



Sydney International Speedway Amendment Report

November 2020



Contents

Executive summary	5
Overview	5
Sydney International Speedway	5
Purpose of this report	7
Proposed amendments	7
Environmental impact assessment	8
Aboriginal heritage	10
Revised environmental mitigation measures	11
Next steps	11
1 Introduction	13
1.1 Overview	13
1.2 Sydney International Speedway	14
1.3 Environmental Impact Statement exhibition	16
1.4 Overview of proposed amendments	16
1.5 Purpose of this Amendment Report	17
2 Methodology	21
2.1 Overview	21
2.2 Assessment of proposed amendments	21
3 Description of proposed amendments	23
3.1 Sydney Dragway ticket office and entryway	23
3.1.1 Description of proposed amendment	23
3.1.2 Environmental Impact screening assessment	24
3.2 Refinements to the construction methodology	26
3.2.1 Description of proposed amendment	26
3.2.2 Environmental impact screening assessment	27
3.3 Reconfiguration of the internal access road and entry to Carpark A	29
3.3.1 Description of proposed amendment	29
3.3.2 Environmental impact screening assessment	30
3.4 Reconfiguration of Carpark D	32
3.4.1 Description of proposed amendment	32
3.4.2 Environmental impact screening assessment	33
3.5 Revised site stormwater and drainage design	35
3.5.1 Description of proposed amendment	35
3.5.2 Environmental impact screening assessment	38
3.6 Modified grandstand facility and inclusion of informal grassed area	40
3.6.1 Description of proposed amendment	40
3.6.2 Environmental impact screening assessment	41
3.7 Amended project footprint	43
4 Environmental impact assessment	45
4.1 Overview	45
4.2 Traffic, transport and parking	46
4.2.1 Overview of Environmental Impact Statement assessment	46
4.2.2 Potential amended construction traffic, transport and parking impacts	46
4.2.3 Management and mitigation measures	49
4.3 Biodiversity	49
4.3.1 Overview of Environmental Impact Statement assessment	49
4.3.2 Existing environment	49
4.3.3 Assessment of potential impacts from proposed amendments	53
4.3.4 Management and mitigation measures	57

4.4	Aboriginal heritage	57
4.4.1	Overview of Environmental Impact Statement assessment	57
4.4.2	Assessment methodology for proposed amendments	58
4.4.3	Additional archaeological survey	58
4.4.4	Significance assessment	59
4.4.5	Potential amended impacts	59
4.4.6	Management and mitigation measures	60
4.5	Soils and surface water quality	60
4.5.1	Overview of Environmental Impact Statement assessment	60
4.5.2	Assessment methodology for proposed amendments	60
4.5.3	Potential amended construction impacts	61
4.5.4	Potential amended operational impacts	62
4.5.5	Management and mitigation measures	62
4.6	Contamination	63
4.6.1	Overview of Environmental Impact Statement assessment	63
4.6.2	Existing environment of proposed amendments	64
4.6.3	Assessment of potential construction impacts from proposed amendments	67
4.6.4	Assessment of potential operational impacts from proposed amendments	67
4.6.5	Management and mitigation measures	67
4.7	Flooding and hydrology	67
4.7.1	Overview of Environmental Impact Statement assessment	67
4.7.2	Assessment methodology for proposed amendments	67
4.7.3	Potential amended operational impacts	68
4.7.4	Management and mitigation measures	72
5	Revised environmental mitigation measures	73
5.1	Revised environmental mitigation and management measures	73
6	Conclusion and next steps	85
7	References	87
	Appendix A – Biodiversity Development Assessment Report	89
	Appendix B – Addendum Aboriginal Cultural Heritage Assessment Report	269

List of Tables

Table E-1:	Native vegetation loss from the exhibited project and the amended project	9
Table 1-1:	Structure and content of this Amendment Report	18
Table 3-1:	Environmental screening – Sydney Dragway ticket office and entryway	25
Table 3-2:	Construction vehicle movements for the importation of structural fill material	26
Table 3-3:	Environmental screening – refinements to the retaining wall construction methodology	28
Table 3-4:	Environmental screening – Configuration of internal access road and entry to Carpark A	31
Table 3-5:	Environmental screening – reconfiguration of Carpark D	34
Table 3-6:	Key components of the revised site stormwater and drainage design	36
Table 3-7:	Blacktown Development Control Plan 2015 required pollutant reduction targets	37
Table 3-8:	Environmental screening – revision of the stormwater management and drainage design	38
Table 3-9:	Environmental screening – modified grandstand and inclusion of a grassed area	41
Table 4-1:	Overview of further environmental assessments required for proposed amendments	45
Table 4-2:	Indicative daily construction vehicle movements (one way)	47
Table 4-3:	Modelled intersection performance during construction in exhibited Environmental Impact Statement and with proposed amendment (2021)	48
Table 4-4:	Additional plant community types and vegetation zones identified in the amended project footprint	50
Table 4-5:	Summary of additional candidate threatened flora species identified for assessment	52
Table 4-6:	Additional threatened fauna species with potential habitat in the project site	53
Table 4-7:	Native vegetation loss from the exhibited project and the amended project	54
Table 4-8:	Comparison of ecosystem credit requirements between the exhibited Environmental Impact Statement and the amended project	57
Table 4-9:	Archaeological survey results of additional areas of project footprint	59
Table 4-10:	Blacktown Development Control Plan 2015 required pollutant reduction targets	61
Table 4-11:	Potential additional surface water impacts during construction from the proposed amendments	61
Table 4-12:	Amended mitigation measures – soils and surface water quality	63
Table 4-13:	Contamination risks within the Sydney Dragway ticket office entryway footprint	65
Table 5-1:	Revised mitigation and management measures	73

List of Figures

Figure E-1: Overview of the project as exhibited in the Environmental Impact Statement	6
Figure E-2: Overview of proposed amendments	8
Figure 1-1: Location of the project	14
Figure 1-2: Sydney International Speedway site layout as exhibited in the Environmental Impact Statement	15
Figure 1-3: Overview of proposed amendments	17
Figure 1-4: The assessment and approvals process for State significant infrastructure projects	19
Figure 3-1: Overview of existing and proposed Sydney Dragway ticket office and entryway	24
Figure 3-2: Heavy vehicle construction routes for the importation of structural fill material	27
Figure 3-3: Overview of the amended internal access road and entry to Carpark A	30
Figure 3-4: Revised configuration of Carpark D (new Dragway parking) compared to footprint as assessed in the Environmental Impact Statement	33
Figure 3-5: Indicative layout of the revised stormwater and drainage infrastructure	37
Figure 3-6: Visual representation of the grandstand design and playground as exhibited in the Environmental Impact Statement	40
Figure 3-7: Visual representation of the proposed grassed area, modified grandstand facility and playground	41
Figure 3-8: Amended project footprint	43
Figure 4-1: Changes to vegetation removal as a result of the proposed amendments	55
Figure 4-2: Overview of archaeological survey area for proposed amendments	58
Figure 4-3: Comparison of flood extents under existing conditions and with the amended project during a one per cent AEP critical median storm event	69
Figure 4-4: Comparison of flood depths over time under existing conditions and with the amended project during a one per cent AEP critical median storm event	70
Figure 4-5: Comparison of flood extents under existing conditions and with the amended project during a one per cent AEP critical storm event	71
Figure 4-6: Comparison of flood depths over time under existing conditions and with the amended project during a one per cent AEP critical storm event	72

Executive summary

Overview

The NSW Government has committed to relocating speedway racing to Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports, creating a true motorplex for the NSW motorsport racing community. The new Sydney International Speedway (the project) would provide the community and racing supporters a unique sporting facility that would cater for local, regional, national, and international racing events while continuing to support the growth of speedway racing in NSW.

The new Sydney International Speedway would be located within Western Sydney Parkland's Precinct 5: Eastern Creek Motor Sports, which sits within the Blacktown Local Government Area, about 32 kilometres west of the Sydney Central Business District. It would be located alongside the existing Sydney Dragway to the north and east and the Sydney Motorsports Park (operated by the Australian Racing Drivers' Club) to the north.

Western Sydney Parklands Trust, in conjunction with the NSW Office of Sport, is leading a masterplanning process for Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports, with opportunities to share infrastructure and coordinate events across the three venues.

The current speedway site, located on Government-owned land at Clyde, is required for a future stabling and maintenance facility for the Sydney Metro West project. Sydney International Speedway is planned to be constructed and operational prior to the start of the speedway racing season in 2021.

The project site is located on land owned and managed by Western Sydney Parklands Trust. The Sydney International Speedway was declared as State significant infrastructure under Section 5.12(4) of the *Environmental Planning and Assessment Act 1979* on October 14 2020. Schedule 4 of the *State Environmental Planning Policy (State and Regional Development) 2011* has been amended to include Sydney International Speedway as State significant infrastructure as a result of this declaration. Sydney Metro is proposing to build the project on behalf of and pursuant to arrangements with Western Sydney Parklands Trust.

Sydney International Speedway

Once complete, the project would include world class racing infrastructure in the form of clay-based racetracks benchmarked to national and international best practice for both speedway vehicles and motorcycles. The following ancillary racing infrastructure would be constructed to support the use of the speedway racetracks:

- New vehicle access to the raceway area via an existing intersection off Ferrers Road
- A racing competitor's pit area in Carpark B, comprising around 150 parking bays for race vehicles and their tenders, including 20 bays for heavy vehicles transporting racing vehicles to and from the speedway and viewing platforms for pit crews
- Workshops/garages and track-side operational support areas to be used by pit crews.

High quality event support infrastructure provided to maximise the spectator experience at speedway events would comprise:

- A grandstand with the capacity to seat around 3750 spectators
- Ticketing and entryway structures
- Spectator facilities, including terraced seating for up to a total of around 7000 spectators, public amenities, corporate boxes, provision for food and beverage operators together with merchandise outlets
- Dedicated parking provided for spectators, visitors and users of the Sydney International Speedway in Carpark A, available for use by other motorsport operators by agreement
- Dedicated parking for Sydney Dragway to replace the existing spectator parking areas which would form part of the Sydney International Speedway project site. The New Dragway Parking in Carparks C and D would be available for use by other motorsport operators by agreement.

Executive Summary

Operational support infrastructure would be provided to enable the operation of the Sydney International Speedway. Such infrastructure would include:

- Public safety including fencing and fire safety systems
- Communications including a fibre optic network (to suit internet broadcasting bandwidth and PA/AV provisions), signage and large broadcasting screens
- Services including the provision of stormwater, drainage and flooding, utilities and lighting.

Construction of the project is expected to take around 13 months to complete. Operation of the new Sydney International Speedway is anticipated to commence in September 2021 with some finishing works occurring concurrently with the commencement of operations.

The following construction activities would be carried out:

- Clearing, earthworks and levelling
- Landforming works
- Establishment of carparks
- Construction of racing and event support infrastructure
- Utilities connections, landscaping and finishing works.

The project's operational site layout as exhibited in the Environmental Impact Statement is provided in Figure E-1. Operation would also include maintenance activities required to support the project.

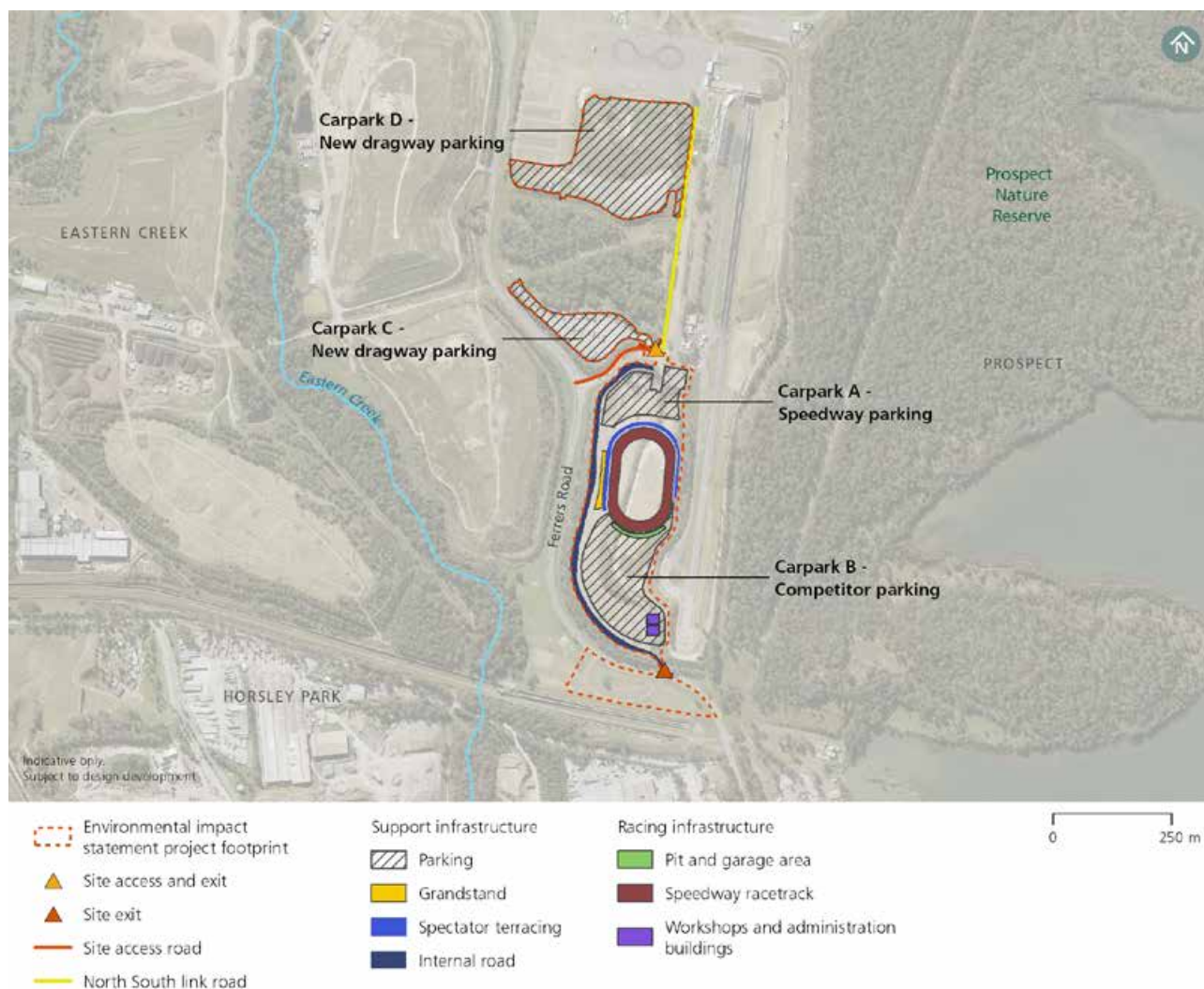


Figure E-1: Overview of the project as exhibited in the Environmental Impact Statement

Purpose of this report

In accordance with Clause 192 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), this Amendment Report has been prepared to assess proposed amendments to the project since the exhibition of the Environmental Impact Statement and identify any associated environmental impacts. The potential environmental impacts are then assessed to determine their significance, and any mitigation or management measures to avoid or minimise the impacts are provided.

A separate Submissions Report (*Sydney International Speedway Submissions Report* (Sydney Metro, 2020)) has been prepared to respond to the issues raised by public authorities, key stakeholders and the community during exhibition of the Environmental Impact Statement. The Submissions Report identifies the issues raised during exhibition and provides responses to these issues.

Proposed amendments

The proposed amendments are a result of continued design development and refinement to minimise environmental impacts and to respond to matters raised in submissions received during the exhibition of the Environmental Impact Statement. An overview of the proposed amendments is shown on Figure E-2, and include:

- Relocation of the Sydney Dragway ticket office and entryway to improve accessibility from the new Dragway parking areas (Carpark C and D)
- Refinements to simplify the construction methodology and make it more efficient, resulting in the need to import structural fill material to the main operational site
- Reconfiguration of the internal road and entry to Carpark A to minimise clearance of native, protected vegetation
- Reconfiguration of Carpark D to accommodate a revised vehicle and pedestrian entry and exit design, to minimise clearance of native, protected vegetation
- Revision of the site stormwater and drainage design to reduce the number of onsite detention tanks required. The revised design includes the installation of a discharge control pit and flow bypass pipe at the existing culvert under Ferrers Road between Carpark C and Carpark D, and a number of batter chutes that take advantage of existing terrain and minimises excavation requirements during construction
- Modification of the southern end of the grandstand facility to remove some corporate box facilities and awning and replacement with a grassed area between the grandstand and playground.

It was identified in the Environmental Impact Statement that opportunities to optimise the project design to minimise the amount of excess cut material were being investigated as part of design development. Since the exhibition of the Environmental Impact Statement, earthworks volumes have been refined and reduced. As a result of the reduced earthworks volumes, the footprint of the area to the south of Ferrers Road has reduced, as shown on Figure 2. Additional information about the reduction in project earthworks volumes is provided in Chapter 2 (Environmental Impact Statement) of the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020).

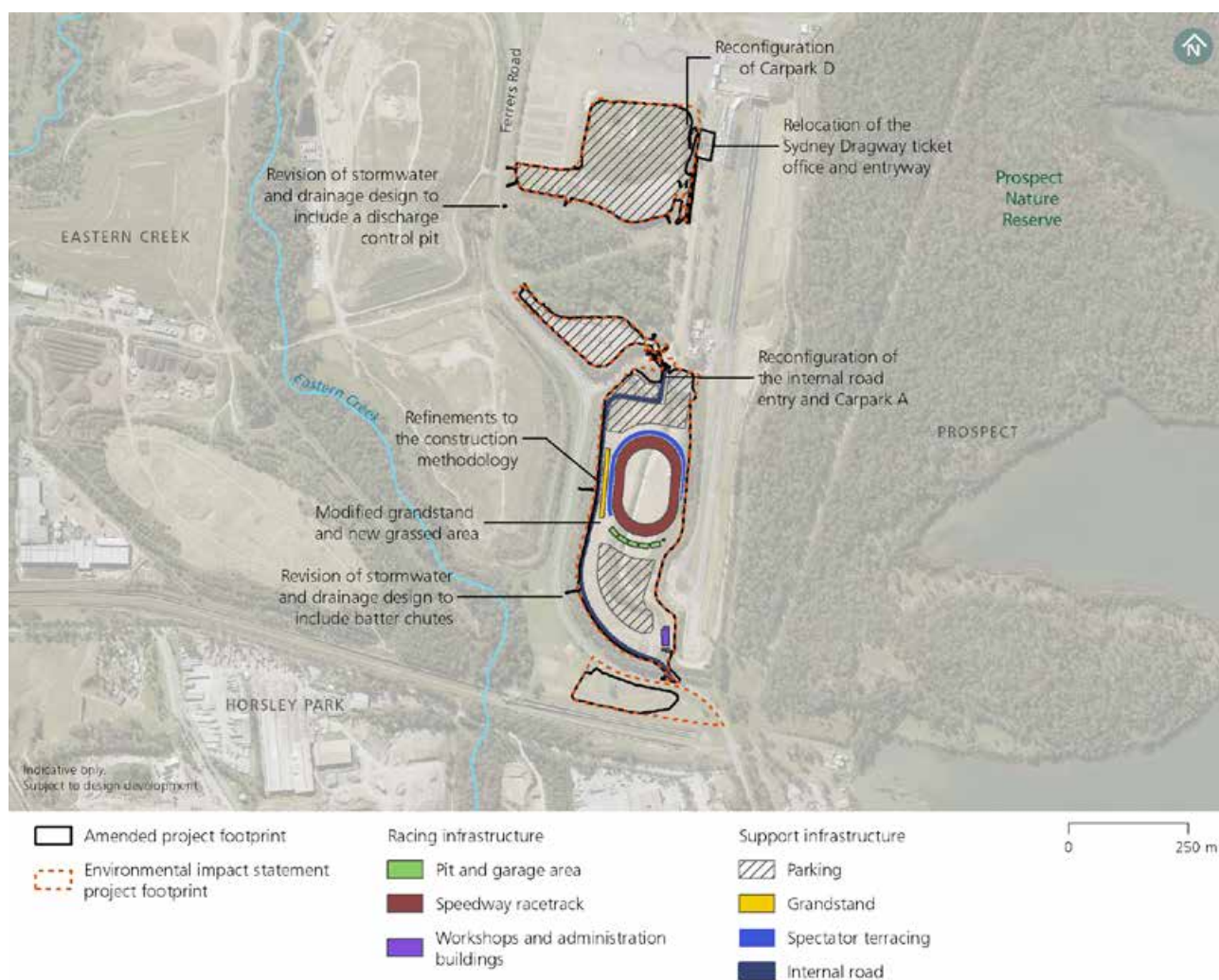


Figure E-2: Overview of proposed amendments

Environmental impact assessment

The inclusion of the proposed amendments may result in additional or modified potential direct and indirect impacts during the construction and operation of the Sydney International Speedway.

An environment screening assessment has been completed for each proposed amendment, considering changes to potential impacts as exhibited in the Environmental Impact Statement as a result of the inclusion of the proposed amendments. The environmental screening assessment identified the need for additional environmental assessment of the proposed amendments and where the assessment in the exhibited Environmental Impact Statement remains applicable. A summary of additional detailed assessments that have been undertaken is provided below.

Traffic, transport and parking

The proposed amendments would not result in a significant change in the construction traffic and transport impacts as identified in the Environmental Impact Statement.

The proposed amendments would result in 85 additional one-way, heavy vehicle movements per day. With the inclusion of additional construction traffic as a result of the proposed amendments, the Great Western Highway/Doonside Road/Brabham Drive intersection would have an additional delay of one second in the weekday evening peak hour compared to the impacts identified in the Environmental Impact Statement. This would mean a total increase in the delay at this intersection of two seconds compared to the without project 2021 scenario, however this would not change the level of service at this intersection compared to the without project scenario.

Biodiversity

The proposed amendments which alter the project footprint would result in an overall reduction in the amount of native vegetation to be directly removed from 0.63 hectares in the Environmental Impact Statement to 0.379 hectares (a reduction of around by 0.251 hectares or about 40 per cent). A summary of the revised impacts to threatened ecological communities as a result of the proposed amendments are provided in Table E-1.

Table E-1: Native vegetation loss from the exhibited project and the amended project

Plant community type	Equivalent threatened ecological community	Conservation status	Environmental Impact Statement clearance amount	Amended project clearance amount	Change in area of impact
Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849)	Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically endangered (BC Act)	0.17	0.079	-0.091
Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850)	Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically endangered (BC Act)	0.46	0.305	-0.155
<i>Phragmites australis</i> and <i>Typha orientalis</i> coastal freshwater wetlands of the Sydney Basin Bioregion (PCT1071)	Plant community type does not meet the definition of a threatened ecological community	–	0	0.001	+0.001
Total			0.63	0.379	-0.251

* The clearance amount for each individual plant community type has been rounded to three decimal places. As a result, the total clearance amount (ha) does not equal the sum of each individual plant community type.

The construction of a drainage pit and flow bypass pipe upstream of the existing culvert under Ferrers Road between Carpark C and D would result in direct instream impacts and an eventual change in the surface water hydrology of the drainage line upstream. The result would be an increase in flood depth during a 50-year flood event and 100-year event, though the time of inundation would be about the same as under existing conditions. This change is considered to be too uncommon and temporary to cause any impact to the structure and function of the surrounding vegetation communities.

Aboriginal heritage

The proposed amendments are not anticipated to impact on any items or areas with potential Aboriginal heritage. Although the proposed amendments would require construction works in areas that were not assessed by the Environmental Impact Statement, a supplementary archaeological field survey of these additional areas of ground disturbance did not identify any new Aboriginal sites and noted that the areas consist of heavily modified and artificial landforms. AHIMS sites and Potential Archaeological Deposits identified in the Environmental Impact Statement area are outside of the construction areas for the proposed amendments.

Soils and surface water quality

An assessment of the revised site stormwater and drainage design for the project with regards to impacts on soils and surface water quality has been completed. This included identification of any additional potential impacts or changes to potential impacts identified within the Environmental Impact Statement and consideration of the criteria identified in *Part J: Water Sensitive Urban Design and Integrated Water Cycle Management* of the *Blacktown Development Control Plan 2015*.

Additional potential erosion and sedimentation impacts from the proposed amendments during construction would be managed by local erosion and sediment control measures as per the Environmental Impact Statement and would be limited to disturbance of topsoil during excavation of the stormwater control structures. There is also potential for disturbance of soils or streambed sediments should instream works be required for the new discharge control pit and flow bypass pipe where water and flow are present.

The potential risks to surface water quality during operation of the Sydney International Speedway are consistent with those identified in the Environmental Impact Statement and are associated with potential runoff of pollutants from new impervious surfaces. The proposed amendment would remove the proposed on-site detention tanks associated with Carparks A, C and D. The water quality measures for these car parks would be developed during detailed design taking into consideration the criteria taken from *Part J: Water Sensitive Urban Design and Integrated Water Cycle Management* of the *Blacktown Development Control Plan 2015*.

Contamination

Potential construction and operational impacts as they relate to contamination would be consistent with those presented in Section 14.5 of the Environmental Impact Statement and as updated in Section 2.3 of the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020).

A site inspection by a contamination specialist to make observations about the current conditions and adjacent land uses for the amended project footprint with respect to potential contamination was carried out for the relocated Sydney Dragway ticket office and entryway structure footprint, as this area of the amended project footprint is outside of the project footprint assessed with regards to contamination in the Environmental Impact Statement. The site inspection identified the following potential contaminant sources within the additional site area, consistent with the revised contaminants of potential concern included in the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020):

- Localised soil contamination from waste storage on site
- Soil contamination from unknown fill material.
- Groundwater contamination from unknown fill material.

Consistent with the revised assessment of potential contamination risk included in the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020), the relocated Sydney Dragway ticket office and entryway area of the amendment project footprint would have a low to moderate risk of potential existing contamination.

Flooding and hydrology

The revised stormwater and drainage design would prevent floodwaters from overtopping Ferrers Road in the area between Carpark C and D during a one per cent AEP event, consistent with the Environmental Impact Statement.

The revised stormwater and drainage design would result in minor increases in flood extents upstream of the culvert on Ferrers Road during the one percent flood event, in comparison to existing conditions. Flood depths would increase by up to 1.1 metres. The duration of inundation is expected to increase by an additional 12 minutes compared to existing conditions critical median storm event (25 minute duration). There would be no impacts to flooding downstream of the project site.

Revised environmental mitigation measures

Some new mitigation measures have been added, and some existing mitigation and management measures have been adjusted in accordance with the proposed amendments. Revised measures relate to:

- Changes to the proposed surface water quality monitoring regime during construction and operation of the project
- The avoidance of water quality impacts associated with concrete waste
- Water quality treatment infrastructure to manage the discharge from the project site during operation
- The revision of contamination measures to more appropriately reflect the potential contamination risk across the project site following additional site investigations.

Next steps

The Department of Planning, Industry and Environment will consider this Amendment Report along with the Environmental Impact Statement, submissions received and the Submissions Report during its assessment of the Sydney International Speedway. The Planning Secretary will prepare an environmental assessment report in accordance with Section 5.18 of the EP&A Act. The Minister for Planning and Public Spaces (or their delegate) will then decide whether or not to approve Sydney International Speedway and identify any conditions of approval that would apply.

If the project is approved by the Department of Planning, Industry and Environment, Sydney Metro would continue to consult with community members, government agencies and stakeholders during the detailed design and construction phases of the project to minimise potential impacts on the local environment and community.

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1 Introduction

This chapter provides an overview of Sydney International Speedway, including the Environmental Impact Statement exhibition and the proposed amendments to the project as exhibited, and sets out the purpose of this Amendment Report.

1.1 Overview

The NSW Government has committed to relocating speedway racing to Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports, creating a true motorplex for the NSW motorsport racing community. The new Sydney International Speedway (the project) would provide the community and racing supporters a unique sporting facility that would cater for local, regional, national, and international racing events while continuing to support the growth of speedway racing in NSW.

The location of the new speedway is shown on Figure 1-1. The project would be located alongside the existing Sydney Dragway to the north and east and the Sydney Motorsports Park (operated by the Australian Racing Drivers' Club) to the north.

Western Sydney Parklands Trust in conjunction with the NSW Office of Sport, is leading a masterplanning process for Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports, with opportunities to share infrastructure and coordinate events across the three venues.

The current speedway site, located on Government-owned land at Clyde, is required for a future stabling and maintenance facility for the Sydney Metro West project. The project is planned to be constructed and operational prior to the start of the speedway racing season in 2021.

The project site is located on land owned and managed by Western Sydney Parklands Trust. The Sydney International Speedway was declared as State significant infrastructure under Section 5.12(4) of the *Environmental Planning and Assessment Act 1979* on October 14 2020. Schedule 4 of the *State Environmental Planning Policy (State and Regional Development) 2011* has been amended to include Sydney International Speedway as State significant infrastructure as a result of this declaration. Sydney Metro is proposing to build the project on behalf of and pursuant to arrangements with Western Sydney Parklands Trust.

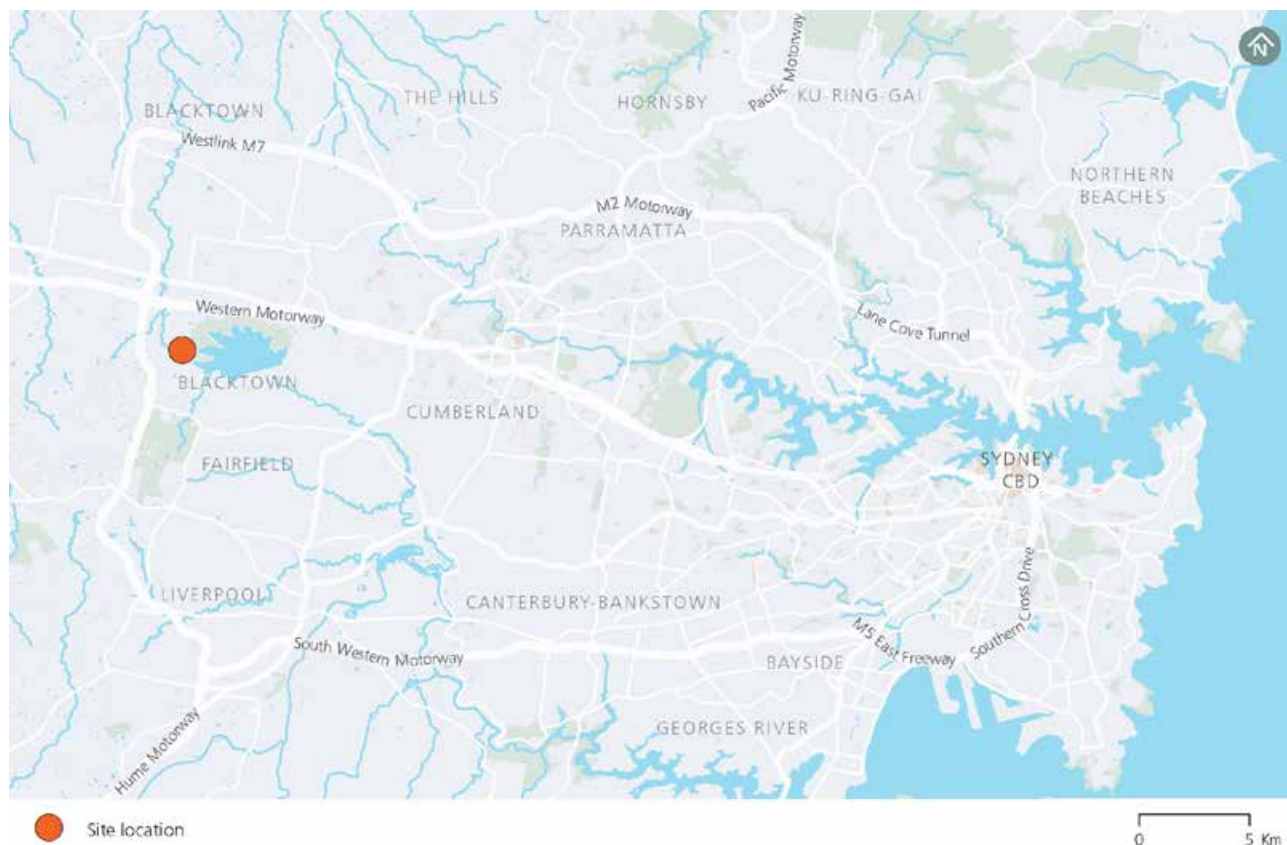


Figure 1-1: Location of the project

1.2 Sydney International Speedway

Once complete, the project would include world class racing infrastructure in the form of clay-based racetracks benchmarked to national and international best practice for both speedway vehicles and motorcycles. The following ancillary racing infrastructure would be constructed to support the use of the speedway racetracks:

- New vehicle access to the raceway area via an existing intersection off Ferrers Road
- A racing competitor's pit area in Carpark B, comprising around 150 parking bays for race vehicles and their tenders, including 20 bays for heavy vehicles transporting racing vehicles to and from the speedway and viewing platforms for pit crews
- Workshops/garages and track-side operational support areas to be used by pit crews.

High quality event support infrastructure provided to maximise the spectator experience at speedway events would comprise:

- A grandstand with the capacity to seat around 3750 spectators
- Ticketing and entryway structures
- Spectator facilities, including terraced seating for up to a total of around 7000 spectators, public amenities, corporate boxes, provision for food and beverage operators together with merchandise outlets
- Dedicated parking provided for spectators, visitors and users of the Sydney International Speedway in Carpark A, available for use by other motorsport operators by agreement
- Dedicated parking for Sydney Dragway to replace the existing spectator parking areas which would form part of the Sydney International Speedway project site. The New Dragway Parking in Carparks C and D would be available for use by other motorsport operators by agreement.

Operational support infrastructure would be provided to enable the operation of the Sydney International Speedway. Such infrastructure would include:

- Public safety including fencing and fire safety systems
- Communications including a fibre optic network (to suit internet broadcasting bandwidth and PA/AV provisions), signage and large broadcasting screens
- Services including the provision of stormwater, drainage and flooding, utilities and lighting.

The operational site layout is shown on Figure 1-2. Operation would also include maintenance activities required to support the project.

Construction of the project is expected to take around 13 months to complete. Operation of the new Sydney International Speedway is anticipated to commence in September 2021 with some finishing works occurring concurrently with the commencement of operations.

The following construction activities would be carried out:

- Clearing, earthworks and levelling
- Landforming works
- Establishment of carparks
- Construction of racing and event support infrastructure
- Utilities connections, landscaping and finishing works.

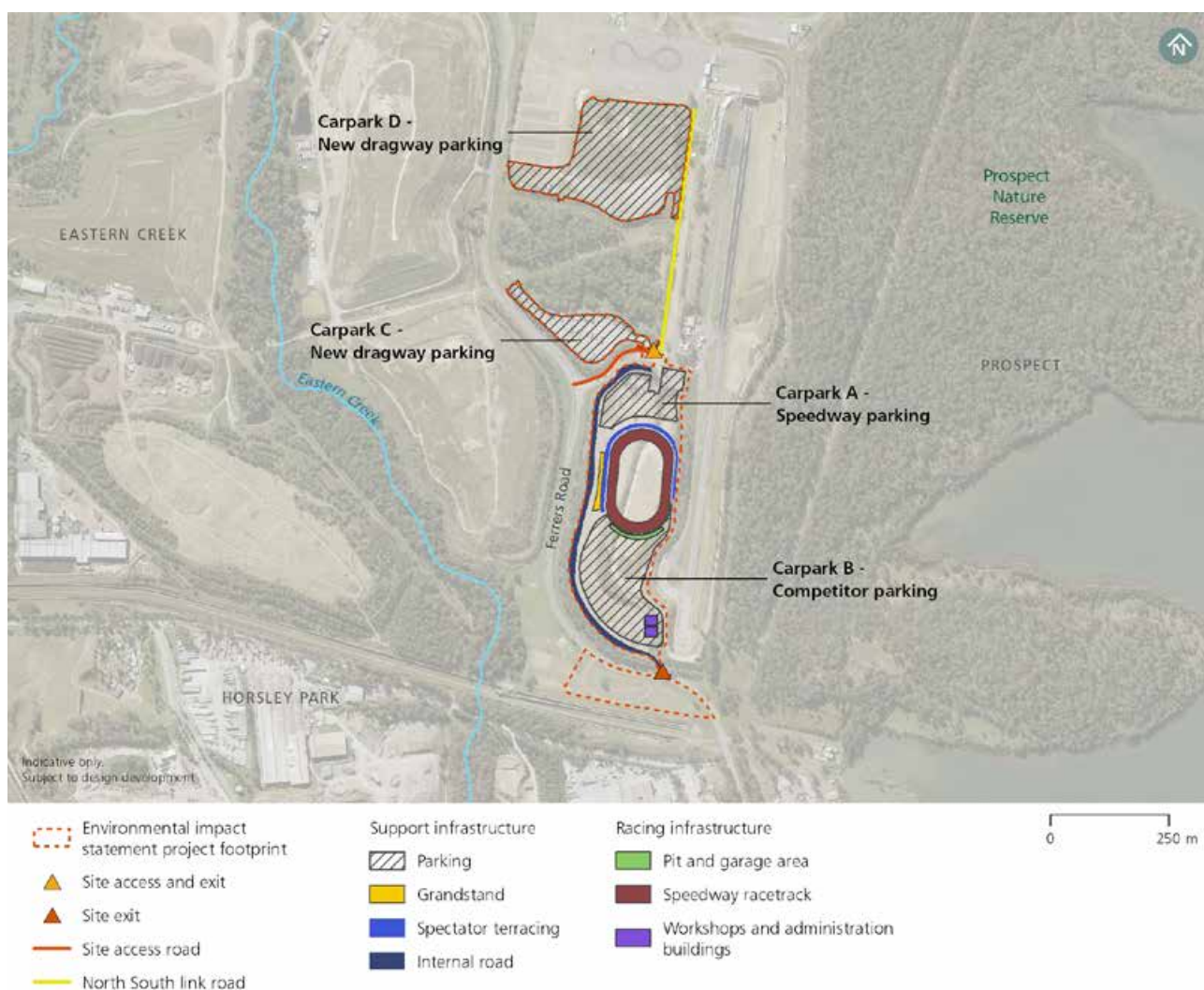


Figure 1-2: Sydney International Speedway site layout as exhibited in the Environmental Impact Statement

1.3 Environmental Impact Statement exhibition

The Environmental Impact Statement for the project was placed on public exhibition for review and comment for four weeks from 19 August 2020 to 16 September 2020.

A Submissions Report (*Sydney International Speedway Submissions Report* (Sydney Metro, 2020)) has been prepared to respond to the issues raised by public authorities, key stakeholders and the community during exhibition of the Environmental Impact Statement. The Submissions Report identifies the issues raised during exhibition and provides responses to these issues.

1.4 Overview of proposed amendments

The following proposed amendments to the project as exhibited in the Environmental Impact Statement, a number of which result in changes to the project footprint, are a result of continued design development and refinement:

- Relocation of Sydney Dragway ticket office and entryway to improve accessibility from the new Dragway parking areas (Carpark C and D)
- Refinements to simplify the construction methodology and make it more efficient, resulting in the need to import structural fill material to the main operational site
- Reconfiguration of the internal road and entry to Carpark A to minimise clearance of native, protected vegetation
- Reconfiguration of Carpark D to accommodate a revised vehicle and pedestrian entry and exit design, which minimises the amount of clearance of native, protected vegetation
- Revision of the site stormwater and drainage design to reduce the number of onsite detention tanks required. The revised design includes the installation of a discharge control pit and flow bypass pipe at the existing culvert under Ferrers Road between Carpark C and Carpark D, and a number of batter chutes that take advantage of existing terrain and minimises excavation requirements during construction.
- Modification of the southern end of the grandstand facility to remove some corporate box facilities and awning and replacement with an informal family seating area between the grandstand and playground.

An overview of the proposed amendments is shown on Figure 1-3. A description of the proposed amendments, along with a comparison of the amendments with the relevant aspects of the exhibited Environmental Impact Statement is provided in Chapter 3 (Description of proposed amendments) of this Amendment Report.

It was identified in the Environmental Impact Statement that opportunities to optimise the project design to minimise the amount of excess cut material were being investigated as part of design development. Since the exhibition of the Environmental Impact Statement, earthworks volumes have been refined and reduced. As a result of the reduced earthworks volumes, the footprint of the area to the south of Ferrers Road has reduced, as shown on Figure 1-3. Additional information about the reduction in project earthworks volumes is provided in Chapter 2 (Environmental Impact Statement) of the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020).

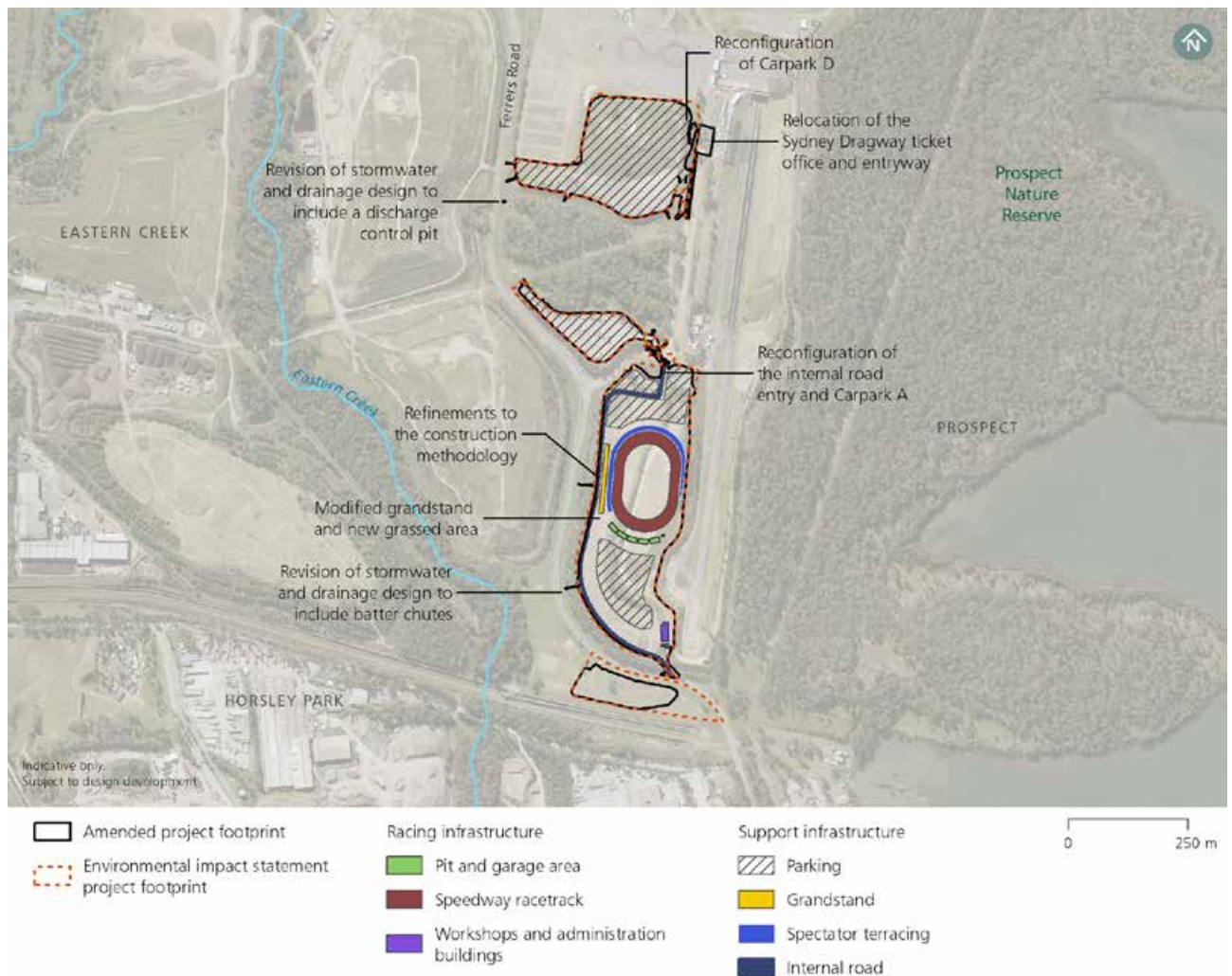


Figure 1-3: Overview of proposed amendments

1.5 Purpose of this Amendment Report

In accordance with Clause 192 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), this Amendment Report has been prepared to assess proposed amendments to the project since the exhibition of the Environmental Impact Statement.

The purpose of this Amendment Report is to outline the proposed amendments since exhibition of the Environmental Impact Statement and identify any associated environmental impacts. The potential environmental impacts are then assessed to determine their significance, and any mitigation or management measures to avoid or minimise the impacts are provided. The structure and content of this report are outlined in Table 1-1. Where required, additional technical information to support the environmental impact assessment of the proposed amendments are appended to this Amendment Report.

Table 1-1: Structure and content of this Amendment Report

Chapter		Description
Chapter 1	Introduction (this chapter)	Outlines the key features of the project as exhibited in the Environmental Impact Statement, introduces the proposed amendments to the design since exhibition of the Environmental Impact Statement and sets out the purpose of this Amendment Report.
Chapter 2	Methodology	Describes the methodology used for the environmental impact assessment of the proposed amendments.
Chapter 3	Description of proposed amendments	Describes the proposed amendments to the project and provides a high level screening assessment of each proposed amendment to identify any potential environmental impacts associated with each amendment that requires further detailed environmental assessment.
Chapter 4	Environmental impact assessment	Provides additional environmental assessment of the potential direct and indirect impacts that may occur from the inclusion of the proposed amendments during construction and operation of the Sydney International Speedway.
Chapter 5	Revised mitigation and management measures	Provides a revised compilation of environmental mitigation and management measures for the project, including any changes as a result of the environmental assessment of the proposed amendments.
Chapter 6	Conclusion and next steps	Provides a summary and conclusion of the Amendment Report and sets out the next steps of the environmental assessment process for the project.

Figure 1-4 presents the assessment and approval process. Following the preparation of the Amendment Report and the *Sydney International Speedway* Submissions Report (Sydney Metro, 2020), an assessment will be carried out by the Department of Planning, Industry and Environment, and a Secretary's Environmental Assessment Report will be prepared. The Minister for Planning and Public Spaces or a delegate will then make a determination on the project and identify any conditions of approval which would apply.



Figure 1-4: The assessment and approvals process for State significant infrastructure projects

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2 Methodology

This chapter describes how the proposed amendments have been assessed within this Amendment Report

2.1 Overview

The assessment of potential environmental impacts in the exhibited Environmental Impact Statement was based on the concept design for the project. The design development and refinement process has been ongoing throughout the preparation and exhibition of the Environmental Impact Statement, resulting in proposed amendments to the design and construction of the project as exhibited.

More detailed information relating to the proposed amendments is provided in Chapter 3 (Description of proposed amendments) of this Amendment Report.

2.2 Assessment of proposed amendments

The *Sydney International Speedway Environmental Impact Statement* (Sydney Metro, 2020) provided an assessment of the key and other issues as defined in the Secretary's Environmental Assessment Requirements for the project (dated 19 May 2020). The outcome of this assessment is detailed in Chapters 6 to 23 of the exhibited Environmental Impact Statement.

An environmental impact screening assessment has been carried out as part of this Amendment Report to determine whether the proposed amendments would result in any consequential changes to the potential impacts of construction and operation of the Sydney International Speedway as presented in the exhibited Environmental Impact Statement.

An environmental impact screening assessment is provided for each proposed amendment in Chapter 3 (Description of proposed amendments). Where the initial screening assessment identified that the proposed amendments were unlikely to result in a change to the potential impacts as presented in the exhibited Environmental Impact Statement, no further assessment was required. Additional environmental impact assessment has been provided in Chapter 4 (Environmental impact assessment) where a potential change to impact was identified in the environmental impact screening as a result of one or more proposed amendments. This impact assessment has been undertaken using the same methodology as outlined in the Environmental Impact Statement (unless otherwise stated).

Where potential environmental impacts may change from those described in the Environmental Impact Statement, the assessment should be read in conjunction with the Environmental Impact Statement and the corresponding Technical Paper of the Environmental Impact Statement, where relevant.

In some instances, the additional assessment has resulted in the need for revised environmental mitigation measure(s). A compilation of revised environmental mitigation measures has been provided in Chapter 5 (Revised environmental mitigation measures) of this Amendment Report, which also includes revised measures required as a result of the response to submissions, as identified in the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020).

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3 Description of proposed amendments

This chapter provides a description of the proposed amendments to the Sydney International Speedway as exhibited in the Environmental Impact Statement. This chapter also provides an environmental impact screening assessment to determine whether the proposed amendments require additional environmental assessment.

3.1 Sydney Dragway ticket office and entryway

3.1.1 Description of proposed amendment

The project as exhibited in the Environmental Impact Statement includes the provision of dedicated Sydney Dragway parking spaces within Carpark C and D to replace the existing spectator parking areas that would form part of the Sydney International Speedway project site (refer to Figure 1-2). Ongoing consultation with Sydney Dragway has identified that the new layout and configuration of the Sydney Dragway parking means that the existing ticket office and entry, located at the southern end of the dragstrip (and east of Carpark C) is in a location which is not easily accessible from the proposed parking areas. As a result, the ticket office and entryway structure is proposed to be relocated to the east of Carpark D and the north-south link road. The relocated ticket office and entryway structure would provide a more efficient and accessible pedestrian route between the car parking areas and the Sydney Dragway.

The proposed amendment consists of:

- A new pedestrian access from Carpark C, footpaths and concrete ramps
- A new ticket office and turnstiles
- A new formal entryway into the Sydney Dragway site
- Supporting infrastructure including landscaping, signage and pedestrian infrastructure.

The location of the existing Sydney Dragway entry and proposed amendment are shown on Figure 3-1.

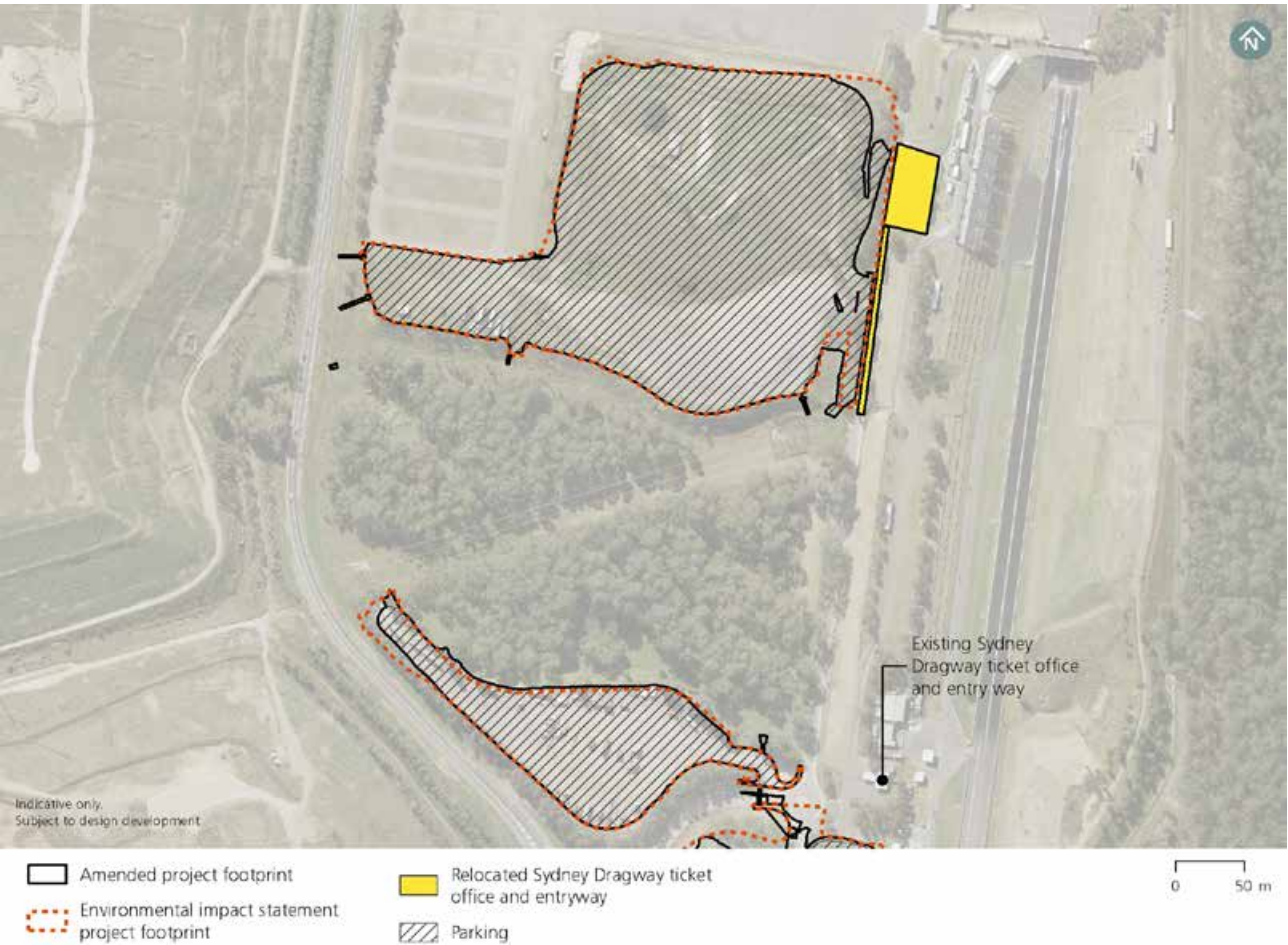


Figure 3-1: Overview of existing and proposed Sydney Dragway ticket office and entryway

3.1.2 Environmental Impact screening assessment

This screening assessment considers changes to potential impacts as exhibited in the Environmental Impact Statement, as a result of the inclusion of the relocated Sydney Dragway ticket office and entryway structure as part of the project. Table 3-1 identifies where the need for additional environmental assessment of the proposed amendment has been identified and where the assessment in the exhibited Environmental Impact Statement remains applicable in relation to the proposed amendment. Where further detailed assessment is required, this, along with any revised environmental mitigation measures, are provided in Chapter 4 (Environmental impact assessment) of this Amendment Report.

Table 3-1: Environmental screening –Sydney Dragway ticket office and entryway

Environmental aspect	Comparison of potential impacts of proposed amendment against exhibited Environmental Impact Statement	Further detailed assessment required?
Traffic, transport and parking	Traffic, transport and parking impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Noise and vibration	Noise and vibration impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Biodiversity	The relocated Sydney Dragway ticket office and entryway structure would alter the project footprint as exhibited in the Environmental Impact Statement and minor additional clearing may be required. As a result, additional assessment of potential impacts is required.	Yes
Air quality	Air quality impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Aboriginal heritage	The relocated Sydney Dragway ticket office and entryway structure would not be located in areas of PAD identified as part of the Environmental Impact Statement or be located near previously registered Aboriginal Heritage Information Management Systems (AHIMS) sites. The ticket office and entryway structure would be located outside of the study area of the ACHAR as included in the Environmental Impact Statement. As a result, additional assessment of potential impacts is required.	Yes
Non-Aboriginal heritage	Impacts to non-Aboriginal heritage from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Landscape character and visual amenity	This proposed amendment would not be visible from the viewpoints assessed in the Environmental Impact Statement. The landscape character and visual amenity impacts would be consistent with those assessed in the Environmental Impact Statement.	No
Soils and surface water quality	Impacts to soils and surface water quality from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Contamination	The relocated Sydney Dragway ticket office and entryway would be located outside of the footprint assessed in the Environmental Impact Statement. There is the potential that existing contamination from historic land use is present in the areas of the proposed amendment. As a result, additional assessment of potential impacts is required.	Yes
Groundwater and geology	Impacts to groundwater and geology from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Flooding and hydrology	Impacts to flooding and hydrology from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Socio-economics	The relocated Sydney Dragway ticket office and entryway would have a beneficial socio-economic outcome for visitors to Sydney Dragway. The inclusion of this proposed amendment would be consistent with the assessment of significance of socio-economic impact included in the Environmental Impact Statement.	No

Environmental aspect	Comparison of potential impacts of proposed amendment against exhibited Environmental Impact Statement	Further detailed assessment required?
Property and land use	Impacts to property and land use from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Hazards	Hazards and risk from the proposed amendment would be consistent with those identified and assessed in the Environmental Impact Statement.	No
Greenhouse gas and energy	Greenhouse gas impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Climate change adaptation	Climate change adaptation impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Waste management and resource use	Waste management and resource use impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Cumulative impacts	Cumulative impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No

3.2 Refinements to the construction methodology

3.2.1 Description of proposed amendment

Continued refinement of the project construction methodology has identified an alternative construction method for the retaining wall along the western boundary of the site which provides a simpler and more efficient construction approach that means a shorter duration of impacts associated with the construction of the retaining wall. The refined construction methodology includes the construction of a reinforced earth retaining wall, instead of using expanded polystyrene (EPS) blocks. This revised construction method requires some structural fill to be imported as the material to be excavated across the project site would not be of a suitable composition. A summary of the average hourly and daily totals of additional heavy vehicle movements associated with the need to import structural fill is summarised in Table 3-2. The refinements to the construction methodology would not result in any changes to the predicted construction light vehicle movements.

It is estimated that over the construction period, heavy vehicle movements for the import of structural fill material would be required across about 15 days, where construction is being completed 24 hours a day, seven days per week.

Table 3-2: Construction vehicle movements for the importation of structural fill material

Activity	Indicative total movements per hour (one way)	Indicative total vehicle movements per day (one way)*
Importation of select fill	4	86

* Based on vehicle movements being undertaken on 21 hours a day over each 24 hour period

It is assumed that heavy vehicles importing the fill material would access the site via the northerly haulage route identified in the Environmental Impact Statement. Consistent with Chapter 6 (Traffic, transport and parking) of the Environmental Impact Statement, vehicles would approach from the M4 Western Motorway travelling westwards, exiting the motorway at the interchange with Reservoir Road and travelling west along Peter Brock Drive and south along Ferrers Road to access the project site. Heavy vehicles leaving the project site would turn right at the site access road and travel north along Ferrers Road and Brabham Drive to access the Great Western Highway, and then travel eastwards along the M4 Western Motorway. An overview of the heavy vehicle access and egress routes for the importation of select fill material as a result of refinements to the construction methodology are provided in Figure 3-2.

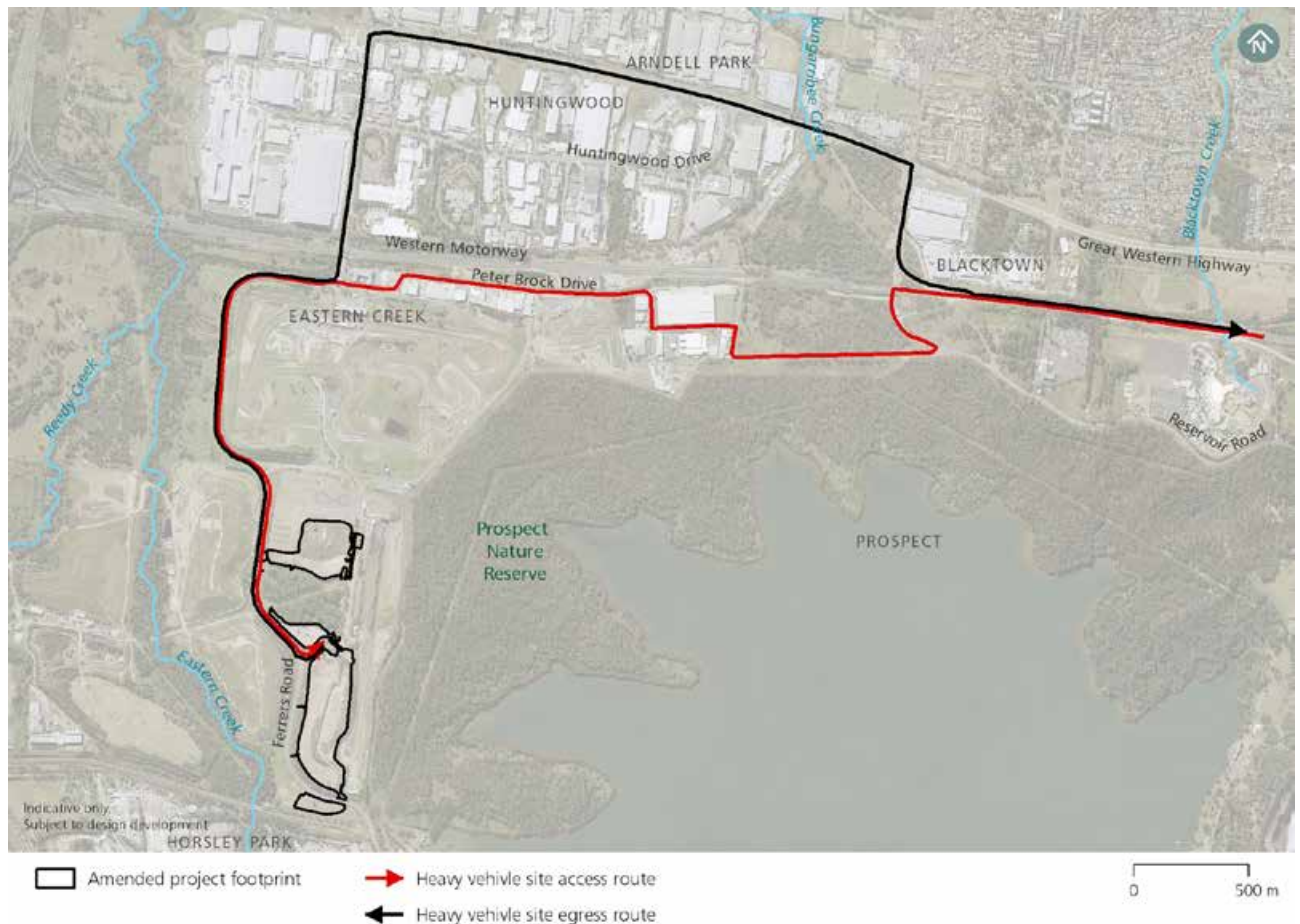


Figure 3-2: Heavy vehicle construction routes for the importation of structural fill material

3.2.2 Environmental impact screening assessment

This screening assessment considers changes to potential impacts as exhibited in the Environmental Impact Statement, as a result of refinements to the construction methodology for the project. Table 3-3 identifies where the need for additional environmental assessment of the proposed amendment has been identified and where the assessment in the exhibited Environmental Impact Statement remains applicable in relation to the proposed amendment. Where further detailed assessment is required, this, along with any revised environmental mitigation measures, are provided in Chapter 4 of this Amendment Report.

Table 3-3: Environmental screening – refinements to the retaining wall construction methodology

Environmental aspect	Comparison of potential impacts of proposed amendment against exhibited Environmental Impact Statement	Further detailed assessment required?
Traffic, transport and parking	This proposed amendment would increase the number of vehicle movements to and from the project site during construction compared to the numbers reported and assessed in the exhibited Environmental Impact Statement. As a result, additional assessment of potential impacts is required.	Yes
Noise and vibration	Noise and vibration impacts from plant and equipment required for the refined construction methodology would be consistent with those assessed in the Environmental Impact Statement.	No
Biodiversity	Impacts to biodiversity from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Air quality	Air quality impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Aboriginal heritage	Impacts to Aboriginal heritage from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Non-Aboriginal heritage	Impacts to non-Aboriginal heritage from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Landscape character and visual amenity	The landscape character and visual amenity impacts would be consistent with those assessed in the Environmental Impact Statement.	No
Soils and surface water quality	Impacts to soils and surface water quality from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Contamination	Contamination risks associated with this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Groundwater and geology	Impacts to groundwater and geology from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Flooding and hydrology	Impacts to flooding and hydrology from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Socio-economics	The inclusion of this proposed amendment would be consistent with the assessment of significance of socio-economic impact included in the Environmental Impact Statement.	No
Property and land use	Impacts to property and land use from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Hazards	Hazards and risk from the proposed amendment would be consistent with those identified and assessed in the Environmental Impact Statement.	No

Environmental aspect	Comparison of potential impacts of proposed amendment against exhibited Environmental Impact Statement	Further detailed assessment required?
Greenhouse gas and energy	Greenhouse gas impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Climate change adaptation	Climate change adaptation impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Waste management and resource use	Waste management and resource use impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Cumulative impacts	Cumulative impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No

3.3 Reconfiguration of the internal access road and entry to Carpark A

3.3.1 Description of proposed amendment

Vehicle access to the main operational site as included in the Environmental Impact Statement was via a single connection to the existing roundabout located along the site access road. From the roundabout, the access road separates into two roads; one providing access to Carpark A, and one forming the internal one-way road along the western boundary of the main operational site, to provide access to the competitor pit area, Carpark B and the new left-only exit in the south of the main operational site.

Further design development since the preparation of the Environmental Impact Statement has included reconfiguration of the internal access road design to minimise the environmental impacts of this proposed amendments, namely through a reduction in the amount of clearance of native, protected vegetation near the entry to the main operational site. All vehicles accessing the main operational site would continue to do so via a single connection with the existing roundabout along the site access road. However, all vehicles would then travel into Carpark A to either park (if visitors/spectators to the Sydney International Speedway), or would travel through Carpark A to access the internal access road via a gate at the western end of Carpark A to travel along the internal one-way access road along the western boundary of the project site to the competitor pit area, Carpark B and the new exit in the south.

An overview of the reconfigured internal access road and entry to Carpark A is shown in Figure 3-3.



Figure 3-3: Overview of the amended internal access road and entry to Carpark A

3.3.2 Environmental impact screening assessment

This screening assessment considers changes to potential impacts as exhibited in the Environmental Impact Statement, as a result of the amended configuration of the internal access road and entry to Carpark A. Table 3-4 describes where the need for additional environmental assessment of the proposed amendment has been identified and where the assessment in the exhibited Environmental Impact Statement remains applicable in relation to the proposed amendment. Where further detailed assessment is required, this, along with any revised environmental mitigation measures, are provided in Chapter 4 of this Amendment Report.

Table 3-4: Environmental screening – Configuration of internal access road and entry to Carpark A

Environmental aspect	Comparison of potential impacts of proposed amendment against exhibited Environmental Impact Statement	Further detailed assessment required?
Traffic, transport and parking	Traffic, transport and parking impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Noise and vibration	Noise and vibration impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Biodiversity	The amended configuration of the internal access road and entry to Carpark A would alter the project footprint as exhibited in the Environmental Impact Statement by reducing the amount of native, protected vegetation that would require clearance to accommodate the project. As a result, additional assessment of potential impacts is required.	Yes
Air quality	Air quality impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Aboriginal heritage	Impacts to Aboriginal heritage from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Non-Aboriginal heritage	Impacts to non-Aboriginal heritage from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Landscape character and visual amenity	The landscape character and visual amenity impacts would be consistent with those assessed in the Environmental Impact Statement.	No
Soils and surface water quality	Impacts to soils and surface water quality from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Contamination	The potential contamination risks as a result of this proposed amendment would be consistent with those assessed in the Environmental Impact Statement	No
Groundwater and geology	Impacts to groundwater and geology from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Flooding and hydrology	Impacts to flooding and hydrology from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Socio-economics	Socio-economic impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Property and land use	Impacts to property and land use from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Hazards	Hazards and risk from the proposed amendment would be consistent with those identified and assessed in the Environmental Impact Statement.	No

Environmental aspect	Comparison of potential impacts of proposed amendment against exhibited Environmental Impact Statement	Further detailed assessment required?
Greenhouse gas and energy	Greenhouse gas impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Climate change adaptation	Climate change adaptation impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Waste management and resource use	Waste management and resource use impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Cumulative impacts	Cumulative impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No

3.4 Reconfiguration of Carpark D

3.4.1 Description of proposed amendment

The project as included in the exhibited Environmental Impact Statement includes the establishment of Carpark D, forming a new area of dedicated Sydney Dragway parking to replace existing parking areas that would form part of the Sydney International Speedway project site. Carpark D is described in Section 5.3.1 and shown on Figure 5-2 of the Environmental Impact Statement.

As part of this proposed amendment, the layout of Carpark D has been amended to accommodate a revised vehicle and pedestrian entry and exit design along the eastern boundary of the carpark and minimise the amount of clearance of native, protected vegetation. The revised design would result in a reduction in the project footprint at this location when compared to the footprint described and assessed in the exhibited Environmental Impact Statement.

Carpark D would still provide around 1760 carparking spaces, as included in the Environmental Impact Statement.

A comparison of the footprint of Carpark D as assessed in the Environmental Impact Statement and the amended design is shown on Figure 3-4.



Figure 3-4: Revised configuration of Carpark D (new Dragway parking) compared to footprint as assessed in the Environmental Impact Statement

3.4.2 Environmental impact screening assessment

This screening assessment considers changes to potential impacts as exhibited in the Environmental Impact Statement, as a result of the revised configuration of Carpark D. Table 3-5 describes where the need for additional environmental assessment of the proposed amendment has been identified and where the assessment in the exhibited Environmental Impact Statement remains applicable in relation to the proposed amendment. Where further detailed assessment is required, this, along with any revised environmental mitigation measures, are provided in Chapter 4 of this Amendment Report.

Table 3-5: Environmental screening – reconfiguration of Carpark D

Environmental aspect	Comparison of potential impacts of proposed amendment against exhibited Environmental Impact Statement	Further detailed assessment required?
Traffic, transport and parking	The proposed amendment would result in the provision of around the same number of parking spaces within Carpark D compared to the design assessed in the Environmental Impact Statement. Traffic, transport and parking impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Noise and vibration	Noise and vibration impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Biodiversity	The proposed amendment would alter the project footprint as exhibited in the Environmental Impact Statement, resulting in a reduction in the amount of native, protected vegetation clearance required for the project. As a result, additional assessment of potential impacts is required.	Yes
Air quality	Air quality impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Aboriginal heritage	Impacts to Aboriginal heritage from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Non-Aboriginal heritage	Impacts to non-Aboriginal heritage from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Landscape character and visual amenity	This proposed amendment would not be visible from the viewpoints assessed in the Environmental Impact Statement. The landscape character and visual amenity impacts would be consistent with those assessed in the Environmental Impact Statement.	No
Soils and surface water quality	Impacts to soils and surface water quality from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Contamination	Existing contamination risks and potential impacts associated with the generation of contamination from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Groundwater and geology	Impacts to groundwater and geology from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Flooding and hydrology	Impacts to flooding and hydrology from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Socio-economics	Socio-economic impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Property and land use	Impacts to property and land use from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No

Environmental aspect	Comparison of potential impacts of proposed amendment against exhibited Environmental Impact Statement	Further detailed assessment required?
Hazards	Hazards and risk from the proposed amendment would be consistent with those identified and assessed in the Environmental Impact Statement.	No
Greenhouse gas and energy	Greenhouse gas impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Climate change adaptation	Climate change adaptation impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Waste management and resource use	Waste management and resource use impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Cumulative impacts	Cumulative impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No

3.5 Revised site stormwater and drainage design

3.5.1 Description of proposed amendment

The project includes the construction and operation of stormwater and drainage infrastructure to support the operation of the Sydney International Speedway.

The exhibited Environmental Impact Statement described the stormwater management as a pit and pipe system that would be installed across the project site to collect and transport stormwater runoff into stormwater drains. Water would then flow to on-site detention tanks located across the project site before being treated (as required). Stormwater runoff would ultimately be discharged from the project site into existing culverts which flow underneath Ferrers Road, and discharge into local waterways.

Some of the onsite detention tanks on the main operational site would also function as rainwater harvesting tanks, to collect and store runoff from the grandstand roof for non potable uses within the project site.

As part of this proposed amendment, the stormwater management and drainage design has been revised to reduce the number of onsite detention tanks within the project site, reducing excavation across the project site and minimising potential construction impacts relating to groundwater, contamination and soils. Instead, the pit and pipe drainage system would direct runoff through a series of drains and to a number of batter chutes along the boundaries of the project site.

Runoff from Carparks A, C and D would be captured within the project site in drainage channels and discharged offsite through batter chutes located along the northern boundary of Carpark C and the southern boundary of Carpark D. Water discharged offsite would flow into existing offsite vegetated swales and natural drainage channels to a 2.5 metre high discharge control pit, fitted with a low flow bypass pipe which would be installed upstream of the existing headwall of the culvert which flows under Ferrers Road between Carpark C and D. The discharge control pit and flow bypass pipe has been designed to prevent stormwater flows from being discharged into local waterways at flows greater than existing and to comply with Blacktown City Council's Permissible Site Discharge requirements.

Runoff captured within the racetrack, grandstand facility and competitor car parking areas would be directed to onsite detention tanks, consistent with the design included in the Environmental Impact Statement. The 1200 cubic metre onsite detention tank located in the racetrack would function as a rainwater harvesting tank and has been sized to be able to hold stormwater in this area from a one per cent AEP event (100 year ARI storm). Batter chutes have been included as part of the revised site stormwater and drainage design in this area of the project site to discharge runoff if the on site detention tanks reach capacity.

All runoff discharged offsite would comply with the Permissible Site Discharge requirements provided in Blacktown City Council's *Engineering Guide for Development* (2005) of no more than 147 litres per second per hectare for 'All other Hawkesbury River Sub-catchments'.

The indicative locations of the batter chutes and the discharge control pit and flow bypass pipe are shown in Figure 3-5.

The revised drainage design has been prepared taking into consideration the pollutant reduction targets of the Blacktown *Development Control Plan 2015* as a guide, summarised in Table 3-7.

A summary of the key components of the revised stormwater and drainage design are summarised in Table 3-6 below.

Table 3-6: Key components of the revised site stormwater and drainage design

Water quality control measure	Description
Concrete channels, sealed pits and gross pollutant traps (also referred to as pit baskets)	<p>Stormwater runoff within the project site would be captured onsite using a pit and pipe drainage system, which would convey runoff to sealed stormwater inlet pits (with a grated entrance) via concrete channels. All channels within the project site would be either concrete or rock-lined.</p> <p>Large litter items and debris are likely to be contained above ground at the grated opening to the pit however pollutants which can bypass the grates are likely to be captured in pit baskets that would be placed inside the stormwater inlet pits.</p>
Batter chutes	<p>Batter chutes have been designed to regulate the flow rate of runoff that is being discharged offsite. Scour protection would be provided at the downstream extent of the structure, consisting of rock lined drains which would further assist to reduce flow rate and capture suspended sediment.</p>
Vegetated swales	<p>Stormwater runoff discharged from the project site would drain into existing vegetated swales located outside of the project site. The swales would assist in capturing sediment from stormwater runoff prior to reaching the discharge control pit or downstream receiving environments.</p>
Onsite detention tanks	<p>Runoff captured within the racetrack, grandstand facility and competitor car parking areas would be directed to two onsite detention tanks, consistent with the design included in the Environmental Impact Statement. The 1200 cubic metre onsite detention tank located in the racetrack would function as a rainwater harvesting tank and has been sized to be able to hold stormwater in this area from a one per cent AEP event (100 year ARI storm).</p> <p>Batter chutes have been included as part of the revised site stormwater and drainage design in this area of the project site to discharge runoff if the on site detention tanks reach capacity.</p>
Discharge control pit and flow bypass pipe	<p>The revised site stormwater and drainage design would result in the removal of on site detention tanks from Carpark C and D. Runoff from Carparks A, C and D would be captured within the project site in drainage channels and discharged offsite through batter chutes located along the northern boundary of Carpark C and the southern boundary of Carpark D. Water discharged offsite would flow into existing offsite vegetated swales and natural drainage channels to a 2.5 metre high discharge control pit, fitted with a low flow bypass pipe which would be installed upstream of the existing headwall of the culvert which flows under Ferrers Road between Carpark C and D.</p> <p>The discharge control pit and flow bypass pipe has been designed to prevent stormwater flows from being discharged into local waterways at flows greater than existing. The amount of flow that is released from the pipe has been designed so that erosion and scour at the outlet pipe does not occur.</p>

Table 3-7: Blacktown Development Control Plan 2015 pollutant reduction targets

Pollutant	Per cent post development average annual load reduction
Gross pollutants	90
Total suspended solids	85
Total phosphorous	65
Total nitrogen	45
Total hydrocarbons	90

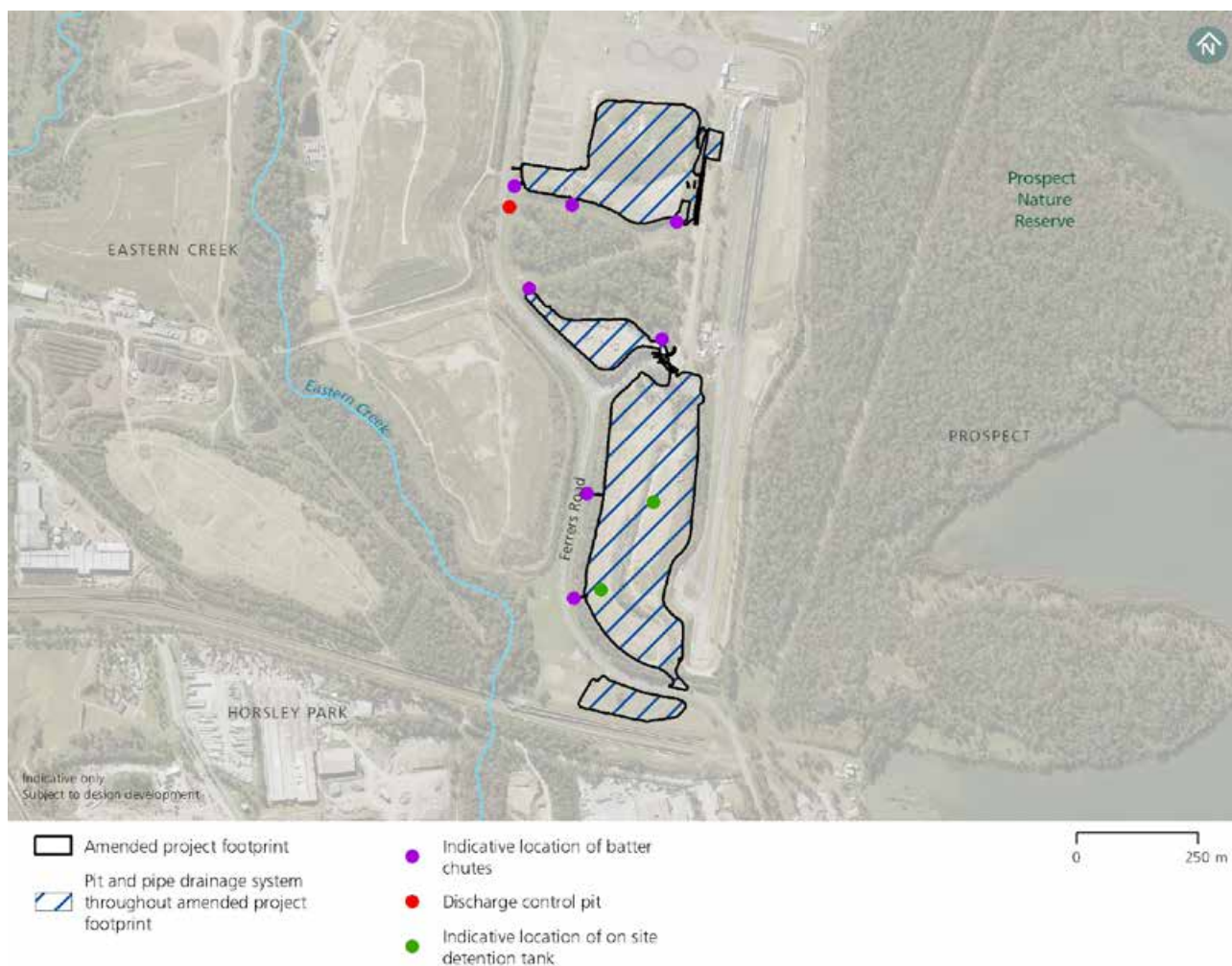


Figure 3-5: Indicative layout of the revised stormwater and drainage infrastructure

3.5.2 Environmental impact screening assessment

This screening assessment considers changes to potential impacts as exhibited in the Environmental Impact Statement, as a result of the inclusion of the revised stormwater management and drainage design as part of the project. Table 3-8 describes where the need for additional environmental assessment of the proposed amendment have been identified and where the assessment in the exhibited Environmental Impact Statement remains applicable in relation to the proposed amendments. Where further detailed assessment is required, this, along with any revised environmental mitigation measures, are provided in Chapter 4 (Environmental impact assessment) of this Amendment Report.

Table 3-8: Environmental screening – revision of the stormwater management and drainage design

Environmental aspect	Comparison of potential impacts of proposed amendment against exhibited Environmental Impact Statement	Further detailed assessment required?
Traffic, transport and parking	Traffic, transport and parking impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Noise and vibration	Noise and vibration impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Biodiversity	The proposed amendment would alter the project footprint as exhibited in the Environmental Impact Statement, resulting in a potential minor increase in the amount of vegetation clearance required for the project. There may also be the potential for minor indirect impacts on the Threatened Ecological Communities between Carpark C and D associated with the batter chutes discharging runoff to this area. As a result, additional assessment of potential impacts is required.	Yes
Air quality	Air quality impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Aboriginal heritage	The revised stormwater and drainage design would be located outside of the project site footprint as included in the exhibited Environmental Impact Statement. All drainage infrastructure would not be located in areas of PAD identified as part of the Environmental Impact Statement or be located near previously registered Aboriginal Heritage Information Management Systems (AHIMS) sites. However, as some of the drainage infrastructure would be outside of areas surveyed for the Environmental Impact Statement, additional assessment of potential impacts is required.	Yes
Non-Aboriginal heritage	Impacts to non-Aboriginal heritage from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Landscape character and visual amenity	The landscape character and visual amenity impacts would be consistent with those assessed in the Environmental Impact Statement.	No

Environmental aspect	Comparison of potential impacts of proposed amendment against exhibited Environmental Impact Statement	Further detailed assessment required?
Soils and surface water quality	<p>The revised stormwater and drainage design includes a site discharge method and location of discharge points which are different to that exhibited in the Environmental Impact Statement. The stormwater management approach as a result of this proposed amendment may have implications for surface water quality in local waterways that differ to those included in the exhibited Environmental Impact Statement.</p> <p>This proposed amendment would provide formal drainage along the embankment of Ferrers Road, which would have potential beneficial impacts in terms of increased ground stability and reduced subsidence along Ferrers Road.</p> <p>As a result, additional assessment of potential impacts is required.</p>	Yes
Contamination	The footprint of the proposed amendment would be located within the study area of the contamination assessment prepared as part of the Environmental Impact Statement. The contamination risks would be consistent with those described and assessed in the Environmental Impact Statement and no further detailed assessment is required.	No
Groundwater and geology	Impacts to groundwater and geology from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Flooding and hydrology	This proposed amendment would result in different hydrological flows and surface water flooding patterns across the project site and downstream of the project to those described within the Environmental Impact Statement. As a result, additional assessment of potential impacts is required.	Yes
Socio-economics	Socio-economic impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Property and land use	Impacts to property and land use from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Hazards	Hazards and risk from the proposed amendment would be consistent with those identified and assessed in the Environmental Impact Statement.	No
Greenhouse gas and energy	Greenhouse gas impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Climate change adaptation	Climate change adaptation impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Waste management and resource use	Waste management and resource use impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Cumulative impacts	Cumulative impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No

3.6 Modified grandstand facility and inclusion of informal grassed area

3.6.1 Description of proposed amendment

As described in the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020), a number of submissions in response to the exhibited Environmental Impact Statement noted the importance of informal seating at the existing speedway and requested a similar grassed area suitable for families and groups be considered as part of the design of the project. In response to these submissions, the design of the grandstand facility has been adjusted so that the southernmost section of the grandstand would be removed, and replaced with a new open, informal grassed area that would function primarily as a family gathering area adjacent to the playground. To accommodate the area, two corporate boxes, some food and beverage provision, and the awning at the southern end of the grandstand would be removed. The capacity of general admission seating at the grandstand would not change. Figure 3-6 shows a visual representation of the grandstand design as described in the Environmental Impact Statement, and the visual representation of the revised design is shown on Figure 3-7 .



Figure 3-6: Visual representation of the grandstand design and playground as exhibited in the Environmental Impact Statement



Figure 3-7: Visual representation of the proposed grassed area, modified grandstand facility and playground

3.6.2 Environmental impact screening assessment

This screening assessment considers changes to potential impacts as exhibited in the Environmental Impact Statement, as a result of the inclusion of the modified grandstand facility and the grassed area. Table 3-9 describes where the need for additional environmental assessment of the proposed amendment have been identified and where the assessment in the exhibited Environmental Impact Statement remains applicable in relation to the proposed amendments. The screening assessment identified that the changes to the grandstand facility and inclusion of a grassed area would be consistent with the impacts presented in the Environmental Impact Statement for construction and operation of the project. No further assessment is considered necessary for this proposed amendment.

Table 3-9: Environmental screening – modified grandstand and inclusion of a grassed area

Environmental aspect	Comparison of potential impacts of proposed amendment against exhibited Environmental Impact Statement	Further detailed assessment required?
Traffic, transport and parking	Traffic, transport and parking impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Noise and vibration	Noise and vibration impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Biodiversity	Biodiversity impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Air quality	Air quality impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Aboriginal heritage	Aboriginal heritage impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No

Environmental aspect	Comparison of potential impacts of proposed amendment against exhibited Environmental Impact Statement	Further detailed assessment required?
Non-Aboriginal heritage	Impacts to non-Aboriginal heritage from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Landscape character and visual amenity	The landscape character and visual amenity impacts would be consistent with those assessed in the Environmental Impact Statement.	No
Soils and surface water quality	Impacts to soil and surface water quality from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Contamination	The footprint of the proposed amendment would be located within the study area of the contamination assessment prepared as part of the Environmental Impact Statement. The contamination risks would be consistent with those described and assessed in the Environmental Impact Statement and no further detailed assessment is required.	No
Groundwater and geology	Impacts to groundwater and geology from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Flooding and hydrology	Flooding and hydrology impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Socio-economics	Socio-economic impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Property and land use	Impacts to property and land use from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Hazards	Hazards and risk from the proposed amendment would be consistent with those identified and assessed in the Environmental Impact Statement.	No
Greenhouse gas and energy	Greenhouse gas impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Climate change adaptation	Climate change adaptation impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Waste management and resource use	Waste management and resource use impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No
Cumulative impacts	Cumulative impacts from this proposed amendment would be consistent with those assessed in the Environmental Impact Statement.	No

3.7 Amended project footprint

A number of the proposed amendments identified in Sections 3.1 to 3.6, have resulted in changes to the project footprint. This has resulted in an overall reduction in the potential environmental impacts of the project, including a reduction in the amount of vegetation clearance required. The amended project footprint compared to the project footprint as exhibited in the Environmental Impact Statement is shown in Figure 3-8.



Figure 3-8: Amended project footprint

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4 Environmental impact assessment

This chapter provides additional environmental assessment of the potential direct and indirect impacts that may occur from the inclusion of the proposed amendments during the construction and operation of the Sydney International Speedway.

4.1 Overview

The environmental screening assessment of the proposed amendments presented in Chapter 3 (Description of proposed amendments) identified the environmental issues where potential impacts may be different to those assessed within the exhibited Environmental Impact Statement. The additional impact assessment required for each proposed amendment is collated in Table 4-1.

As several proposed amendments require additional assessment of potential impacts to biodiversity and Aboriginal heritage, the environmental impact assessment presented in this chapter has considered the proposed amendments to the project holistically. This also ensures that any interrelations or overlap between proposed amendments are captured.

Table 4-1: Overview of further environmental assessments required for proposed amendments

Environmental aspect	Proposed amendment					
	Sydney Dragway ticket office and entry	Refinements to the construction methodology	Reconfiguration of the internal access road and entry to Carpark A	Reconfiguration of Carpark D	Revised site stormwater and drainage design	Modified grandstand and inclusion of a grassed area
Traffic, transport and parking		●				
Noise and vibration						
Biodiversity	●		●	●	●	
Air quality						
Aboriginal heritage	●				●	
Non-Aboriginal heritage						
Landscape character and visual amenity						
Soils and surface water quality					●	
Contamination	●					
Groundwater and geology						
Flooding and hydrology					●	
Socio-economics						
Hazards						
Greenhouse gas						
Climate change						
Waste management and resource use						
Cumulative impacts						

4.2 Traffic, transport and parking

The proposed amendments may result in change to the potential construction traffic impacts described in the Environmental Impact Statement. There would be no change to the potential operational traffic, transport and parking impacts.

4.2.1 Overview of Environmental Impact Statement assessment

The Environmental Impact Statement included an assessment of the potential impacts to the performance of the local road network with and without the project during peak construction in 2021.

The assessment indicated that during construction of the project, the level of service of the modelled intersections would not change with or without the project, with the exception of the Great Western Highway/Doonside Road/Brabham Drive intersection. At this intersection, the level of service would temporarily decrease in the evening peak from a level of service D without the project, to a level of service E with construction of the project. The temporary reduction in level of service is associated with an increase in average intersection delay of one second, which is not considered to noticeably change the operational performance of this intersection.

4.2.2 Potential amended construction traffic, transport and parking impacts

There would be no change to the following impacts as a result of the proposed amendments when compared to those presented in the exhibited Environmental Impact Statement:

- Parking and access
- Pedestrian, cyclist and motorist safety
- Active transport network
- Public transport impacts.

Construction traffic routes and access

Construction traffic routes would be the same as assessed in the Environmental Impact Statement. Heavy vehicles entering the project site to deliver select fill material would travel from the M4 Western Motorway via Peter Brock Drive and Ferrers Road to the existing intersection with Ferrers Road. Heavy vehicles exiting the site will travel north along Ferrers Road and Brabham Drive to travel east on the Great Western Highway.

Construction vehicle movements

A comparison of the indicative daily construction vehicle movements for the project as included in the exhibited Environmental Impact Statement and with the proposed amendments is included in Table 4-2. The assessment of revised vehicle numbers relating to the transport of excavated material between areas of the project site has been considered in the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020) and included here for completeness. Potential construction impacts have been considered here as relevant to the importation of select fill only.

Table 4-2: Indicative daily construction vehicle movements (one way)

Activity	Exhibited Environmental Impact Statement			Amended project		
	Indicative total vehicle movements per day (one way)					
	Light vehicles	Heavy vehicles	Total	Light vehicles	Heavy vehicles	Total
Construction worker travel to and from the project site	180	–	180	180	–	180
Delivery of materials	–	16	16	–	16	16
Importation of select fill	–	–	–	–	85	85
Transport of excavated material between areas of the project site*	–	592	592	–	95	95

* The assessment of revised vehicle numbers relating to the transport of excavated material between areas of the project site has been considered in the Sydney International Speedway Submissions Report (Sydney Metro, 2020) and included here for completeness.

Intersection performance

Based on the construction haulage route that would be used for the importation of fill, of the five intersections assessed in the Environmental Impact Statement, the following three intersections would be potentially affected during construction:

- Great Western Highway/Doonside Road/Brabham Drive
- Brabham Drive/Huntingwood Drive
- Brabham Drive/Ferrer Road/Peter Brock Drive.

The modelled level of service for the abovementioned intersections would not change as a result of the additional heavy vehicle movements associated with the proposed amendments. Therefore, the project with the proposed amendments would have a negligible impact on the performance of the surrounding road network. A comparison of the modelled intersection performance of the abovementioned intersections during peak construction (2021) of the project with the inclusion of additional traffic movements associated with the proposed amendments and the modelled intersection performance as included in the exhibited Environmental Impact Statement is provided in Table 4-3.

With the inclusion of additional construction traffic as a result of the proposed amendments, the Great Western Highway/Doonside Road/Brabham Drive intersection would have an additional delay of one second in the weekday evening peak hour compared to the impacts identified in the Environmental Impact Statement. This would mean a total increase in the delay at this intersection of two seconds compared to the without project 2021 scenario, however this would not change the level of service at this intersection compared to the without project scenario.

Table 4-3: Modelled intersection performance during construction in exhibited Environmental Impact Statement and with proposed amendment (2021)

Intersection and hourly period	2021 without project					2021 with construction of the project (exhibited Environmental Impact Statement)					2021 with construction of the project (with proposed amendments)				
	Intersection throughput (vehicles/ hour)	Average delay (seconds/ vehicle)	Level of Service	Maximum queue length by directional approach (metres)		Intersection throughput (vehicles/ hour)	Average delay (seconds/ vehicle)	Level of Service	Maximum queue length by directional approach (metres)		Intersection throughput (vehicles/ hour)	Average delay (seconds/ vehicle)	Level of Service	Maximum queue length by directional approach (metres)	
Great Western Highway/Doonside Road/Brabham Drive															
Weekday morning	3890	53	D	NB	75	3940	54	D	NB	75	3950	54	D	NB	75
				EB	135				EB	140				EB	140
				SB	215				SB	220				SB	220
				WB	40				WB	40				WB	40
Weekday evening	4220	56	D	NB	185	4270	57	E	NB	205	4280	58	E	NB	210
				EB	65				EB	65				EB	65
				SB	125				SB	125				SB	125
				WB	145				WB	145				WB	145
Brabham Drive/Huntingwood Drive															
Weekday morning	2070	9	A	NB	10	2110	9	A	NB	15	2120	9	A	NB	15
				EB	10				EB	10				EB	10
				SB	20				SB	20				SB	20
				WB	10				WB	10				WB	10
Weekday evening	2230	13	A	NB	20	2280	13	A	NB	25	2290	13	A	NB	25
				EB	10				EB	10				EB	10
				SB	10				SB	10				SB	10
				WB	55				WB	55				WB	55
Brabham Drive/Ferrers Road/Peter Brock Drive															
Weekday morning	1570	11	A	NB	-	1610	11	A	NB	-	1630	11	A	NB	-
				EB	10				EB	10				EB	10
				SB	20				SB	20				SB	20
				WB	< 5				WB	< 5				WB	< 5
Weekday evening	1660	11	A	NB	-	1700	11	A	NB	-	1720	11	A	NB	-
				EB	10				EB	15				EB	15
				SB	20				SB	20				SB	20
				WB	5				WB	5				WB	10

4.2.3 Management and mitigation measures

The proposed amendments would not require any changes or additions to the mitigation measures provided in the Environmental Impact Statement as they relate to traffic, transport and parking.

4.3 Biodiversity

4.3.1 Overview of Environmental Impact Statement assessment

A Biodiversity Development Assessment Report (BDAR) was prepared to support the Environmental Impact Statement, in accordance with the *Biodiversity Conservation Act 2016* and the Secretary's Environmental Assessment Requirements for the project. The preparation of the BDAR included desktop assessment and field surveys to identify biodiversity values, plant community types and determine the likelihood for the occurrence of threatened species and their habitats. The existing environment and likely biodiversity impacts of the project were assessed using the Biodiversity Assessment Method.

The project site was described as being located within a highly modified landscape, and vegetation present consists mostly of poor condition young regrowth, isolated and (likely planted) trees and vegetation.

Construction of the project as exhibited in the Environmental Impact Statement would result in the clearance of about 0.63 hectares of Cumberland Plain Woodland in the Sydney Basin Bioregion, identified as a threatened ecological community under the *Biodiversity Conservation Act 2016*.

No threatened fauna species are likely to be significantly impacted by the project. One threatened fauna species, the Southern Myotis (listed as vulnerable under the *Biodiversity Conservation Act 2016*) is considered likely to occur based on the presence of suitable foraging habitat. Other threatened species are expected to occur in nearby bushland. These areas would not be impacted by the project.

There would be no direct impacts to Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* listed Threatened Ecological Communities.

To mitigate potential impacts to biodiversity associated with the project, biodiversity credit obligations were calculated using the Biodiversity Assessment Method Calculator. The BDAR concluded that a total of six ecosystem credits would be required as follows:

- Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Plant Community Type 849) – Moderate: One credit
- Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (Plant Community Type 850) – Poor: Three credits
- Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (Plant Community Type 850) – Revegetation: Two credits.

4.3.2 Existing environment

Vegetation characteristics

As a result of the amended project footprint, one additional plant community has been identified as being located within the amended project footprint:

- PCT 1071 – *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion.

A summary of the plant community types within the project footprint is provided in Table 4-4. These vegetation community types were identified and mapped during the field surveys completed in December 2019.

As a result of the proposed amendments the footprint of the project has been amended. A comparison of the vegetation zone area identified in the Environmental Impact Statement with the amended footprint for each plant community type identified in the amended project footprint is summarised in Table 4-4.

Table 4-4 Additional plant community types and vegetation zones identified in the amended project footprint

Plant community type ID No.	Plant community type name	Broad condition class	Vegetation zone area (hectares)				Corresponding Threatened Ecological Community
			Development site		Study area		
			Environmental Impact Statement	Amended project footprint	Environmental Impact Statement	Amended project footprint	
849	Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate	0.1	0.016	0.28	0.152	Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered).
849	Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Poor	0.07	0.059	0.83	0.842	Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered).
850	Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Poor	0.3	0.246	0.31	0.362	Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered).
850	Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Revegetation	0.16	0.059	2.29	2.291	Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered).
849	Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Blackberry dominant	0	0	0.06	0.069	Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered).
850	Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Moderate	0	0	0.85	1.048	Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered).

Plant community type ID No.	Plant community type name	Broad condition class	Vegetation zone area (hectares)				Corresponding Threatened Ecological Community
			Development site		Study area		
			Environmental Impact Statement	Amended project footprint	Environmental Impact Statement	Amended project footprint	
850	Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Regeneration	0	0	0.08	0.073	Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered).
1071	<i>Phragmites australis</i> and <i>Typha orientalis</i> coastal freshwater wetlands of the Sydney Basin Bioregion	Drainage line	0	0.001	0.07	0.068	–
835	Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate	0	0	0	0	–
Total			0.63	0.379*	4.8	4.906	

* Note: The vegetation zone areas in the Development site and Study area have been rounded to three decimal places. As a result, the total vegetation zone area (ha) for the Development site and Study area do not equal the sum of each individual vegetation zone.

Targeted threatened species surveys

Threatened flora species

Based on the assessment of habitat in the locality, and a review of databases and published information, an additional seven threatened flora species summarised in Table 4-6 were considered 'candidate species' for assessment based on the amended project footprint.

These threatened plant species were targeted during surveys of the project site in December 2019 and February 2020, however no threatened plant species were identified during the surveys. The artificial drainage line in the area of vegetation between Carpark C and D which was also targeted for aquatic and semi aquatic species. The small area of the drainage line near the Ferrers Road culvert within the development site is highly degraded and likely dry most of the year.

Surveys were conducted outside of the required survey period for *Dillwynia tenuifolia* and *Zannichellia palustris*. However, no species of *Dillwynia* were found during the surveys at all, therefore most of these target species would be been detected if present.

Zannichellia palustris is known to dieback in summer. The drainage line was first surveyed in December 2019, which is within the survey period for this species, however the targeted surveys took place in mid-February. Surveys for *Zannichellia palustris* are required to be completed by the end of January. However, two to three weeks following the end of the required survey period is likely to have detected some amount of plant matter. There were no submerged fully aquatic plant species identified within the drainage line during targeted surveys. Additionally, the section of the drainage line that would be directly impacted by the development contained little water at the time of survey and is likely to be dry most of the year. Hence, it is highly likely that the artificial drainage line does not provide suitable habitat for *Zannichellia palustris* and this species would not be impacted by the development.

Table 4-5: Summary of additional candidate threatened flora species identified for assessment

Species name	Common name	Biodiversity Conservation Act 2016 status	Environment Protection and Biodiversity Conservation Act 1999 status
<i>Commersonia prostrata</i>	Dwarf Kerrawang	Endangered	Endangered
<i>Dillwynia tenuifolia</i>	Dillwynia tenuifolia	–	Vulnerable
<i>Haloragis exalata</i> subsp. <i>exalata</i>	Square Raspwort	Vulnerable	Vulnerable
<i>Maundia triglochinosoides</i>	Maundia triglochinosoides	–	Vulnerable
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	Vulnerable	Vulnerable
<i>Persicaria elatior</i>	Tall Knotweed	Vulnerable	Vulnerable
<i>Zannichellia palustris</i>	Zannichellia palustris	–	Endangered

* Note: – the survey was completed outside of the allocated survey period for *Dillwynia tenuifolia* and *Zannichellia palustris*. However, no species of *Pultenaea* or *Zannichellia* were found during the surveys.

Threatened fauna species

As a result of one additional plant community type being identified as present in the amended project footprint, an additional 11 threatened fauna species have been identified as predicted ecosystem credit species, based on areas of potential habitat in the amended project footprint that were not in the project footprint described and assessed in the Environmental Impact Statement footprint. Of these, one was identified as having potential foraging habitat within the study area.

A summary of the threatened fauna with potential habitat in the project site is provided in Table 4-5. The remaining ecosystem credit species were excluded from the assessment, as the features associated with these species are not present within the project site. Additional information about these species is provided in the revised Biodiversity Development Assessment Report at Appendix A of this Amendment Report.

Species credit species are those species for which the likelihood of occurrence, or elements of suitable habitat, cannot be confidently predicted by vegetation surrogates or landscape features. Species credit species can be reliably detected by survey. Once the initial list of predicted candidate species credit species was generated, the geographic limitations of each species (where applicable) were examined to see if they were met. Where the project site is not within the geographic limitation described for a species, the species was removed from the predicted list of threatened species and no further assessment was carried out.

Table 4-6: Additional threatened fauna species with potential habitat in the project site

Species name	Common name	BC Act	EPBC Act	Commentary	Likelihood of occurrence
Birds					
<i>Pandion cristatus</i>	Eastern Osprey (Foraging)	–	Vulnerable	This species may fly over the development site on occasion. There is unlikely to be any suitable breeding habitat present.	Moderate

Aquatic ecology

The drainage line between Sydney Dragway and Eastern Creek is an unmapped and artificial waterway, draining runoff into Eastern Creek. There is no upstream connectivity within Eastern Creek and only very common fish species are likely to inhabit this drainage line. No threatened aquatic species have been recorded. One introduced species, the Eastern Gambusia (*Gambusia holbrooki*) was identified in Eastern Creek during surveys for this assessment.

There is no mapped threatened fish habitat within or adjacent to the project site. The Nepean River (west) and Georges River (south) are the closest waterways that are mapped habitat for a threatened fish species, the Macquarie Perch.

The proposed amendments may result in potential direct impacts to this unmapped and artificial, waterway.

4.3.3 Assessment of potential impacts from proposed amendments

Impacts to the following biodiversity related matters as a result of the proposed amendments would be consistent with those presented in the exhibited Environmental Impact Statement and have not been considered further as part of this assessment:

- Impacts to habitat connectivity
- Fauna injury or mortality
- Key threatening processes
- Cumulative impacts.

Amendments to loss of native vegetation

The proposed amendments which alter the project footprint would result in an overall reduction in the amount of native vegetation to be directly removed by 0.251 hectares or about 40 per cent. The amended project would result in the removal of 0.379 hectares of native vegetation, compared to 0.63 hectares in the Environmental Impact Statement.

A summary of the revised impacts to threatened ecological communities as a result of the proposed amendments, and a comparison of these impacts to those included in the exhibited Environmental Impact Statement are provided in Table 4-7. Figure 4-1 shows the areas of the amended project footprint including:

- Vegetation identified in the exhibited Environmental Impact Statement as being removed that would now be retained
- New areas of vegetation removal not identified in the exhibited Environmental Impact Statement.

Table 4-7: Native vegetation loss from the exhibited project and the amended project

Plant community type	Equivalent threatened ecological community	Conservation status	Environmental Impact Statement clearance amount	Amended project clearance amount	Change in area of impact
Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849)	Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically endangered (BC Act)	0.17	0.079	-0.094
Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850)	Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically endangered (BC Act)	0.46	0.305	-0.155
<i>Phragmites australis</i> and <i>Typha orientalis</i> coastal freshwater wetlands of the Sydney Basin Bioregion (PCT1071)	Plant community type does not meet the definition of a threatened ecological community	–	0	0.001	+0.001
Total			0.63	0.379*	-0.251

* Note: The vegetation zone areas in the Development site and Study area have been rounded to three decimal places. As a result, the total vegetation zone area (ha) for the Development site and Study area do not equal the sum of each individual vegetation zone.

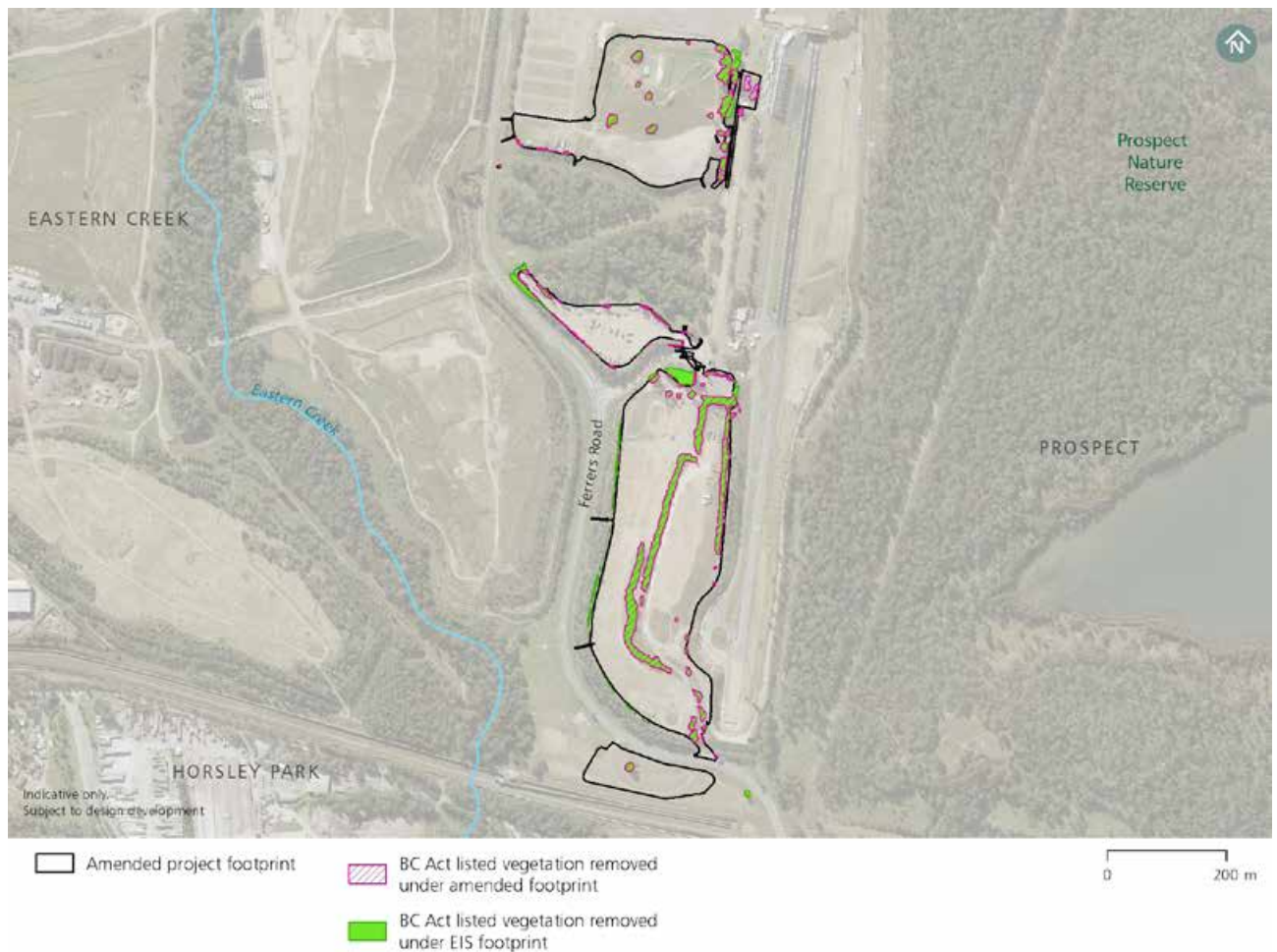


Figure 4-1: Changes to vegetation removal as a result of the proposed amendments

Impacts to threatened species

One species credit species, the Southern Myotis, is assumed to be directly impacted by the project through a loss of potential foraging habitat. The Environmental Impact Statement indicated that the extent of impact to this species is limited to a very small area of habitat (305 square metres) that is within 200 metres of Eastern Creek. As a result of the proposed amendments, the extent of impact has reduced by 26 per cent to 226 square metres, comprised of 51 square metres of moderate quality vegetation and 175 square metres of poor quality vegetation.

Loss of fauna habitat

New areas of vegetation requiring removal are unlikely to be used as breeding habitat by any threatened species. Therefore, it is still considered unlikely that the project would detrimentally affect any species if they are present.

The proposed amendments would result in the project requiring the removal of an additional 1.27 hectares of revegetation and weeds.

Impacts on aquatic habitats and groundwater dependent ecosystems

The construction of a drainage pit and flow bypass pipe upstream of the existing culvert under Ferrers Road between Carpark C and D would result in direct instream impacts and an eventual change in the surface water hydrology of the drainage line upstream. The reduction of the existing 1500 millimetre pipe with a smaller 900 millimetre diameter flow bypass pipe has been incorporated into the project design to manage flooding and hydrology impacts and avoid the overtopping of Ferrers Road during a one per cent AEP rainfall event. This would change the duration and extent of inundation of the upstream area between the two culverts during a one per cent AEP flood event. The result would be an increase in flood depth by 1.1 metres for around an additional 12 minutes during a one per cent AEP critical median storm event. There would also be an increase in depth by 1.1 metres for a one per cent AEP critical storm event, though the time of inundation would be about the same as under existing conditions. This change is considered to be too uncommon and temporary to cause any impact to the structure and function of the surrounding vegetation communities.

There would be some disturbance to instream habitats as a result of the construction of the drainage pit and flow bypass pipe upstream of the existing culvert under Ferrers Road between Carpark C and D. However, the new drainage infrastructure at this location would be mostly preconstructed and dropped into place from the road verge with minimal instream works required. The total area of direct disturbance caused by the new drainage infrastructure at this location would be around 14 square metres, with nine square metres of direct impact to PCT 1071 (*Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion) expected as a result. Appropriate environmental controls would be implemented to minimise potential disturbance and sedimentation of downstream aquatic habitats during construction and operation of the project. The section of the drainage line that would be impacted is highly ephemeral and likely dry most of the year.

Assessment against the Biodiversity Assessment Method

The proposed amendments would result in the same number of biodiversity offset credits. The proposed amendments would result in the need for one biodiversity offset credit for the *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion native vegetation plant community which wasn't required as part of the project as included in the Environmental Impact Statement. However, as the extent of native vegetation clearing has reduced by about 40 per cent, two biodiversity offset credits previously required to account for impacts to Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (Plant Community Type 850) is reduced to one credit.

A summary of the revised ecosystem requirements of the amended project footprint compared to those identified in the exhibited Environmental Impact Statement are provided in Table 4-8.

An area of 51 square metres of the vegetation zone which forms the potential habitat for the Southern Myotis and would be directly impacted by the project was identified as having a Vegetation integrity score of 23.9. On this basis, this area would require offsetting in accordance with the Biodiversity Assessment Methodology.

Part of the vegetation zone which forms the potential habitat for the Southern Myotis and would be directly impacted by the project was identified as having a Vegetation Integrity score of 11.3. The threshold Vegetation Integrity score for requiring an offset for native vegetation is greater than 15, and for threatened species it is greater than 17. On this basis, this area of 175 square metres of direct impact to potential Southern Myotis habitat would not require offsetting in accordance with the Biodiversity Assessment Methodology.

Table 4-8: Comparison of ecosystem credit requirements between the exhibited Environmental Impact Statement and the amended project

Ecosystem credit category	Environmental Impact Statement	Amended project
Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Plant Community Type 849) – Moderate	1	1
Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (Plant Community Type 850) – Poor	3	2
Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (Plant Community Type 850) – Revegetation	2	1
<i>Phragmites australis</i> and <i>Typha orientalis</i> coastal freshwater wetlands of the Sydney Basin Bioregion (1071) – Drainage line	0	1
Southern Myotis (<i>Myotis macropus</i>)	0	1
Total	6	6

4.3.4 Management and mitigation measures

The proposed amendments would not require any changes or additions to the mitigation measures provided in the Environmental Impact Statement as they relate to biodiversity.

4.4 Aboriginal heritage

4.4.1 Overview of Environmental Impact Statement assessment

The Aboriginal heritage assessment as part of the Environmental Impact Statement included a desktop review, field surveys and consultation with Aboriginal stakeholders to identify Aboriginal heritage items and places that may be impacted by the project and their heritage significance.

The assessment identified three previously registered Aboriginal sites within the project footprint, however no Aboriginal artefacts were found during the field surveys. Given the previous disturbance at the locations of the registered Aboriginal sites it was considered possible that all three sites were either surface collected or destroyed during previous construction works within the project site associated with historical activities.

Two areas of Potential Archaeological Deposits (PADs) were identified outside of the project footprint; one between Carpark C and D, and the other to the west of the southern area of the project site.

The exhibited Environmental Impact Statement concluded that the project as exhibited would not impact on any items or areas with potential Aboriginal heritage. A final statement of significance has been documented within the final version of Technical Paper 5 (Aboriginal Cultural Heritage Assessment Report), following comment from Aboriginal stakeholders during the public exhibition of the Environmental Impact Statement with regards to the historical and aesthetic cultural value(s) of the project site. The Technical paper 5 (Aboriginal Cultural Heritage Assessment Report) is provided in Appendix C of the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020).

4.4.2 Assessment methodology for proposed amendments

- The Aboriginal heritage assessment methodology for the proposed amendments was consistent with the approach undertaken for the Environmental Impact Statement.

As these proposed amendments would result in additional areas of ground disturbance outside of the areas previously surveyed for the Aboriginal cultural heritage assessment, an additional site walkover with a representative from the Deerubbin Local Aboriginal Land Council was undertaken on 9 September 2020. The site walkover visually inspected areas of additional ground disturbance outside of the study area of the exhibited Environmental Impact Statement.

A technical memo summarising the results of the supplementary Aboriginal cultural heritage assessment of the proposed amendments has been included as Appendix B of this Amendment Report.

The final version of Technical Paper 5 (Aboriginal Cultural Heritage Assessment Report) has been appended to the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020), including comments received from registered Aboriginal stakeholders during consultation, and the technical memo provided as Appendix B of this Amendment report. The final Aboriginal Cultural Heritage Assessment Report included the technical memo will be provided to registered Aboriginal stakeholders for information only.

4.4.3 Additional archaeological survey

Survey results

The site inspection identified that the additional project footprint attributed to the proposed amendments does not contain any registered AHIMS sites or new areas of Aboriginal archaeological potential. A summary of the archaeological survey is included in Table 4-9 and an overview of the field survey area for the proposed amendments is shown on Figure 4-2

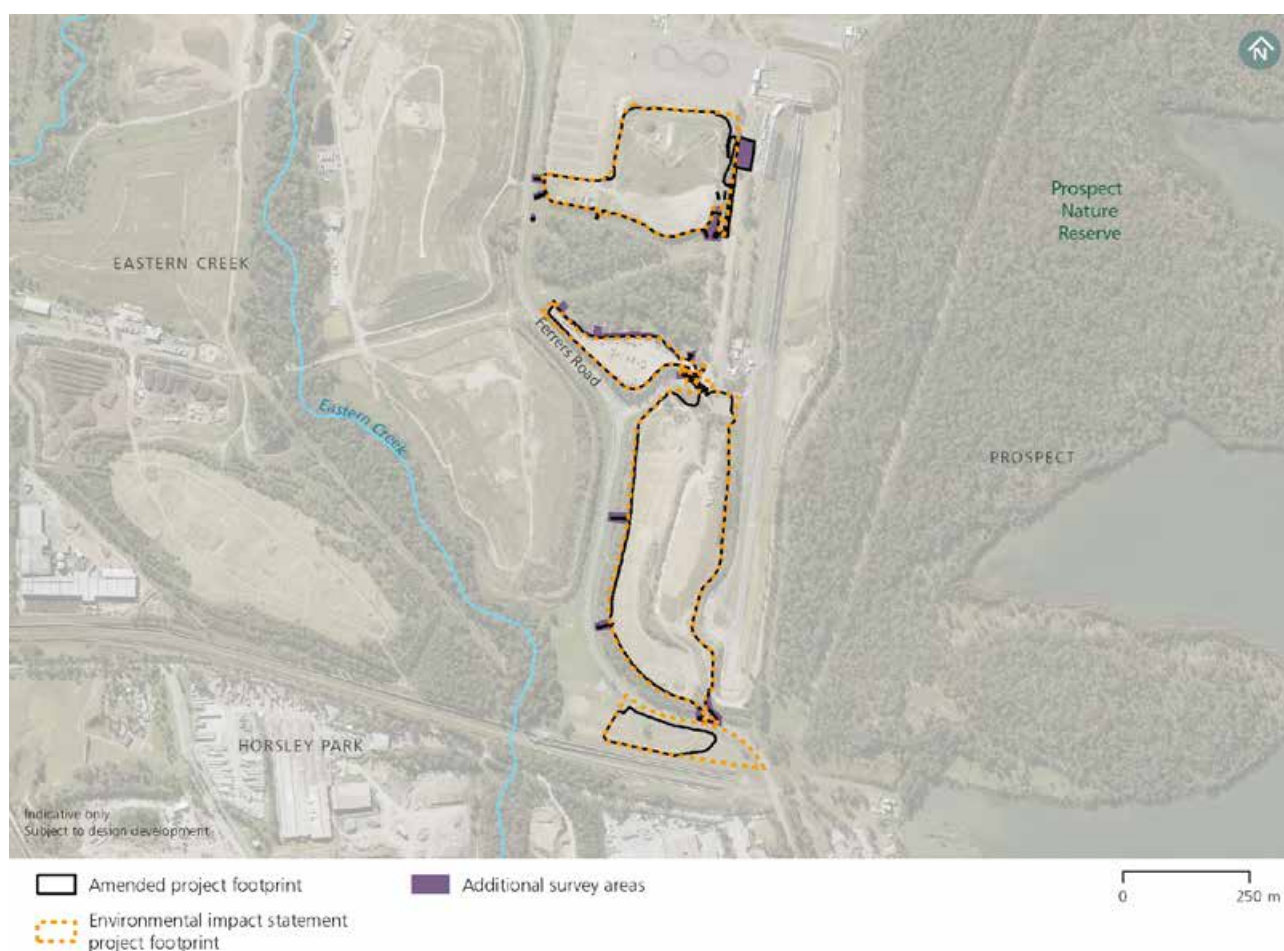


Figure 4-2: Overview of archaeological survey area for proposed amendments

Table 4-9: Archaeological survey results of additional areas of project footprint

Survey area/ proposed amendment area	Summary of survey results	Previously registered AHIMS sites	Areas of archaeological potential
Sydney Dragway ticket office and entry	The survey area consisted of a bitumen access road with artificial embankments. Visibility across the survey area was generally low with dense grasses obscuring the ground surface across the majority of the survey unit. A small area of exposure of underlying sandy fill base associated with recent earthworks was noted in the eastern portion of the survey unit. The survey area was assessed to have been subject to high levels of disturbance during former earthworks.	Nil	Nil
Revised site stormwater and drainage design – Carpark C and D	The majority of the survey area was comprised of discrete areas of artificial embankment surrounding an intact area of Cumberland Plain woodland located between Carpark C and Carpark D. The embankment was identified as a heavily modified landform. Visibility across the entire survey unit was low with dense grasses obscuring the ground surface across the majority of the survey unit. No new Aboriginal objects or areas of potential were identified within the survey unit. The survey area included some small portions of land within the previously identified SIS PAD 02; however, the amended project footprint does not extend into this area.	Nil	Nil
Revised site stormwater and drainage design – main operational site	This survey area consisted of three discrete areas within an artificial embankment supporting an artificial raised terrace. The embankment appeared to be a completely artificial landform with ground exposures showing evidence of sand and gravel fill inclusions. The embankment was covered in sparse regrowth eucalypt forest and dense grasses obscuring ground visibility across the majority of the survey area. No Aboriginal objects or areas of archaeological potential were identified within the survey area.	Nil	Nil

4.4.4 Significance assessment

As the archaeological field survey did not identify any new areas of archaeological potential, the proposed amendments would not alter the significance assessment as included in the final version of Technical paper 5.

4.4.5 Potential amended impacts

The proposed amendments are not anticipated to impact on any items or areas with potential Aboriginal heritage.

Construction activities to completed construction works associated with the proposed amendments would be consistent with the construction activities described and assessed in the Environmental Impact Statement. However, the additional areas of ground disturbance as a result of the proposed amendments (as shown in Figure 4-2), consist of heavily modified and artificial landforms and no new Aboriginal sites were identified within these areas as part of the archaeological field survey.

Previously registered AHIMS sites, and areas of potential Aboriginal archaeological heritage significance identified as part of the exhibited Environmental Impact Statement are located outside of the additional areas of ground disturbance attributed to the proposed amendments and would not be impacted by construction or operation of the amended project.

4.4.6 Management and mitigation measures

The proposed amendments would not require any changes or additions to the mitigation measures provided in the Environmental Impact Statement as they relate to Aboriginal heritage.

4.5 Soils and surface water quality

4.5.1 Overview of Environmental Impact Statement assessment

The soils and surface water quality assessment as part of the Environmental Impact Statement concluded that construction activities would be adequately managed through the implementation of standard construction management measures which would be sufficient to manage potential soil erosion and risks to downstream water quality.

The project as described in the exhibited Environmental Impact Statement included permanent water quality controls which aimed to capture stormwater runoff from the project site and treat water to an appropriate standard prior to discharge so that there would be no impact to downstream water quality, primarily through the capture and transfer of all stormwater runoff into onsite detention tanks prior to discharge.

A Neutral or Beneficial Impact assessment was carried out to assess the potential impacts of the project on bulk water supply infrastructure as identified in the *State Environmental Planning Policy (Western Sydney Parklands) 2009*. It concluded that the project is predicted to have a neutral impact on the Warragamba Pipelines and a beneficial impact on the water quality of Prospect Reservoir as existing flows east towards the Reservoir would be directed west towards Eastern Creek.

4.5.2 Assessment methodology for proposed amendments

The environmental impact screening assessments outlined in Chapter 3 (Description of proposed amendments) identified the following proposed amendments as requiring further detailed assessment of soils and surface water quality impacts:

- Revision of the project site stormwater and drainage design to reduce the number of onsite detention tanks and instead install batter chutes and a discharge control pit and flow bypass pipe.

The methodology to assess the potential impacts of the proposed amendments is generally consistent with the surface water assessment as part of the Environmental Impact Statement and included:

- Review of revised stormwater and drainage design to identify changes to the anticipated discharge rates and surface water treatment regime
- Identification of any additional potential impacts or changes to potential impacts identified within the Environmental Impact Statement relating to soils and surface water quality as a result of the proposed amendments
- Identification of any additions or changes to the mitigation and management measures identified within the Environmental Impact Statement.

Criteria

Additional criteria to those identified in the Environmental Impact Statement have been identified based on the submission received from Blacktown City Council. These criteria are taken from Table 2 of *Part J: Water Sensitive Urban Design and Integrated Water Cycle Management* of the *Blacktown Development Control Plan 2015* and relate to a minimum percentage reduction of the post-development average annual pollutant loads.

There is no data available to characterise the pre-development (i.e. Existing without project) pollutant loads from the project site. As a result, the post-development average annual pollutant load reductions are being determined by identifying the average annual pollutant loads from the project site with no mitigation in place, and then considering appropriate mitigation measures and design elements

The criteria are identified in Table 4-10.

Table 4-10: Blacktown Development Control Plan 2015 pollutant reduction targets

Pollutant	Per cent post development average annual load reduction
Gross pollutants	90
Total suspended solids	85
Total phosphorous	65
Total nitrogen	45
Total hydrocarbons	90

4.5.3 Potential amended construction impacts

Soils

Any potential additional soil impacts would be managed by erosion and sediment control measures as outlined in the Environmental Impact Statement. Additional potential temporary erosion and sedimentation impacts from the proposed amendments during construction would be limited to disturbance of topsoil during excavation of the stormwater control structures. There is also potential for temporary disturbance of soils or streambed sediments should instream works be required for the new discharge control pit and flow bypass pipe where water and flow are present.

Potential temporary impacts from the proposed amendments during construction relating to acid sulfate soils and saline soils would be consistent with those described and assessed in the Environmental Impact Statement.

Surface water impacts

Potential temporary surface water impacts during construction, additional to those identified in the Environmental Impact Statement, as a result of the proposed amendments are summarised in Table 4-11 below.

Table 4-11: Potential additional surface water impacts during construction from the proposed amendments

Construction activity	Potential impacts
Instream construction works	<ul style="list-style-type: none"> Any instream works would be appropriately managed through the implementation of erosion and sediment control measures as outlined in the Environmental Impact Statement. This would effectively manage any potential for elevated concentrations of mobilised sediments entering and polluting downstream waters from disturbance of the streambed within the drainage channel.
In-situ concrete works for the construction of: <ul style="list-style-type: none"> Batter chutes and rock-lined drains, The discharge control pit and flow bypass pipe between carpark C and D 	<ul style="list-style-type: none"> Appropriate mitigation measures would be implemented to manage any in-situ concrete works required for the construction of the proposed amendments. This would adequately manage the potential for temporary impacts such as increased pH of the downstream water quality if concrete waste was mobilised to waterways.

4.5.4 Potential amended operational impacts

Surface water

Consistent with the Environmental Impact Statement, the amended stormwater and drainage design would still direct water flows away from Prospect Reservoir. As such, there would no change to the neutral or beneficial impacts assessment to the reservoir which concluded there would be a reduction in pollutant load in runoff to Prospect Reservoir as a result of the project.

Performance against the adopted criteria

The Environmental Impact Statement identified that permanent water quality controls including on-site detention tanks would be provided which would aim to capture stormwater runoff from the project site during operations and treat water to an appropriate standard prior to discharge to receiving waterways so that there is no impact to downstream water quality.

On-site detention tanks are still proposed for the main operational site and the competitor pit area to the south and these areas would be managed as outlined in the Environmental Impact Statement.

The proposed amendment would remove the proposed on-site detention tanks associated with Carparks A, C and D. The water quality measures for these car parks would be developed during detailed design taking into consideration the criteria taken from *Part J: Water Sensitive Urban Design and Integrated Water Cycle Management of the Blacktown Development Control Plan 2015*. These measures could include one or a combination of vegetated swales, bioretention systems, gross pollutant traps and water quality basins or tanks.

The potential risks to surface water quality during operation of the Sydney International Speedway are consistent with those identified in the Environmental Impact Statement and are associated with potential runoff of pollutants from new impervious surfaces.

4.5.5 Management and mitigation measures

Additional environmental mitigation measures proposed to manage any potential impacts to soils and surface water quality from the proposed amendments are provided in Table 4-12. New management measures or additions to existing management measures are shown in bold text, with deletions shown with a ~~strike through~~.

Table 4-12: Amended mitigation measures – soils and surface water quality

Reference	Impact/ issue	Mitigation measure	Revised or additional mitigation measure	Application location(s)
Construction				
SSW8	Concrete waste	To avoid potential ingress of concrete waste material into downstream waterways, the Construction Soil and Water Management Plan would include procedures to capture, contain and appropriately dispose of any concrete waste from concrete works.	Additional mitigation measure	Concrete works at batter chutes and downstream scour protection locations The discharge control pit and bypass flow pipe.
Operation				
SSW6	Surface Waste water discharge	Water treatment infrastructure would be designed to include appropriate water quality measures so that surface water runoff is treated taking into consideration the pollutant reduction target criteria taken from Table 2 of Part J: Water Sensitive Urban Design and Integrated Water Cycle Management of the Blacktown Development Control Plan 2015. to a level that is compliant with the ANZECC/ARMCANZ (2000) and ANZG (2018) default guidelines for 95 per cent species protection.	Revised mitigation measure	All

4.6 Contamination

4.6.1 Overview of Environmental Impact Statement assessment

The contamination assessment for the Environmental Impact Statement identified that the project site has a moderate to high potential contamination risk associated with historic bulk earthworks and filling activities carried out on-site to form the current landform profile. Earthworks during construction of the project could intersect areas of potential contamination. The potential risks associated with encountering existing contamination would be appropriately managed by well established mitigation processes and measures.

The contamination assessment concluded that management measures adopted during construction would remove potential for contamination impacts from existing contamination to occur during operation of the project, and that the risk of contamination from operational activities, such as spills and leaks, associated with the project would be manageable through the implementation of appropriate mitigation measures.

Since the exhibition of the Environmental Impact Statement, additional site investigations have been completed across the project site, to further inform the construction methodology for the project. Based on the results of these additional investigations, the potential contamination across the project site, and the level of risk associated with these sources of contamination has been revised. The revised contamination assessment has identified that the project site has a low to moderate contamination risk, compared to the moderate to high potential risk identified in the exhibited Environmental Impact Statement.

The mitigation measures presented in the Environmental Impact Statement have also been revised to reflect the updated potential sources of, and risks associated with, contamination at the project site. Additional detail relating to the revised contamination assessment is provided in the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020), and the complete list of revised environmental mitigation measures are provided in Chapter 5 of this Amendment Report.

4.6.2 Existing environment of proposed amendments

Site inspection

A site inspection by a suitably experienced contamination specialist of the areas of amended project footprint outside of the project footprint presented in the Environmental Impact Statement was undertaken on the 24 September 2020. The purpose of the site inspection was to make observations about the current conditions and adjacent land uses for the amended project footprint with respect to potential contamination. The site inspection area comprises the footprint of the proposed relocated Sydney Dragway ticket office and entryway structure as shown on Figure 3-1.

Contaminants of potential concern and potential exposure pathways

The site inspection identified the following potential contaminants sources within the additional site area, consistent with the revised contaminants of potential concern included in the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020):

- Localised soil contamination from waste storage on site, potentially including heavy metals, total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), volatile organic compounds (VOCs)/semi volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs) and asbestos
- Soil contamination from unknown fill material. Potential contamination associated with the unknown fill material is likely to be mainly asbestos
- Groundwater contamination from unknown fill material, potentially including dissolved heavy metals, total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAH), volatile organic compounds (VOCs), semi volatile organic compounds (SVOCs) and per and polyfluoroalkyl substances (PFAS).

Potential exposure pathways are direct contact, ingestion, and inhalation for human health. The exposure pathway for sensitive receiving ecological environments is biological uptake.

Vapours have the potential to accumulate within excavations and enclosed structures at the project site at concentrations which could represent an asphyxiation, explosion or acute/chronic health risk.

Existing contamination risk

The existing contamination risks within the relocated Sydney Dragway ticket office and entryway area is described in Table 4-13. Consistent with the revised assessment of potential contamination risk included in the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020), the Sydney Dragway ticket office and entryway area of the amendment project footprint would have a low to moderate risk of potential existing contamination.

Text denoted as bold in the table below relates to new information associated with the contamination assessment of the proposed amendments. Text that is in ~~strike through~~ is no longer relevant to the assessment of contamination for the project.

Table 4-13: Contamination risks within the Sydney Dragway ticket office entryway footprint

Construction activity	Potential contamination source	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction and operational footprint and scope			Potential contamination risk
		Media and COPCs	Contamination status	Rating	Potential for contamination to be intersected	Exposure pathways	Rating	
Cut and fill within the footprint of the relocated Sydney Dragway ticket office and entryway	Subsurface fill material	Soil: Asbestos	Contamination possibly present in the media of concern at concentrations above the relevant assessment criteria and limited in extent	SE2	Contamination (if present) could be exposed during excavation	Potential exposure pathways are inhalation only for human health ^(1, 2) .	PR2	Moderate
Cut and fill within the footprint of the relocated Sydney Dragway ticket office and entryway	Perched groundwater	Groundwater: Heavy metals, TRH, PAH, VOCs/SVOCs, PFAS	Contamination possibly present in the media of concern at concentrations above the relevant assessment criteria and potentially widespread	SE3	Contamination (if present) unlikely to be exposed during excavation at significant volumes	Significant contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and ecological receptors	PR1	Low
Cut and fill within the footprint of the relocated Sydney Dragway ticket office and entryway	Waste materials (steel beams, cement bags, Intermediate Bulk Containers, fencing)	Soil: Heavy metals, TRH, PAH, OCPs, OPPs, VOCs/SVOCs, PCBs, asbestos.	Contamination possibly present in the media of concern at concentrations above the relevant assessment criteria and limited in extent	SE2	Contamination (if present) would be exposed during excavation	Potential exposure pathways include direct contact, ingestion, and inhalation for human health ⁽¹⁾	PR3	Moderate

Construction activity	Potential contamination source	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction and operational footprint and scope			Potential contamination risk
		Media and COPCs	Contamination status	Rating	Potential for contamination to be intersected	Exposure pathways	Rating	
Area 2: Cut and fill	Waste materials (tyres, oil drums, and construction/demolition waste waste)	Soil: Heavy metals, TRH, PAH, OCPs, OPPs, VOCs/SVOCs, PCBs, asbestos.	Contamination possibly present in the media of concern at concentrations above the relevant assessment criteria and limited in extent	SE2	Contamination (if present) would be exposed during excavation	Potential exposure pathways include direct contact, ingestion, and inhalation for human health ⁽¹⁾	PR3	Moderate
Area 4: Cut and fill	UST	Soil and groundwater: Heavy metals, TRH, BTEX, PAH	Contamination possibly present in the media of concern at concentrations above the relevant assessment criteria and limited in extent	SE2	Contamination (if present) could be exposed during excavation	Potential exposure pathways include direct contact, ingestion, and inhalation for human health ⁽¹⁾	PR2	Moderate
Area 6: Cut and fill	Stockpiled soils and construction/demolition waste	Soil: Heavy metals, TRH, TPH, PAH, OCPs, OPPs, VOCs/SVOCs, PCBs, Asbestos.	Contamination possibly present in the media of concern at concentrations above the relevant assessment criteria and limited in extent	SE2	Contamination (if present) could be exposed during excavation	Potential exposure pathways include direct contact, ingestion, and are inhalation only for human health ^(1, 2)	PR3 ²	Moderate

1 Construction workers and site users could be exposed to contamination via contact (dermal, ingestion, inhalation) with contaminated soils and dust.

2 Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos.

3 Construction workers and site users could be exposed to contamination via vapour emissions.

4 Adjacent site users could be exposed to contamination via vapour emissions (inhalation).

4.6.3 Assessment of potential construction impacts from proposed amendments

Potential construction impacts as they relate to contamination would be consistent with those presented in Section 14.5 of the Environmental Impact Statement. No further assessment is considered necessary as part of this Amendment Report.

4.6.4 Assessment of potential operational impacts from proposed amendments

Potential operational impacts as they relate to contamination would be consistent with those presented in Section 14.6 of the Environmental Impact Statement. No further assessment is considered necessary as part of this Amendment Report.

4.6.5 Management and mitigation measures

The proposed amendments would not require any changes or additions to the mitigation measures provided in the Environmental Impact Statement as they relate to contamination. The mitigation measures provided in the Environmental Impact Statement have been revised following additional site investigations carried out since the exhibition of the Environmental Impact Statement, as described in Chapter 2 (Environmental Impact Statement clarifications) of the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020). The compiled revised measures are provided in Chapter 5 (Revised environmental mitigation measures) of this report.

4.7 Flooding and hydrology

The proposed amendments may result in changes to potential flood impacts during operation. There would be no change to the potential flooding impacts during construction of the project as described and assessed in the exhibited Environmental Impact Statement.

4.7.1 Overview of Environmental Impact Statement assessment

A qualitative assessment of the potential flooding and hydrology related project impacts was carried out as part of the exhibited Environmental Impact Statement. The assessment concluded that the project site would continue to be above the probable maximum flood levels of Eastern Creek and the Hawkesbury – Nepean River during both construction and operation of the project.

In terms of offsite impacts, construction of the project would not result in any impacts to flooding downstream of the project site, including no loss of flood conveyance or floodplain storage. The project site was therefore also considered to be compatible with the existing flood hazard of the land during construction.

During operation, the project would incorporate stormwater and flooding infrastructure, including on-site detention tanks which would result in no changes to peak flows to culverts downstream of the project. The project site is at sufficiently high elevation that future sea level rise would not impact on flooding conditions at the site.

4.7.2 Assessment methodology for proposed amendments

Quantitative flood modelling using TUFLOW software was undertaken to understand the potential flooding impacts of the drainage pit and flow bypass pipe during a one per cent AEP event on the area upstream of the culvert underneath Ferrers Road between Carpark C and D during operation of the project.

The TUFLOW modelling was undertaken for two events:

- A one per cent AEP event of 120 minutes duration (the 'critical storm event')
- A one per cent AEP critical median storm event of 25 minutes duration (the 'critical median storm event').

4.7.3 Potential amended operational impacts

There would be no change in relation to mainstream flooding and the project site would continue to be above the probable maximum flood levels of Eastern Creek and the Hawkesbury – Nepean River during both construction and operation of the project.

The revised site stormwater and drainage design includes reducing the diameter of the inlet pipe which directs water through the culvert underneath Ferrers Road between Carpark C and D. This has been incorporated into the proposed amendment as it would:

- Prevent floodwaters from overtopping Ferrers Road in the area between Carpark C and D during a one per cent AEP event
- Provide a design that meets the Permissible Site Discharge limit of 147 litres per second per hectare for 'all other Hawkesbury River sub-catchments' as stipulated in the *Engineering Guide for Development* (Blacktown City Council, 2005).

As a result of the proposed amendments, there would be a potential increase in flood levels for short periods upstream of the culvert underneath Ferrers Road between Carpark C and D during the one per cent AEP flood event.

The potential impact during the one per cent AEP critical median storm, compared to existing conditions include:

- A potential minor increase on flood extent upstream of the culvert. A comparison of flood extents under existing conditions and with the amended project during the two per cent AEP is shown in Figure 4-3
- A potential increase in flood depths by up to 1.1 metres, and a potential minor increase in the duration of inundation by about 12 minutes. A comparison of the flood depths over time under existing conditions and with the amended project during a two per cent AEP event is shown on Figure 4-4.

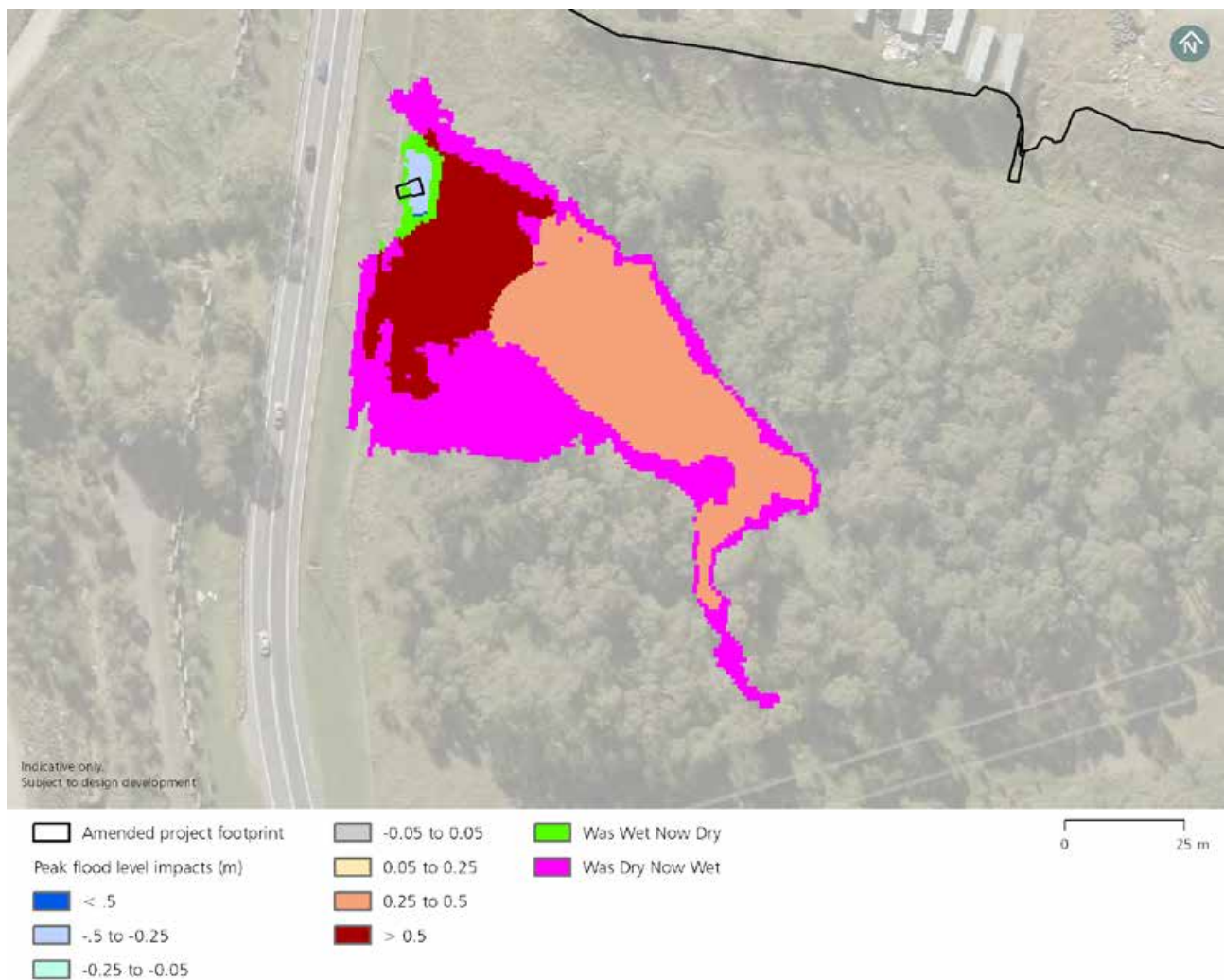


Figure 4-3: Comparison of flood extents under existing conditions and with the amended project during a one per cent AEP critical median storm event

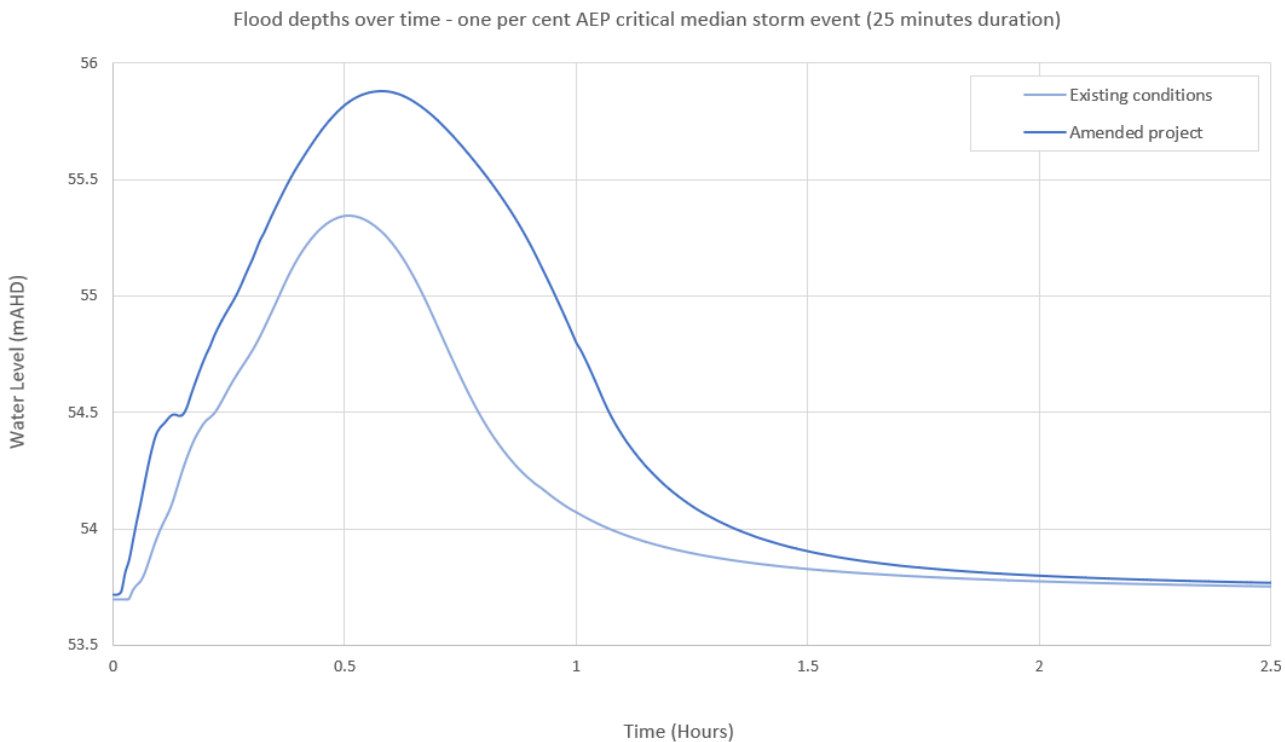


Figure 4-4: Comparison of flood depths over time under existing conditions and with the amended project during a one per cent AEP critical median storm event

The potential impact during the one per cent AEP critical storm event, compared to existing conditions include:

- A potential minor increase in flood extent. A comparison of flood extents under existing conditions and with the amended project during a one per cent AEP event is shown in Figure 4-5
- A potential increase in flood depths by up to 1.1 metres, however the duration of inundation would be almost identical to existing conditions. A comparison of the flood depths over time under existing conditions and with the amended project during a one per cent AEP event is shown on Figure 4-6.

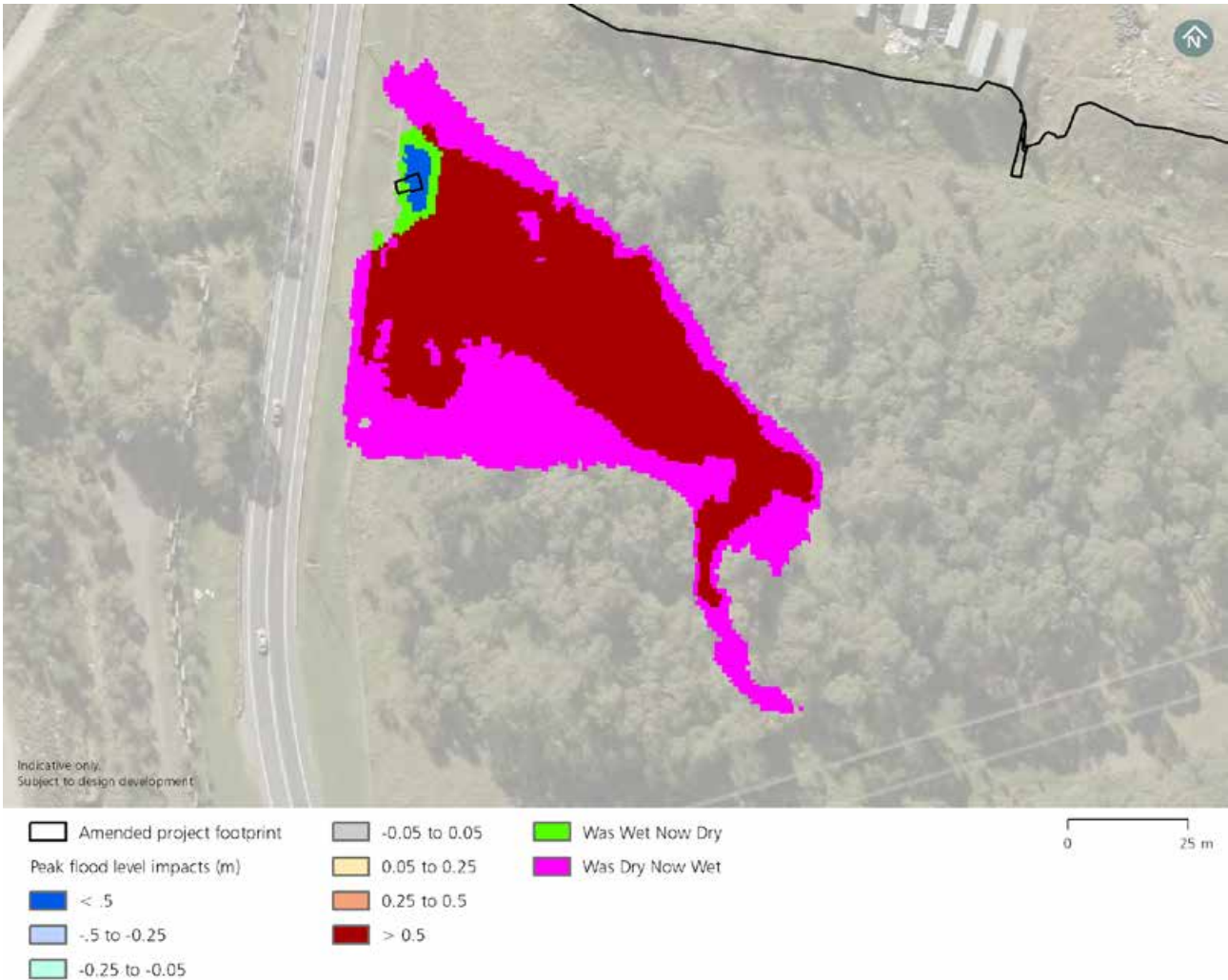


Figure 4-5: Comparison of flood extents under existing conditions and with the amended project during a one per cent AEP critical storm event

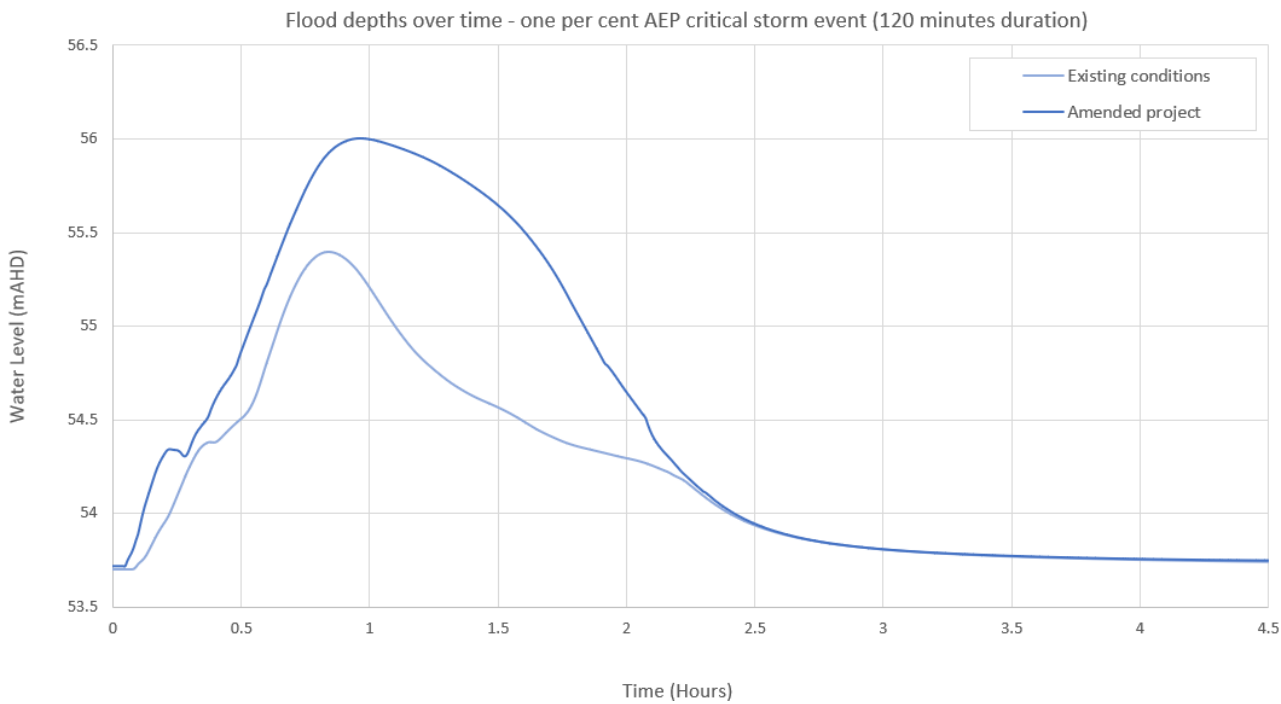


Figure 4-6: Comparison of flood depths over time under existing conditions and with the amended project during a one per cent AEP critical storm event

4.7.4 Management and mitigation measures

The proposed amendments would not require any changes or additions to the mitigation measures provided in the Environmental Impact Statement as they relate to flooding and hydrology.

5 Revised environmental mitigation measures

This chapter provides a complete set of revised environmental mitigation and management measures for the project, highlighting how they have changed compared with the measures listed in the Environmental Impact Statement.

5.1 Revised environmental mitigation and management measures

The list of mitigation and management measures presented in Chapter 25 (Synthesis and conclusion of the Environmental Impact Statement) of the Environmental Impact Statement has been updated with consideration given to:

- The proposed amendments as described in Chapter 3 (Description of proposed amendments)
- Submissions received as addressed in Chapters 6 (Community submissions) and 7 (Government agency and key stakeholder submissions) of the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020)
- Clarifications to the Environmental Impact Statement as outlined in Chapter 2 (Environmental impact statement clarifications) of the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020)
- Additional environmental assessment work carried out in this Amendment Report and the Submissions Report to address proposed amendments and/or clarifications.

Some new measures have been added, and the wording of existing measures has been adjusted.

Table 5-1 provides the full set of amended measures to avoid, mitigate and/or manage the potential impacts of Sydney International Speedway. This table supersedes the measures presented in the Environmental Impact Statement.

New management measures or additions to existing management measures are shown in bold text, with deletions shown with a ~~strike through~~. Measures that have changed as a result of the proposed amendments are **presented in yellow**. Measures that have changed as a result of responding to community, Governmental agencies and/or stakeholder submissions or through clarifications of the Environmental Impact Statement are **presented in green**.

Table 5-1: Revised mitigation and management measures

Reference	Impact/issue	Mitigation measure	Applicable location
Traffic and transport			
Construction			
TTP1	Traffic related incidents	In the event of a traffic related incident, coordination would be carried out with Transport Coordination and/or the Transport Management Centre's Operations Manager.	All
TTP2	Property access for emergency vehicles	Access to other properties within Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports would be provided at all times, including for emergency vehicles.	All
TTP3	Construction site access and egress	All trucks would enter and exit construction sites in a forward direction, where feasible and reasonable.	All
TTP4	Road network performance	Construction site traffic would be managed to minimise movements along Ferrers Road and the surrounding road network during peak periods.	All

Reference	Impact/issue	Mitigation measure	Applicable location
TTP5	Parking availability for construction personnel	Parking for construction personnel would be provided on-site and not on surrounding local streets.	All
TTP6	Construction traffic during major events	<p>During major events at Sydney Dragway, impacts to the transport and traffic network would be reduced by (as necessary):</p> <ul style="list-style-type: none"> • Avoiding the use of the spectator access road by construction traffic during Sydney Dragway major events • Minimising the level and nature of construction activity pre, during and post events • Maintaining appropriate access to all areas within the Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports • Scheduling deliveries to the project site outside of event periods, when possible. 	All
TT7	Parking for events at Sydney Dragway during construction	<p>Temporary offset parking for Sydney Dragway would be established prior to commencement of construction. This would include a total of around 2400 dedicated parking spaces for Sydney Dragway comprising of:</p> <ul style="list-style-type: none"> • Retention of about 800 existing spaces in the existing P2 Dragway car park outside of the project footprint • A minimum of 1600 spaces within the project site for use by visitors to Sydney Dragway during events • For larger events at Sydney Dragway, additional parking spaces within the Sydney Motorsport Park (operated by the Australian Racing Drivers Club) would also be made available. During these events, a shuttle bus service would be provided between this parking and the Sydney Dragway. 	All
Operation			
TTP8	Public transport accessibility during major events	Opportunities to enhance public transport accessibility to the project would be investigated, including the provision of bus services and bus stop infrastructure to service major events.	All
TTP9	Property access for emergency vehicles	Access to other properties within Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports would be maintained at all times, including for emergency vehicles.	All
TTP10	Impacts to road network performance during events at the project site (including concurrent operations)	A traffic management plan would be developed by the operator of the Sydney International Speedway and would include traffic measures to minimise impacts to road network performance during peak event times. The traffic management plan would consider measures to be implemented to manage the arrival and exit of vehicles to the project site, including traffic marshalling and the use of temporary traffic signals when major events are scheduled at the same time as Sydney Dragway.	All

Reference	Impact/issue	Mitigation measure	Applicable location
Noise and vibration			
Construction			
NV1	Night time impacts	Feasible and reasonable options to reduce night time noise impacts associated with the wood chipper would be investigated including positioning or shielding of equipment, restricting the use of the wood chipper to daytime construction hours, or through the early implementation of at-property treatments required to reduce operational noise.	Carparks A, C and D
Operation			
NV2	Operational motorsport noise	At-property treatment would be provided to noise sensitive receivers where the predicted average event noise level $L_{Aeq(15\text{minute})}$ is more than 5 dB above the background noise level.	All relevant receivers
NV3	Fireworks displays	An evaluation of the potential noise impacts from occasional firework displays during some events would be carried out when more information is available regarding the proposed displays associated with the project.	Main operational site
NV4	Operational Environmental Management Plan	<p>An Operational Environmental Management Plan (OEMP) (to be prepared by the operator, once appointed) would include the following measures to manage and mitigate noise:</p> <ul style="list-style-type: none"> • Establishing vehicle noise control limits for events and monitoring to verify compliance with these limits • Managing the use of the public address system to minimise noise • Coordination with other motorsports operators to minimise noise from concurrent events • Establishment of a complaints handling and response procedure. 	Main operational site
Biodiversity			
Design			
B1	Vegetation clearance	Opportunities to minimise the amount of vegetation clearance within the project site would be considered as part of further design development where feasible and reasonable.	All
Construction			
B2	Impacts to threatened ecological communities and threatened species	Biodiversity offsets (ecosystem credits) would be acquired in accordance with the Biodiversity Assessment Method due to impacts on native vegetation.	All

Reference	Impact/issue	Mitigation measure	Applicable location
Air quality			
Construction			
AQ1	Dust generation during construction	<p>The following best practice dust management measures would be implemented during all construction works:</p> <ul style="list-style-type: none"> • Apply water sprays during loading and unloading of materials • Regularly wet down exposed and disturbed areas including stockpiles and haulage routes, especially during dry weather • Adjust the intensity of activities based on measured and observed dust levels and weather forecasts • Minimise the amount of materials stockpiled and position stockpiles away from surrounding receivers • Regularly inspect dust emissions and apply additional controls as required. 	All
AQ2	Exhaust emissions from the combustion of fossil fuels during construction	Plant and equipment would be maintained in a proper and efficient manner.	All
AQ3	Dust generation during construction and operation	Four permanent dust monitoring stations would be installed across the project site and at Sydney Dragway. These stations would acquire and measure baseline dust levels in real time to inform thresholds for safe operational dust levels at the Sydney Dragway and to monitor dust levels during construction and operation of the project.	Main operational site and Sydney Dragway
AQ4	Dust generation during construction and operation	An on-site meteorological station would be installed, sited in accordance with the relevant standards and guidelines, to inform the dust monitoring programme.	Main operational site
Aboriginal heritage			
Construction			
AH1	Aboriginal site protection	<p>Prior to the commencement of construction works, exclusion areas would be established around the following identified Aboriginal sites, to prevent inadvertent impacts during works:</p> <ul style="list-style-type: none"> • SIS PAD 01 (AHIMS ID pending) • SIS PAD 02 (AHIMS ID pending). 	<p>SIS PAD 01 (adjacent to the southern area)</p> <p>SIS PAD 02 (between Carparks C and D)</p>
AH2	Unexpected finds	Should unexpected Aboriginal artefacts be identified during excavation and construction works, the Sydney Metro Unexpected Finds Protocol would be implemented.	All
AH3	Unexpected finds	In the event that a potential burial site or potential human skeletal material is exposed during construction, the Sydney Metro Exhumation Management Plan would be implemented.	All

Reference	Impact/issue	Mitigation measure	Applicable location
Non-Aboriginal heritage			
There are no additional mitigation measures required that are specific to non-Aboriginal heritage. Potential impacts have been avoided through design and would be managed through the Construction Environmental Management Framework and an unexpected finds procedure.			
Landscape character and visual amenity			
Design			
LV1	Removal of trees	Opportunities to minimise the area of vegetation clearance and for the retention and protection of existing street trees and trees within the project site would be identified during detailed construction planning.	All
LV2	Urban heat island effects	Opportunities for the incorporation of trees and low heat absorbing ground surface finishes in carparking areas would be identified and implemented where feasible and reasonable.	All
Construction			
LV3	Visual impacts	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).	All
LV4	Lighting impacts	Lighting of the construction site would be orientated to minimise glare and light spill impacts on adjacent receivers.	All
LV5	Trees	Existing trees to be retained would be protected prior to the commencement of construction in accordance with Australian Standard AS4970 the Australian Standard for Protection of Trees on Development Sites and Adjoining Properties.	All
Soils and surface water quality			
Construction			
SSW1	Acid sulfate soils	Prior to ground disturbance in areas of potential acid sulfate soil occurrence, testing would be carried out to determine the presence of actual and/or potential acid sulfate soils. If acid sulfate soils are encountered, they would be managed in accordance with the <i>Acid Sulfate Soil Manual</i> (ASSMAC, 1998).	All
SSW2	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 be managed in accordance with <i>Book 4 Dryland Salinity: Productive Use of Saline Land and Water</i> (NSW DECC 2008) and would not be reused in other areas of the project site. Erosion controls would be implemented in accordance with <i>Managing Urban Stormwater – Soils and Construction, Volume 1</i> (Landcom, 2004) and <i>Volume 2D</i> (NSW Department of Environment, Climate Change and Water 2008), commonly referred to as the 'Blue Book'.	All

Reference	Impact/issue	Mitigation measure	Applicable location
SSW3	Erosion and sedimentation	Erosion and sedimentation measures would be implemented in accordance with the principles and requirements in the ' <i>Blue Book</i> ' (Landcom, 2004 and Department of Environment, Climate Change and Water, 2008).	All
SSW4	Management of surface water runoff	Any water collected on the project site during construction would be appropriately treated and discharged to avoid any potential contamination or local stormwater impacts. Temporary sediment basins would be designed in accordance with <i>Managing Urban Stormwater: Soils and Construction and Managing Urban Stormwater, Volume 2D: Main Road Construction</i> (DECC, 2008).	All
SSW5	Water quality monitoring	<p>An onsite surface water monitoring program would be implemented to observe any changes in surface water the quality of runoff from the project site prior to discharge that may be attributable to the project and inform appropriate management responses.</p> <p>The program would be developed in consultation with the EPA and Blacktown City Council, where required relevant Councils. Monitoring would occur at all points of discharge within the project site prior to and during construction at all waterways with the potential to be impacted, including the unnamed drainage line between Carpark C and Carpark D, Eastern Creek and Prospect Reservoir.</p> <p>Monitoring sites could be located upstream and downstream of the potential discharges and would include sampling for key indicators of concern.</p>	All
SSW8	Concrete waste	To avoid potential ingress of concrete waste material into downstream waterways, the Construction Soils and Water Management Plan would include procedures to capture, contain and appropriately dispose of any concrete waste from concrete works.	Concrete works at batter chutes and downstream scour protection locations, and at the discharge control pit and bypass flow pipe.
Operation			
SSW6	Surface Waste water discharge	Water treatment infrastructure would be designed to include appropriate water quality measures so that surface water runoff is treated taking into consideration the pollutant reduction target criteria taken from Table 2 of Part J: Water Sensitive Urban Design and Integrated Water Cycle Management of the Blacktown Development Control Plan 2015. to a level that is compliant with the ANZECC/ARMCANZ (2000) and ANZG (2018) default guidelines for 95 per cent species protection.	All

Reference	Impact/issue	Mitigation measure	Applicable location
SSW7	Water quality monitoring	<p>An onsite operational surface water monitoring program would be implemented at all points of discharge within the project site to observe the quality of runoff from the project site prior to discharge offsite that may be attributable to the project and inform appropriate management responses.</p> <p>The monitoring program would be developed and implemented to align with the pre-construction construction monitoring described in SSW5 and would include sampling for key indicators of concern.</p>	All
Contamination			
Construction			
C1	Management of low risk contamination	<p>For areas that have been identified as having moderate, or high contamination impact potential, a further review of data would be performed, including review of any additional/preliminary contamination site investigations conducted following desktop assessment to refine impact assessment.</p> <p>Where the additional data review confirm that contamination is likely Areas identified as having to have a very low or low impact potential contamination risk, the areas would then be managed in accordance with the Soil and Water Management Plan. 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>	All Areas identified as having a very low or low potential contamination risk
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 National Environmental Protection (Assessment of Site Contamination) Measure (2013) and other guidelines made or endorsed by the NSW Environment Protection Authority.</p> <p>Construction areas requiring Detailed Site Investigation would be confirmed following the additional data review (mitigation measure C1), however based on the preliminary findings of this Preliminary Site Investigation, it is anticipated that Detailed Site Investigations would likely be required throughout the project site (within all areas 1-7).</p>	Dependant on the outcomes of mitigation measure C1, locations may include some or all of areas one to seven

Reference	Impact/issue	Mitigation measure	Applicable location
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 high risk, a Remedial Action Plan (RAP) would be developed for the relevant construction area. 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 Environment Protection Authority 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>Construction areas requiring a RAP would be confirmed following the additional data review (mitigation measure C1) and Detailed Site Investigation (mitigation measure C2), however on the basis of this Preliminary Site Investigation, it is anticipated that a Remedial Action Plan and remediation could be required to manage contaminated fill materials at the project site.</p> <p>Areas identified to have a moderate potential contamination risk would be managed in accordance with an unexpected finds protocol.</p> <p>The unexpected finds protocol would detail management works required to mitigate impacts from contamination (if encountered) throughout and following completion of construction. The unexpected finds protocol would be prepared in accordance with relevant NSW EPA guidelines and where applicable, detail management methodologies in accordance with Australian Standards and other relevant Australian and NSW government guidelines and codes of practice. The unexpected finds protocol would detail generic management measures associated with unexpected finds and more specific measures around the following:</p> <ul style="list-style-type: none"> Asbestos finds during excavation works Localised contamination (if present) underlying areas of waste materials in Areas 1 and 2 Removal requirements should the underground storage tank potentially located within Area 4 be uncovered during excavation works Monitoring requirements within excavations (LEL monitoring) to assess the risk (if any) associated with ground gas in the vicinity of the western boundary. <p>Any management of contamination encountered in accordance with the unexpected finds protocol, would be performed as an integrated component of construction and to a standard commensurate with the proposed end use of the land.</p>	<p>Dependant on the outcomes of mitigation measures C1 and C2, locations may include areas one to seven.</p> <p>Construction areas 1 to 6</p>

Reference	Impact/issue	Mitigation measure	Applicable location
C4	Site Audit Statement	Where contamination is highly complex, such as where there is 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 remediation activities and would develop a Site Audit Statement (SAS) and Site Audit Report (SAR) upon completion of remediation. The requirement for auditor involvement would be confirmed following the completion of the Detailed Site Investigation (mitigation measure C2) and prior to the preparation of the RAP (mitigation measure C3).	Dependent on outcomes of the C1, C2 and C3, locations may include areas one to seven
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.	As applicable
Operation			
C6	Accidental leaks or spills during operation	The Operational Environmental Management Plan would include an Emergency Response Plan 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.	All areas
Groundwater and geology			
Construction			
GW1	Contamination of groundwater during construction	Any stormwater, seepage or intercepted groundwater from earthworks, stockpiling and other construction areas would be collected and tested prior to re use, off-site discharge or disposal as appropriate. Water quality testing would include pH (acidity), salinity and potential contamination parameters.	All
Operation			
GW2	Contamination of groundwater during operation	A geotechnical assessment, contamination assessment and earthworks design would ensure that long term leaching of excavated materials (such as acid rock drainage from Bringelly Shale and saline soil and rock) does not pose a risk to groundwater.	All
GW3	Contamination of groundwater during operation	The Operational Environmental Management Plan would be implemented including appropriate procedures for storage of hazardous materials, refuelling, spill prevention and spill response.	All
Flooding and hydrogeology			
Operation			
FH1	Flood behaviour	On-site stormwater detention would be provided for the project site to manage rainfall runoff rates and volumes due to increased imperviousness of the project site and changes to sub catchment boundaries.	All

Reference	Impact/issue	Mitigation measure	Applicable location
Socio-economic			
Construction			
SE1	Impacts on business and social infrastructure	<p>Consultation would be carried out with managers of potentially impacted businesses and social infrastructure about the timing and duration of construction works and management of potential impacts, with the aim of minimising potential disruption to the use of businesses and social infrastructure from construction activities. This includes, but is not limited to:</p> <ul style="list-style-type: none"> • Sydney Dragway • Sydney Motorsport Park (operated by the Australian Racing Drivers Club) • Businesses within and surrounding land leased by Sydney Dragway • Motorsports facilities within the Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports • Western Sydney Parklands Trust. 	All
SE2	Impacts on clubs that use land impacted by the project	<p>Consultation as part of the masterplanning process for the motorsport precinct Masterplan would aim to provide an appropriate venue for all existing motorsport users in the precinct. The masterplan process is outside the scope of the Environmental Impact Statement.</p>	All
Property and land use			
There are no mitigation measures specific to property and land use. Potential impacts would be appropriately mitigated through the implementation of measures specific to air quality, noise and visual amenity.			
Hazards			
Construction			
H1	Impacts on underground utilities	Dial before you dig searches and non-destructive digging would be carried out to identify the presence of underground utilities.	All
Operation			
H2	Proper handling of dangerous goods	Handling of dangerous goods would be carried out in accordance with the <i>Storage and Handling of Dangerous Goods Code of Practice</i> (WorkCover NSW, 2005).	All
H3	Storage of flammable liquids	Storage of flammable/combustible liquids within the project site would be carried out in accordance with <i>Australian Standard AS 1940: The Storage and Handling of Flammable and Combustible Liquids</i> . Secondary containment measures would be implemented in a location away from waterways and drainage paths/infrastructure.	All
H4	Management of operational hazards and risks	An Operational Hazard and Risk Management Plan would be developed for the project site and implemented as part of the OEMP for the project. This plan would be reviewed regularly and updated should goods entering the project site change. As a minimum, the plan would adopt the requirements of the <i>Code of Practice for Storage and Handling of Dangerous Goods</i> (WorkCover NSW, 2005).	All

Reference	Impact/issue	Mitigation measure	Applicable location
Greenhouse gases and energy			
Design			
GHG1	Energy efficiency	Energy efficiency would be considered further during detailed design development, with energy efficient systems installed where feasible and reasonable. This would include consideration to the use of motion sensor activated and/or independent solar powered CCTV systems and LED lighting technology.	All
GHG2	Emissions of greenhouse gases during operation	<p>Opportunities to optimise the project design to minimise greenhouse gas emissions during operation would be considered as part of further design development, including considerations relating to:</p> <ul style="list-style-type: none"> Track design to minimise ongoing plant maintenance Waste management strategy and design to minimise waste to landfill during operation. 	All
Climate change adaptation			
Design			
CC1	Climate change risks	Climate change risk treatments would be confirmed and incorporated into the detailed design.	
Waste management and resource use			
Construction			
WM1	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 (Environment Protection Authority, 2014)</i> .	All
WM2	Waste minimisation	Construction waste would be minimised by accurately calculating materials brought to the project site and limiting materials packaging.	All
WM3	Reuse and recycling	Waste streams would be segregated to avoid cross contamination of materials and maximise reuse and recycling opportunities.	All
WM4	Waste tracking	A materials tracking system would be implemented for material transferred to offsite locations such as licensed waste management facilities.	All
Cumulative impacts			
C1	Potential cumulative construction traffic impacts	<p>Coordination and consultation with the proponents of other relevant projects and other parts of Transport for NSW, including Transport Coordination, would occur where required to manage the interface of projects under construction at the same time.</p> <p>Coordination and consultation with these stakeholders would include:</p> <ul style="list-style-type: none"> Provision of regular updates to the detailed construction program, construction sites and haul routes Identification of key potential conflict points with other construction projects Developing mitigation strategies in order to manage conflicts including coordination of traffic management arrangements between projects. 	All

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6 Conclusion and next steps

This chapter provides a conclusion to this Amendment Report and outlines the next steps in the planning approval process for the Sydney International Speedway.

Sydney International Speedway has been assessed as State significant infrastructure in accordance with the provisions under Division 5.2 of Part 5 of the EP&A Act. An Environmental Impact Statement that addresses the requirements of the Secretary of the Department of Planning, Industry and Environment was prepared and placed on exhibition from 19 August 2020 to 16 September 2020. Submissions were invited from the community, Government agencies and other key stakeholders.

The *Sydney International Speedway Submissions Report* (Sydney Metro, 2020) has been prepared that includes consideration of the issues raised by the community and stakeholders during the exhibition of the Environmental Impact Statement for Sydney International Speedway.

The project's design development and refinement process was ongoing during preparation and exhibition of the Environmental Impact Statement, to minimise potential environmental impacts. The design was further developed to respond to submissions received during public exhibition of the Environmental Impact Statement. As a result, the following amendments to the project as exhibited in the Environmental Impact Statement are proposed:

- Relocation of the Sydney Dragway ticket office and entryway to improve accessibility from the new Dragway parking areas (Carpark C and D)
- Refinements to simplify the construction methodology and make it more efficient, resulting in the need to import structural fill material to the main operational site
- Reconfiguration of the internal road and entry to Carpark A to minimise clearance of native, protected vegetation
- Reconfiguration of Carpark D to accommodate a revised vehicle and pedestrian entry and exit design, which minimises the amount of clearance of native, protected vegetation
- Revision of the site stormwater and drainage design to reduce the number of onsite detention tanks required. The revised design includes the installation of a discharge control pit and flow bypass pipe at the existing culvert under Ferrers Road between Carpark C and Carpark D, and a number of batter chutes that take advantage of existing terrain and minimises excavation requirements during construction
- Modification of the southern end of the grandstand facility to remove some corporate box facilities and awning and replacement with a grassed area between the grandstand and playground.

The changes in potential impacts associated with the proposed amendments compared to those described in the Environmental Impact Statement have been identified in Chapter 3 (Description of proposed amendments) and assessed in Chapter 4 (Environmental impact assessment) of this Amendment Report. The changes to potential impacts as a result of the proposed amendments would include:

- Improved pedestrian accessibility to the Sydney Dragway with the relocation of the Sydney Dragway ticket office and entry
- A 40 per cent reduction in the amount of native vegetation clearance as a result of amendments to the project footprint
- As a result of the proposed amendments, the extent of direct impact to Southern Myotis (*Myotis Macropus*) habitat that requires offsetting has reduced by 26 per cent
- Ferrers Road would no longer be overtopped during a one per cent AEP storm event, with the inclusion of the revised site stormwater and drainage design
- Improved spectator and visitor experience during operation of the project by providing a grassed area between the grandstand and playground
- The proposed amendments would result in the project requiring the removal of an additional 0.1 hectares of revegetation and weeds
- The construction of a drainage pit and flow bypass pipe upstream of the existing culvert under Ferrers Road between Carpark C and D would result in direct instream impacts and an eventual change in the surface water hydrology of the drainage line upstream. This would change the duration and extent of inundation of the upstream area between the two culverts during a one per cent AEP flood event. This change is considered to be too uncommon and temporary to cause any impact to the structure and function of the surrounding vegetation communities. Appropriate environmental controls would be implemented to minimise potential disturbance and sedimentation of downstream aquatic habitats during construction and operation of the project. The section of the drainage line that would be impacted is highly ephemeral and likely dry most of the year.

Although the proposed amendments would result in some potential additional impacts compared to the Environmental Impact Statement, overall the proposed amendments would result in reduced impacts or overall benefits when compared to those assessed in the Environmental Impact Statement. The potential changes in impacts identified would not result in any unacceptable impacts and revised environmental mitigation measures have been proposed where required.

On balancing the strategic need and benefits of the project with the potential changes in impacts as a result of the proposed amendments, Sydney International Speedway is still considered to be in the public interest.

Department of Planning, Industry and Environment will consider this Amendment Report along with the Environmental Impact Statement, submissions received and the *Sydney International Speedway Submissions Report* (Sydney Metro, 2020) during its assessment of the Sydney International Speedway. The Secretary of the Department of Planning, Industry and Environment will prepare an environmental assessment report in accordance with Section 5.18 of the EP&A Act. The Minister for Planning and Public Spaces (or their delegate) will then decide whether or not to approve Sydney International Speedway and identify any conditions of approval that would apply.

This Amendment Report and the Submissions Report will be available on the Department of Planning, Industry and Environment website and on the Sydney Metro website at <https://www.sydneymetro.info/>.

If the project is approved by the Department of Planning, Industry and Environment, Sydney Metro would continue to consult with community members, government agencies and stakeholders during the detailed design and construction phases of the project to minimise potential impacts on the local environment and community.

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Appendix A – Biodiversity Development Assessment Report

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Sydney International Speedway

Technical Paper 3: Revised Biodiversity Development Assessment Report

Final

November 2020

Sydney Metro



Sydney International Speedway

Project No: IA199800
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Contents

Glossary of terms	i
Executive Summary	v
1. Introduction	1
1.1 Sydney International Speedway	1
1.2 Purpose and scope of this report.....	5
1.3 Secretary's Environmental Assessment Requirements	6
1.4 Key terms used in this report.....	8
1.5 Authors	9
2. Methodology	10
2.1 Study area	10
2.2 Background research and data sources	10
2.3 Mapping extent of native vegetation cover	11
2.4 Plant community type identification	11
2.5 Patch size	15
2.6 Threatened species habitat assessment – creating a candidate species list	15
2.7 Targeted threatened species surveys	16
2.8 Survey limitations	23
3. Landscape features	26
3.1 IBRA Bioregions and sub regions	26
3.2 BioNet NSW Landscapes	26
3.3 Rivers, streams and estuaries	26
3.4 Wetlands.....	26
3.5 Connectivity of habitat	26
3.6 Areas of geological significance and soil hazard features.....	26
3.7 Areas of outstanding biodiversity value	26
3.8 Native vegetation extent	26
4. Native vegetation and vegetation integrity.....	27
4.1 Plant community type descriptions	27
4.2 Vegetation zones and vegetation integrity score	38
4.3 Patch size	39
4.4 Threatened ecological communities.....	39
4.5 Groundwater dependent ecosystems	41
5. Habitat suitability for threatened species	42
5.1 Habitat suitability for species that can be predicted by habitat surrogates (ecosystem credit species).....	42
5.2 Habitat suitability for species that cannot be predicted by habitat surrogates (species credit species)	46
5.3 Threatened species survey results.....	58
6. Aquatic assessment	65
6.1 Existing environment	65

6.2	Aquatic biota.....	66
6.3	Threatened fish.....	67
7.	Matters of National Environmental Significance	69
7.1	Wetlands of international and national importance	69
7.2	Nationally listed threatened ecological communities	69
7.3	Threatened plants.....	70
7.4	Threatened animals	70
7.5	Migratory species	71
8.	Impact avoidance and minimisation	73
8.1	Avoiding and minimising impacts on native vegetation and habitat.....	73
8.2	Avoiding and minimising prescribed biodiversity impacts	75
9.	Assessment of impacts	77
9.1	Impacts on native vegetation and habitat	77
9.2	Serious and irreversible impact entities	79
9.3	Prescribed biodiversity impacts	82
9.4	Noise, vibration, dust, light and contaminants.....	85
9.5	Contribution to Key Threatening Processes.....	87
9.6	Aquatic impacts	88
9.7	Cumulative biodiversity impacts.....	88
10.	Managing and mitigating impacts on biodiversity values	90
11.	Thresholds for the assessment and offsetting of impacts of development	91
11.1	Impacts on a potential entity that are serious and irreversible impacts	91
11.2	Impacts for which the assessor is required to determine an offset requirement	91
11.3	Impacts for which the assessor is not required to determine an offset requirement.....	92
11.4	Impacts that do not require further assessment by the assessor	92
12.	Biodiversity credit requirements.....	94
13.	Conclusions	95
14.	References.....	97

Appendices

Appendix A. Habitat assessment

Appendix B. Floristic survey composition and structure data

Appendix C. Vegetation integrity assessment plot data

Appendix D. EPBC Act significance assessments

Appendix E. Biodiversity credit report

Appendix F. Protected Matters Search Tool Report

Figures

Figure 1-1 Location map.....	2
Figure 1-2 Site map	3
Figure 1-3 Development overview	6
Figure 2-1 Location of plot based floristic vegetation survey and vegetation integrity assessments.....	14
Figure 2-2 Threatened plant surveys	24
Figure 2-3 Threatened animal surveys	25
Figure 4-1 Plant community types and vegetation zones	29
Figure 4-2 Threatened ecological communities	40
Figure 5-1 Threatened species polygon for Southern Myotis (Myotis macropus)	63
Figure 5-2 Threatened species polygon for the Cumberland Plain Land Snail	64
Figure 6-1 Aquatic habitats	68
Figure 11-1 Impacts requiring offsets and impacts not requiring offsets	93

Tables

Table 1-1 Secretary's Environmental Assessment Requirements – Biodiversity	6
Table 1-2 Personnel, role and qualifications	9
Table 2-1 Plant community types and vegetation zones identified in the development site	12
Table 2-2 Summary of survey effort for threatened plant species	16
Table 2-3 Summary of survey effort for threatened animal species	18
Table 2-4 Targeted fauna survey details	20
Table 2-5 Weather and rainfall conditions during nocturnal fauna surveys (Horsley Park Equestrian Centre AWS 067119).....	21
Table 2-6 Green and Golden Bell Frog survey timing and sampling effort	22
Table 4-1 Plant community types and vegetation zones identified in the development site and study area	27
Table 4-2 Floristic and structural summary of PCT 849 within the development site	31
Table 4-3 Floristic and structural summary of PCT 850 within the development site	33
Table 4-4 Floristic and structural summary of PCT 1071 within the development site	36
Table 4-5 Floristic and structural summary of PCT 835 within the development site	38
Table 4-6 Vegetation zones and vegetation integrity scores for the South East Highlands bioregion	38
Table 5-1 Summary of predicted ecosystem credit species that were assessed	42
Table 5-2 Summary of candidate species credit species returned by the BAM-Calculator	46
Table 5-3 Summary of candidate species credit species with geographic or habitat constraints.....	48
Table 5-4 Summary of candidate species credit species for further assessment	55
Table 5-5 Assessment of Green and Golden Bell Frog habitat quality	58
Table 5-6 Results of nocturnal frog surveys (species present and general observations)	60
Table 5-7 Results of bat call analysis (number of calls identified per species per detector night)	61
Table 6-1 Fish habitat classification	66
Table 7-1 EPBC Act listed TECs returned from the Protected Matters Search Tool and their predicted occurrence (based on PMST assessment).....	70
Table 7-2 Summary of direct impact to EPBC Act listed threatened species habitat (native vegetation) within the development site	71
Table 8-1 Design refinements noted to avoid impacts to native vegetation	74

Table 9-1 Summary of native vegetation clearing within the development site	77
Table 9-2 Summary of direct impacts on threatened species credit species habitat associated with the loss of native vegetation	78
Table 9-3 Area of Cumberland Plain Woodland CEEC (PCT 849 and PCT 850) within the development site and both a 1,000 ha and 10,000 ha radius of the development site	80
Table 9-4 Estimate of the extant area of Cumberland Plain Woodland CEEC (PCT 849 and PCT 850) within the Cumberland Plain Subregion and the proportional impact of the development	81
Table 9-5 Threatened ecological communities that may be impacted by groundwater drawdown	85
Table 9-6 Summary of Key Threatening Processes that the development would directly or indirectly contribute to	87
Table 9-7 Past, present and future developments within the Cumberland Plain region	89
Table 10-1 Mitigation measures	90
Table 11-1 Impacts to PCTs which require an offset.....	91
Table 11-2 Impacts to threatened species which require an offset.....	92
Table 11-3 Impacts which do not require an offset	92
Table 12-1 Ecosystem credits required	94
Table 12-2 Species credits required	94
Table A-14-1 Habitat suitability assessment for threatened plant species.....	100
Table A-14-2 Habitat suitability assessment for threatened animal species	109

Glossary of terms

Definitions	
Biodiversity Assessment Method	<p>The Biodiversity Assessment Method (BAM) is the assessment manual that outlines how an accredited person assesses impacts on biodiversity at development sites and stewardship sites. It is a scientific document that provides:</p> <ul style="list-style-type: none"> a consistent method for the assessment of biodiversity on a proposed development or major development, or clearing site, guidance on how a proponent can avoid and minimise potential biodiversity impacts, and the number and class of biodiversity credits that need to be offset to achieve a standard of 'no net loss' of biodiversity.
Biodiversity credits	Ecosystem credits or species credits.
Biodiversity credit report	The report produced by the BAM Calculator (BAM-C) that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
Biodiversity offsets	Management actions that are carried out to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity values from the impacts of development.
Biodiversity Investment Opportunities Map (BIO Map)	A deliverable of the NSW Government's Green Corridors program. The BIO Map development aims to achieve better biodiversity outcomes by directing biodiversity investment funding to the strategic locations of greatest benefit.
Bioregion	Bioregions are relatively large land areas characterised by broad, landscape scale natural features and environmental processes that influence the functions of entire ecosystems. They capture the large scale geophysical patterns across Australia. These patterns in the landscape are linked to fauna and flora assemblages and processes at the ecosystem scale.
BAM Credit Calculator (BAM-C)	The computer program that provides decision support to assessors and proponents by applying the Biodiversity Assessment Method, which calculates the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site.
Core area	Land identified by the BIO Map. Core Areas are large remnants where management would be of greatest benefit to the conservation of key state and regional biodiversity values within a region.
Cumulative impact	The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Refer to the development Secretary's Environmental Assessment Requirements for cumulative impact assessment requirements.
Development site	The area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials
Direct impact	An impact on biodiversity values that is a direct result of vegetation clearance and loss of habitat. It is predictable, usually occurs at or near to the development site and can be readily identified during the planning, design, construction, and operational phases of a development.
Ecological community	An ecological community is a naturally occurring group of native plants, animals and other organisms living in a unique location. Ecological communities can be listed as threatened under the EPBC Act and/or BC Act.
Ecosystem credit	A measurement of the value of endangered ecological communities (EECs), critically endangered ecological communities (CEECs) and threatened species habitat for species that

Definitions	
	can be reliably predicted to occur with a plant community type (PCT). Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at a biodiversity stewardship site.
Ecosystem credit species	Threatened species that can be reliably predicted to occur with a PCT, for which species specific biodiversity credits are not required.
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic component.
Indirect impact	<p>An impact on biodiversity values that occurs when development related activities affect threatened species, threatened species habitat, or ecological communities in a manner other than direct impact. Compared to direct impacts, indirect impacts often:</p> <ul style="list-style-type: none"> • occur over a wider area than just the development site • have a lower intensity of impact in the extent to which they occur compared to direct impacts • occur off-site • have a lower predictability of when the impact occurs • have unclear boundaries of responsibility.
Locality	This is defined as the area within a 10 kilometre radius surrounding the development site
Local population	The population that occurs in the development site. In cases where multiple populations occur in the development site and/or a population occupies part of the development site, impacts on the entirety of each population must be assessed separately.
MNES	A matter of national environmental significance (MNES) protected by a provision of Part 3 of the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act).
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1: 250,000.
Mitigation	Action to reduce the severity of an impact.
Mitigation measure	Any measure that facilitates the safe movement of wildlife and/or prevents wildlife mortality.
Patch	A patch is defined in the BAM as an area of intact native vegetation that occurs on the subject land. The patch may extend onto adjoining land beyond the development site of the subject land, and for woody ecosystems, includes native vegetation separated by ≤ 100 metres from the next area of intact native vegetation. For non woody vegetation, this gap is reduced to ≤ 30 metres.
Plant community type	A NSW plant community type identified using the plant community type (PCT) classification system. The PCT classification was created in 2011 by consolidating two existing community level classifications: the NSW Vegetation Classification and Assessment database; and the BioMetric Vegetation Types database used in NSW regulatory programs. The PCT classification is now maintained in the BioNet Vegetation Classification application. It is a way to classify vegetation types.
Population	A group of organisms, all of the same species, occupying a particular area.
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Species credit species	Threatened species that are assessed according to section 6.4 of the BAM which may generate species specific biodiversity credit requirements.
Study area	The development site and any other areas surveyed and assessed for biodiversity values which may be subject to indirect impacts.

Definitions	
Target species	A species that is the focus of a study or intended beneficiary of a conservation action or connectivity measure.
Threatened Biodiversity Data Collection	Part of the BioNet database, accessible from the BioNet website at www.bionet.nsw.gov.au .
Threatened species	A species listed under the NSW <i>Biodiversity Conservation Act 2016</i> (BC Act), <i>Fisheries Management Act 1994</i> (FM Act) or EPBC Act.
Threatened ecological community	A community of different species associated with one another and sharing the same habitat, that is listed under the NSW <i>Biodiversity Conservation Act 2016</i> (BC Act), <i>Fisheries Management Act 1994</i> (FM Act) and Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act). Threatened ecological communities are listed as endangered or critically endangered under the NSW <i>Biodiversity Conservation Act 2016</i> (BC Act), or may be listed as vulnerable, endangered or critically endangered under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act).
1,500 metre landscape buffer	The assessment area surrounding the development site includes the area of land in the 1,500 metre landscape buffer around the development site. The study area is situated within the 1,500 metre landscape buffer. The landscape buffer is an assessment area used to identify landscape features surrounding the development site to provide development site context and to inform the likely habitat suitability of the development site.

Abbreviations	
BAM	Biodiversity Assessment Method
BAM-C	BAM Calculator
BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
BDAR	Biodiversity Development Assessment Report
BIO Map	Biodiversity Investment Opportunities Map
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
DPI	Department of Primary Industries
EEC	Endangered ecological community
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999 (Federal)</i>
FM Act	<i>Fisheries Management Act 1994 (NSW)</i>
IBRA	Interim Biogeographically Regionalisation of Australia
MNES	Matters of National Environmental Significance
PCT	plant community type
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSI	State Significant Infrastructure
TECs	Threatened Ecological Communities
VIS	Vegetation information system (BioNet Vegetation Classification)

Executive Summary

Sydney Metro (as ‘the proponent’) is seeking approval for the construction and operation of Sydney International Speedway on land owned and managed by Western Sydney Parklands Trust.

The development is State significant infrastructure under Part 5, Division 5.2 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and is subject to approval by the Minister for Planning and Public Spaces.

This Biodiversity Development Assessment Report (BDAR) has been prepared for the Sydney International Speedway development in accordance with the requirements of the *Biodiversity Conservation Act 2016* (BC Act) and the Biodiversity Assessment Method (BAM). This BDAR documents the results of the biodiversity assessment carried out for the development in line with the relevant State and Commonwealth environmental and threatened species legislation and policy. It also considers relevant matters under the *Fisheries Management Act 1994*.

Existing environment

The development site (being the development footprint and the area of land that would be directly impacted) is located within Western Sydney Parklands’ Precinct 5: Eastern Creek Motor Sports which sits within the Blacktown Local government area (LGA) in the Central River City sub region of Greater Sydney, about six kilometres southwest of the Blacktown City Centre, and 32 kilometres west of the Sydney Central Business District

The Western Motorway (M4 Motorway) is about 1.4 kilometres north, and the Westlink M7 is about 1.2 kilometres west of the development. Industrial and commercial developments are located to the north and west of these major roads. The Prospect Nature Reserve, which contains the Prospect Reservoir, is about 150 metres east of the development. The development is bounded by Ferrers Road to the northwest, Ferrers Road and vegetation as part of Western Sydney Parklands in the west, the Warragamba Pipeline to the south and the Austral Bricks Horsley Park Brickworks located further south. Other motorsport operators within Western Sydney Parklands’ Precinct 5: Eastern Creek Motor Sports include Sydney Dragway immediately to the north and east and Sydney Motorsports Park (operated by the Australian Racing Drivers’ Club) to the north.

The landscape is highly modified for existing infrastructure and vegetation is mostly limited to poor condition young regrowth, isolated and likely planted trees and revegetation. Two moderate quality patches of woodland are present. An artificial drainage line contains patches of poor condition wetland vegetation. Three plant community types (PCTs) were identified in the development site:

- Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849)
- The Grey Box – Forest Red Gum grassy woodland on shale of the Cumberland Plain, Sydney Basin Bioregion (PCT 850)
- *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071).

Areas of PCT 849 and PCT 850 align with one Threatened Ecological Community (TEC) listed under the BC Act: Cumberland Plain Woodland in the Sydney Basin Bioregion (listed as Critically Endangered). One moderate condition patch of these PCTs met the condition threshold for the EPBC Act listed Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Critically Endangered Community), however it is outside of the development site between Carpark C and Carpark D. Two additional PCTs were identified within proximity of the development site.

Twenty-three candidate threatened plant species were identified as having potential habitat on the development site by the Biodiversity Assessment Method Calculator (BAM-C) and a review of databases and were targeted during surveys. None of the target threatened plant species were found within or adjacent to the development site.

The following threatened fauna species were identified by the BAM-C as potential candidate species and their potential presence at the development site is addressed via targeted survey and habitat assessment:

- Cumberland Plain Land Snail (*Meridolum corneovirens*)
- Green and Golden Bell Frog (*Litoria aurea*)

- Birds:
 - Owls: Barking Owl (*Ninox connivens*), Masked Owl (*Tyto novaehollandiae*), Powerful Owl (*Ninox strenua*)
 - Nectarivores: Little Lorikeet (*Glossopsitta pusilla*), Regent Honeyeater (*Anthochaera virens*), Swift Parrot (*Lathamus discolor*), Gang-gang Cockatoo (*Callocephalon fimbriatum*)
 - Woodland birds: Dusky Woodswallow (*Artamus cyanopterus cyanopterus*), Varied Sittella (*Daphoenositta chrysoptera*)
 - Raptors: Little Eagle (*Hieraaetus morphnoides*), Square-tailed Kite (*Lophoictinia isura*)
- Mammals:
 - Insectivorous bats: Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Eastern Freetail-bat (*Mormopterus norfolkensis*), Grey-headed Flying-fox (*Pteropus poliocephalus*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Large Bent-winged Bat (*Miniopterus orianae oceanensis*), Little Bent-winged Bat (*Miniopterus australis*), Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*), Southern Myotis (*Myotis macropus*)
 - Grey-headed Flying Fox (*Pteropus poliocephalus*).

Of these, only the Cumberland Plain land Snail, Southern Myotis and the Green and Golden Bell Frog are considered likely to have potential breeding habitat and potential candidate threatened species for which a biodiversity credit requirement may be generated. In the absence of breeding habitat, the remaining species are only ecosystem credit species for the purposes of this assessment.

Targeted surveys were completed for Southern Myotis and the Green and Golden Bell Frog in February 2020. The Cumberland Plain Land Snail was assumed to be present based on the presence of suitable habitat in moderate condition woodland between Carpark C and Carpark D, which is outside of the development site.

The Green and Golden Bell Frog was not identified from the targeted surveys. Areas of potential habitat are present at locations outside of the development site, including along the artificial drainage line between Carpark C and Carpark D, with some lower quality habitat opportunities along Eastern Creek. Based on the results of the targeted surveys, distribution of recent recorded sightings, the distance of the Parramatta key population and the relatively disconnected nature of the drainage line near the development site to surrounding potential habitats, it is considered that the potential for the Green and Golden Bell Frog to occur within the development site is low. No species polygons have been developed for the Green and Golden Bell Frog and no offsets are required.

The Southern Myotis was not caught during trapping efforts, however analysis of calls recorded made a probable identification of this species along Eastern Creek and the artificial drainage line between Carpark C and Carpark D. Only Eastern Creek was considered to contain suitable habitat based on the habitat requirements for this species as it does not contain areas of open water greater than three metres wide. Species polygons were created to include all associated habitat within 200 metres of Eastern Creek.

Impacts to biodiversity

The potential for direct impacts to biodiversity is limited to clearing of native vegetation and habitat. The development would not impact any areas of land that the Minister for Energy and Environment has declared as an area of outstanding biodiversity value in accordance with section 3.1 of the BC Act.

Plant community types

Despite avoidance and minimisation measures, the development site would result in the direct removal of some native vegetation. The estimated clearing is about 0.38 hectares (3,787 square metres) consisting of the following PCTs:

- Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849) – 0.074 hectares (744 square metres)
- Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850) – 0.304 (3,043 square metres)

- *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071) – 0.001 hectares (10 square metres).

Threatened Ecological Communities

One Threatened Ecological Community (TEC) listed under the BC Act would be impacted by the development:

- Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered) – 0.38 hectares comprising the combined extent of the two PCTs (PCT 849 and PCT 850) described above.

The areas of the TEC are mostly in poor condition represented by regrowth native species amongst plantings and weed growth. The woodland between Carpark C and Carpark D (outside of the development site) is also a patch of BC Act listed Cumberland Plain Woodland in the Sydney Basin Bioregion. Some areas of this vegetation in moderate conditions are also part of the Commonwealth EPBC Act listed Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest ecological community (listed as Critically Endangered). The development would not include clearing of any native vegetation identified as a TEC under the EBPC Act.

Threatened species

Direct impacts on species credit threatened species habitat associated with the clearing of native vegetation is limited to 0.005 hectares (51 m²) of habitat for Southern Myotis. No Cumberland Plain Land Snail habitat would be impacted by the development. Other impacts to threatened species habitat including impacts to connectivity and species movement, impacts to non-native vegetation and disturbed areas, and impacts to water quality and hydrology are considered to be minimal and manageable through the implementation of suitable mitigation measures.

Prescribed biodiversity impacts

The construction of a drainage pit and flow bypass pipe upstream of the existing culvert under Ferrers Road between Carpark C and D would result in direct instream impacts and an eventual change in the surface water hydrology of the drainage line upstream. The reduction of the existing 1500 millimetre pipe with a smaller 900 millimetre diameter flow bypass pipe has been incorporated into the project design. This would change the duration and extent of inundation of the upstream area between the two culverts during a 50-year and 100-year flood event. The result would be an increase in flood depth by 1.1 metres for around an additional 12 minutes during a 50-year flood event. There would also be an increase by 1.1 metres for a 100-year event, though the time of inundation would be about the same as under existing conditions. This change is considered to be too uncommon and temporary to cause any impact to the structure and function of the surrounding vegetation communities.

There would be some disturbance to instream habitats as a result of the construction of the drainage pit and flow bypass pipe upstream of the existing culvert under Ferrers Road between Carpark C and D. However, the new drainage infrastructure at this location would be mostly preconstructed and dropped into place from the road verge with minimal instream works required. The total area of direct disturbance caused by the new drainage infrastructure at this location would be around 14 square metres, with nine square metres of direct impact to PCT 1071 (*Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion) expected as a result. Appropriate environmental controls would be established to minimise disturbance and sedimentation of downstream aquatic habitats during construction and operation of the project. The section of the drainage line that would be impacted is highly ephemeral and likely dry most of the year.

The development may include the removal of some human made structures that may provide suitable roosting habitat for a range of insectivorous bat species. However, there are likely to be minimal, if any, roosting opportunities for these species. It is unlikely that the development would detrimentally affect the bioregional persistence of these species.

Up to 1.3 hectares of revegetation and weeds would be impacted by the development. This includes some areas of planted native non indigenous trees. Twelve threatened species may utilise the non-native vegetation, including both native and exotic planted trees and shrubs, that are found within the development sites, including the Grey-headed Flying Fox and Swift Parrot. Due to the marginal, unnatural, structure of the vegetation present, it is unlikely to be used as breeding habitat by any threatened species. It is unlikely that the development would detrimentally affect the bioregional persistence of these species.

Considering the highly disturbed nature of the landscape within which the development site is located, there are not expected to be any indirect impacts that would adversely affect areas of vegetation that would be retained. There is potential for indirect impacts to surrounding aquatic habitats (e.g. Eastern Creek) from erosion and contaminated runoff from construction and operation. The implementation of standard mitigation measures (i.e. sediment control, spill control) would control sediment and pollutants from any significant runoff events.

Management and mitigation

Once all practicable steps to avoid or minimise impacts have been implemented at the detailed design phase, management and mitigation measures would be implemented to further lessen the potential ecological impacts of the development. Mitigation measures, identified in **Section 10** of this BDAR, would be implemented during construction and would also be outlined in a Flora and Fauna Management Plan (refer to Appendix C (Construction Environmental Management Framework) of the Environmental Impact Statement).

Offsetting biodiversity impacts

An offset is required for the impacts to PCTs and the biodiversity credit obligation has been calculated using the BAM-C and presented in this BDAR. Areas of the development site that do not possess PCTs have not been assessed and offset credits are not required. A summary of the biodiversity credit requirements for the development include:

- Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (849) – Moderate: 1 credit
- Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (850) – Poor: 2 credits
- Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (850) – Revegetation: 1 credit
- *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071) – 1 credit

1. Introduction

1.1 Sydney International Speedway

The NSW Government has committed to relocating speedway racing to Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports, creating a true motorplex for the NSW motorsport racing community. The new Sydney International Speedway (the development) would provide the community and racing supporters a unique sporting facility that would cater for local, regional, national, and international racing events while continuing to support the growth of speedway racing in NSW.

The new speedway would be located alongside the existing Sydney Dragway to the north and east and the Sydney Motorsports Park (operated by the Australian Racing Drivers' Club) to the north.

Western Sydney Parklands Trust in conjunction with the NSW Office of Sport, is leading a masterplanning process for Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports, with opportunities to share infrastructure and coordinate events across the three venues. This masterplan sets the context for the planning of the new Sydney International Speedway, which is the subject of this Environmental Impact Statement.

As part of delivering Sydney Metro West - the city's next big underground railway, the existing government land currently used for speedway racing is required for a future stabling and maintenance facility. The development is planned to be constructed and operational prior to the closure of the current speedway.

The development site is located on land owned and managed by Western Sydney Parklands Trust. Sydney Metro is applying for State significant infrastructure approval and is proposing to build the development on behalf of and pursuant to arrangements with Western Sydney Parklands Trust.

Section 5.12(4) of the EP&A Act provides for the declaration of specified development on specified land as State significant infrastructure. A declaration is being sought for the Sydney International Speedway as State significant infrastructure under Sections 5.12(4) of the EP&A Act. Schedule 4 of State Environmental Planning Policy (State and Regional Development) 2011 would be amended to include Sydney International Speedway.

1.1.1 Location

The development would be located within Western Sydney Parkland's Precinct 5: Eastern Creek Motor Sports, which sits within the Blacktown Local Government Area (LGA) in the Central River City sub-region of Greater Sydney, about six kilometres south-west of Blacktown City Centre, and 32 kilometres west of the Sydney Central Business District. The location of the development is shown on **Figure 1-1**.

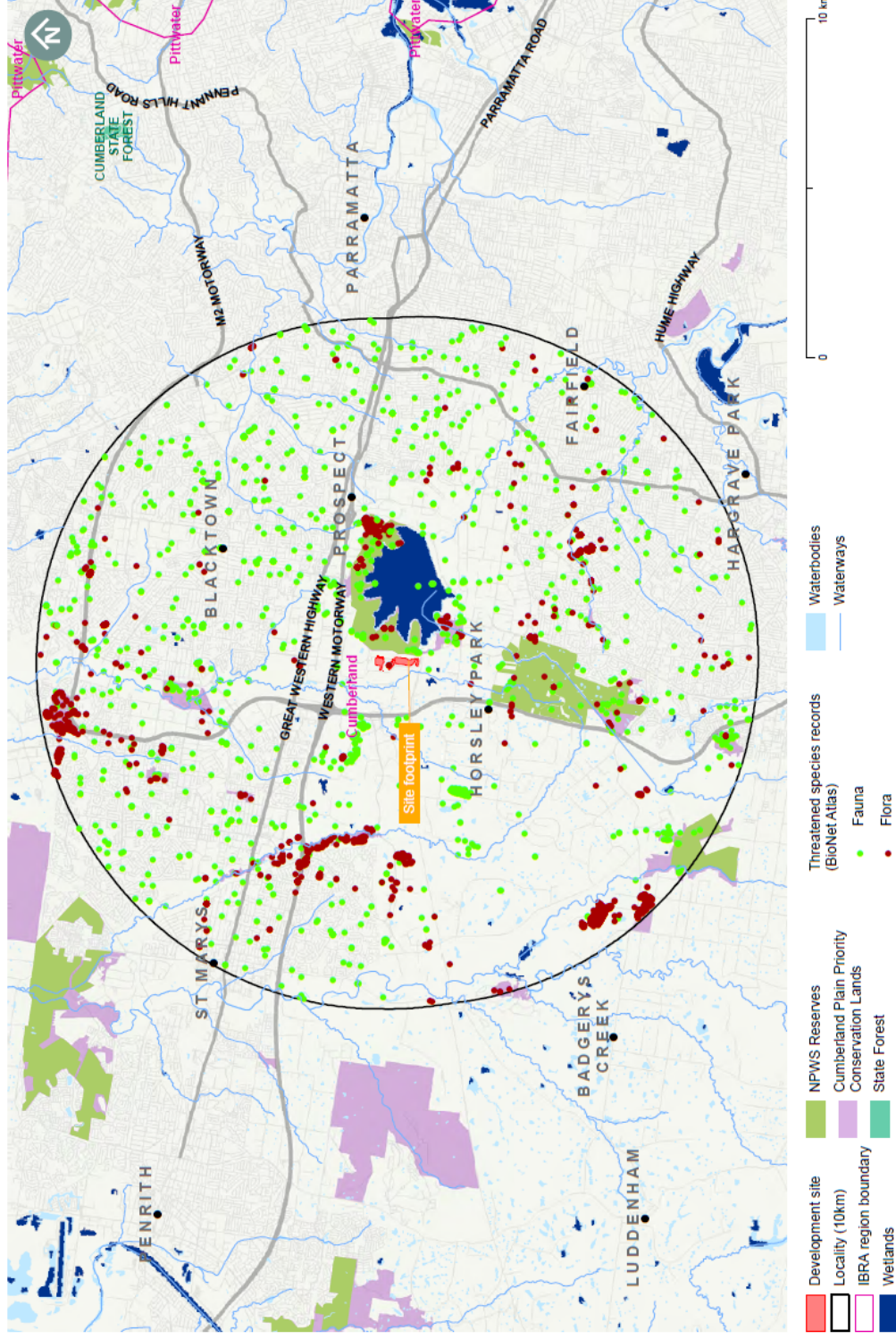


Figure 1-1 Location map

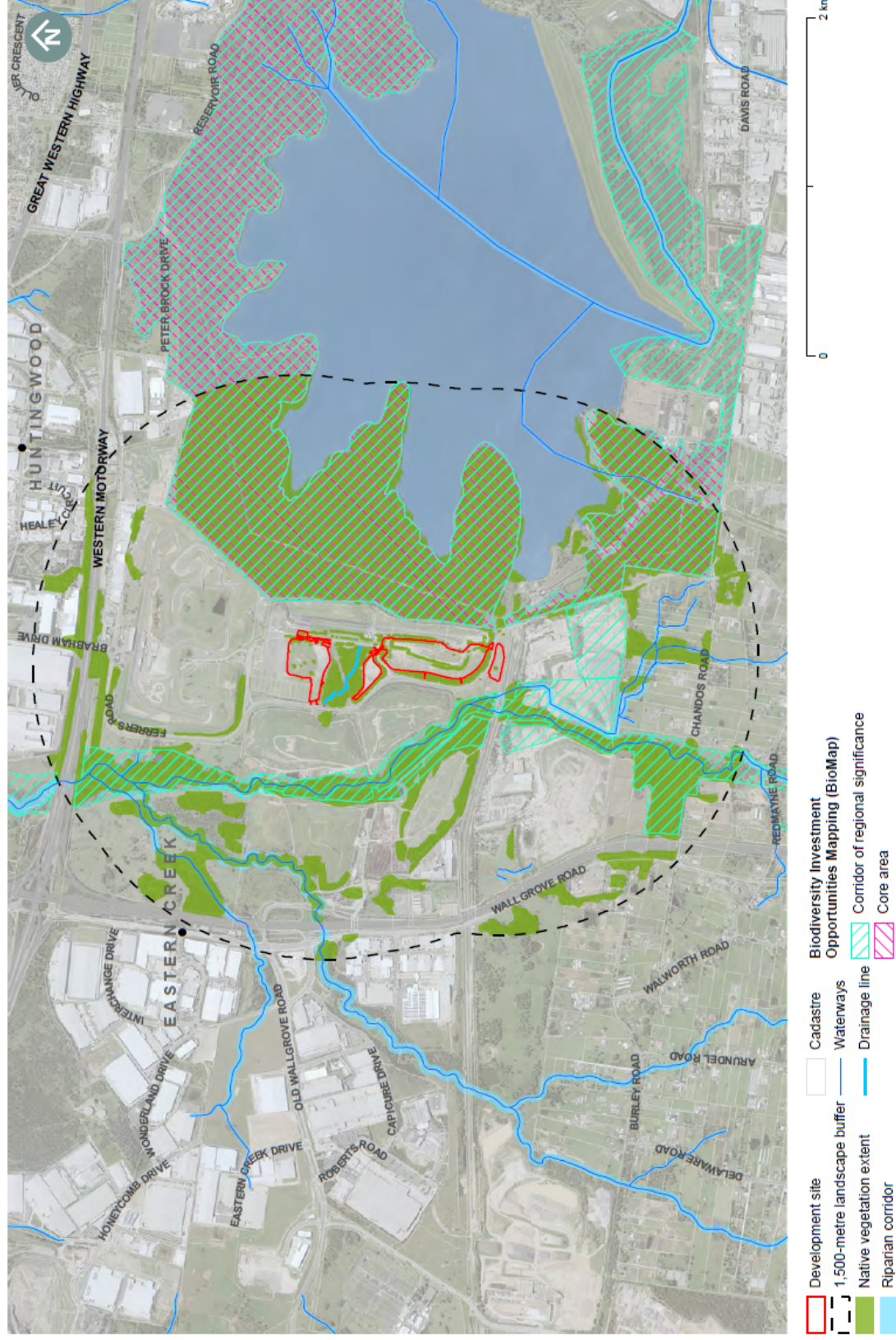


Figure 1-2 Site map

1.1.2 Local context of the development

The development site is about 21 hectares. The Western Motorway (M4 Motorway) is about 1.4 kilometres north, and the Westlink M7 is about 1.2 kilometres west of the development. Industrial and commercial developments are located to the north and west of these major roads. The Prospect Nature Reserve, which contains the Prospect Reservoir, is about 150 metres east of the development.

Sixteen precincts have been identified within the Western Sydney Parklands, each with its own character and land uses, infrastructure, issues and opportunities. The development would be situated within Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports. The development is bounded by Ferrers Road to the north-west, Ferrers Road and vegetation as part of Western Sydney Parklands in the west, the Warragamba Pipeline to the south and the Austral Bricks Horsley Park Brickworks located further south. Other motorsport operators within Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports include the Sydney Dragway immediately to the north and east and Sydney Motorsports Park (operated by the Australian Racing Drivers' Club) to the north. A full list of stakeholders is provided in Chapter 4 (Stakeholder and community engagement).

Other businesses in the vicinity include:

- The SUEZ Eastern Creek Resource Recovery Park, about 1.1 kilometres west of the development
- Global Renewables waste processing facility, about 650 metres west of the development.

1.1.3 Overview of Sydney International Speedway Development

Once complete, the development would include world class racing infrastructure in the form of a clay-based racetracks benchmarked to national and international best practice for both speedway vehicles and motorcycles. To facilitate the use of the speedway racetracks, the following ancillary racing infrastructure would be constructed:

- New vehicle access to the raceway area, including a gated access via an intersection off Ferrers Road
- A racing competitor's pit area, comprising around 150 parking bays for race vehicles and their tenders, including 20 bays for heavy vehicles transporting racing vehicles to and from the speedway and viewing platforms for pit crews
- Workshops/garages and track-side operational support areas to be used by pit crews.

High quality event support infrastructure provided to maximise the spectator experience at speedway events would comprise:

- A grandstand with the capacity to seat around 3750 spectators
- Ticketing and entryway structures
- Spectator facilities, including terraced seating for up to a total of around 7000 spectators, public amenities, corporate boxes, provision for food and beverage operators together with merchandise outlets
- Dedicated parking provided for spectators, visitors and users of the Sydney International Speedway, available for use by other motorsport operators by agreement
- Dedicated parking for Sydney Dragway to replace the existing spectator parking areas which would form part of the Sydney International Speedway development site. The new Sydney Dragway parking would be available for use by other motorsport operators by agreement.

Operational support infrastructure would be provided to enable the operation of the Sydney International Speedway. Such infrastructure would include:

- Public safety including fencing and fire safety systems

- Communications including a fibre optic network (to suit internet broadcasting bandwidth and PA/AV provisions), signage and large broadcasting screens
- Services including the provision of stormwater, drainage and flooding, utilities and lighting.

The operational site layout is shown on **Figure 1-3**. Operation would also include maintenance activities required to support the development.

Construction of the development is expected to take around 13 months to complete. The following construction activities would be carried out:

- Clearing, earthworks and levelling
- Landforming works
- Establishment of carparks
- Construction of racing and event support infrastructure
- Utilities connections, landscaping and finishing works.

Further detail on the development is provided in Chapter 5 (Project description) of the Sydney International Speedway Environmental Impact Statement.

1.2 Purpose and scope of this report

This technical paper is one of several technical papers that form part of the Environmental Impact Statement. The purpose of the BDAR is to identify and assess the biodiversity impacts of the development. In doing so it responds directly to the Secretary's Environmental Assessment Requirements outlined in **Section 1.3**.

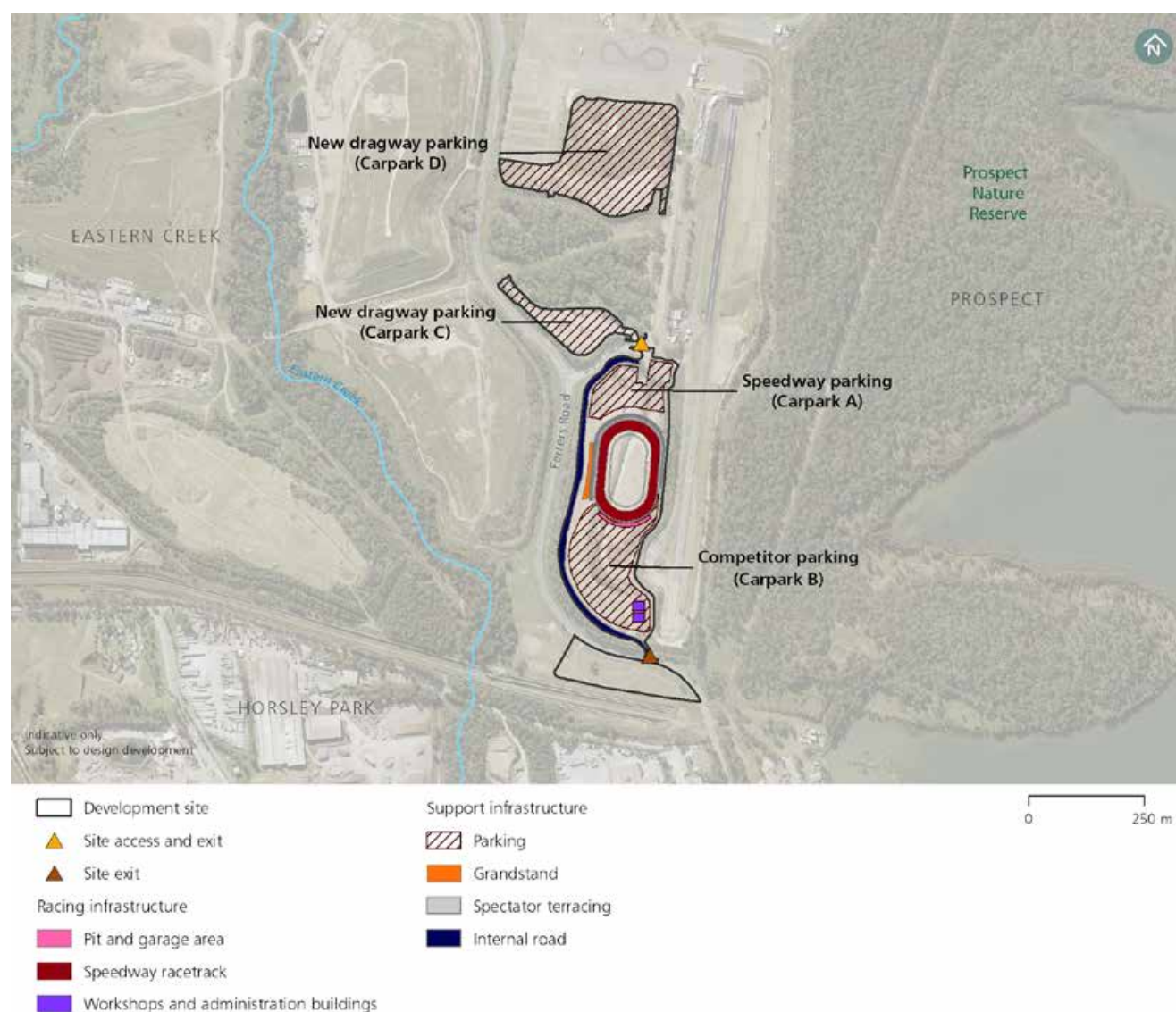


Figure 1-3 Development overview

1.3 Secretary's Environmental Assessment Requirements

The Secretary's Environmental Assessment Requirements were issued for Sydney International Speedway on 19 May 2020. The requirements specific to biodiversity and where these requirements are addressed in this BDAR, are outlined in **Table 1-1**.

Table 1-1 Secretary's Environmental Assessment Requirements – Biodiversity

Reference	Requirement	Where addressed
4. Biodiversity		
2.4.1	The proponent must assess biodiversity impacts in accordance with section 7.9 of the <i>Biodiversity Conservation Act 2016</i> (BC Act), the Biodiversity Assessment Method (BAM), and be documented in a Biodiversity Development Assessment Report (BDAR).	This report is the BDAR as required under section 7.9 of the BC Act. The BDAR was prepared in accordance with the Biodiversity Assessment Method (Office of Environment and Heritage, 2017) and guidance provided in the Biodiversity Assessment Method Operational Manual Stage 1 (State of NSW and Office of Environment and Heritage, 2018) and Biodiversity Assessment Method Operational Manual Stage 2 (State of NSW and Department of Planning Industry and Environment, 2019) (see Section 2).

Reference	Requirement	Where addressed
4. Biodiversity		
		<p>The Biodiversity Assessment calculator case associated with this BDAR is 00020140/BAAS19068/20/00020141.</p> <p>The biodiversity surveys completed during preparation of this BDAR were guided by the Threatened Species Survey and Assessment Guidelines (see Section 2).</p>
2.4.2	The BDAR must include information in the form detailed in s6.12 of the BC Act, cl6.8 of the <i>Biodiversity Conservation Regulation 2017</i> and the BAM.	<p>The BDAR has been prepared in accordance with s6.12 of the BC Act. This report has been prepared by an accredited person as described in Section 1.5. The four specific requirements of s6.12 are:</p> <ul style="list-style-type: none"> a) assesses in accordance with the biodiversity assessment method the biodiversity values of the land subject to the proposed development, activity or clearing, and (refer Chapters 2, 3, 4, 5, 6, 7) b) assesses in accordance with that method the impact of proposed development, activity or clearing on the biodiversity values of that land, and (refer Chapter 9) c) sets out the measures that the proponent of the proposed development, activity or clearing proposes to take to avoid or minimise the impact of the proposed development, activity or clearing, and (refer Chapter 8 and 10) d) specifies in accordance with that method the number and class of biodiversity credits that are required to be retired to offset the residual impacts on biodiversity values of the actions to which the biodiversity offsets scheme applies (refer Chapters 11 and 12). <p>The BDAR has been prepared in accordance with cl6.8 of the <i>Biodiversity Conservation Regulation 2017</i>. A biodiversity development assessment report must include:</p> <ul style="list-style-type: none"> a) the number and classes of biodiversity credits required to be retired in accordance with the like-for-like requirements of the offset rules, and (refer Chapters 11 and 12) b) the number and classes of biodiversity credits that could be retired in accordance with the variation rules (in any case in which the proponent of the development proposes to use the variation rules), and (N/A to this development) c) details of any proposal to fund a biodiversity conservation action in accordance with the offset rules, and (N/A to this development) d) details of any ecological rehabilitation of a site impacted by mining under a mining lease that is proposed as a measure to offset or compensate for those impacts, and (N/A to this development) e) the date of the report and the requisite certification under section 6.15 of the Act, and (refer to the Title page of this report for date) f) details of the accreditation of the person preparing the report and of the qualifications and experience of any other person commissioned to conduct research or investigations that are relied on in preparing the report, and (refer to Section 1.5) g) any other information required by the biodiversity assessment method or ancillary rules to be included in the report (refer Chapters 2, 3, 4, 5, 6, 7).

Reference	Requirement	Where addressed
4. Biodiversity		
		This BDAR has been prepared in accordance with the Biodiversity Assessment Method as described in Chapter 2).
2.4.3	The BDAR must be submitted with all digital spatial data associated with the survey and assessment as per Appendix 10 of the BAM.	Digital spatial data supplied. Refer to the following figures included in this BDAR: <ul style="list-style-type: none"> • Figure 1-1 • Figure 1-2 • Figure 1-3 • Figure 2-1 • Figure 2-2 • Figure 2-3 • Figure 4-1 • Figure 4-2 • Figure 5-1 • Figure 5-2 • Figure 6-1 • Figure 11-1
2.4.4	The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the BC Act.	Section 1.5
2.4.5	The BDAR must include details of the measures proposed to address offset obligations.	Chapters 11 and 12
2.4.6	The Proponent must assess any impacts on biodiversity values not covered by the BAM.	Section 0
2.4.7	The Proponent must identify whether the development, or any component of the development, would be classified as a Key Threatening Process (KTP) in accordance with the listings in the BC Act, FM Act and the Environmental Protection and the Biodiversity Conservation Act 2000 (EPBC Act).	Section 9.4

1.4 Key terms used in this report

The following terms are discussed throughout the technical paper which aligns with terminology of the Biodiversity Assessment Method (BAM), and are defined as:

- **Development site:** this area includes all areas to be directly impacted (see **Figure 1-2**). The development site is also known as the 'subject land' in the BAM. For the purposes of this BDAR, the term *development site* is used.

- Study area: the study area is much larger than the development site and includes the development site and surrounding area within a 50 metre buffer (see **Figure 2-1**) that may be subject to surface indirect impacts.
- Locality: This is defined as the area within a 10 kilometre radius surrounding the development site (see **Figure 1-2**).
- Bioregion: The study area is located in the Sydney Basin bioregion within the Cumberland subregion (Thackway and Cresswell, 1995).
- 1,500 metre landscape buffer: The assessment area surrounding the development site (or subject land) includes the area of land in the 1,500 metre landscape buffer around the development site. The study area is situated within the 1,500 metre landscape buffer. The landscape buffer is an assessment area used to identify landscape features surrounding the development site to provide development site context and to inform the likely habitat suitability of the development site (see **Figure 1-1**).

1.5 Authors

The work to prepare this BDAR was carried out by appropriately qualified and experienced ecologists as outlined in **Table 1-2**.

Table 1-2 Personnel, role and qualifications

Name	Role	Qualifications
Brenton Hays	Senior Ecologist - Technical lead, targeted surveys, reporting, GIS analysis	Bachelor of Environmental Science and Management (Hons) Accredited under section 6.10 of the Biodiversity Conservation Act 2016 as a Biodiversity Assessment Method Assessor (No. BAAS19068)
Lukas Clews	Associate Ecologist – Vegetation Integrity Surveys and targeted plant searches, reporting, GIS analysis	Master of Scientific Studies Graduate Certificate in Applied Science Bachelor of Science Diploma in Conservation and Land Management Certified Environmental Practitioner (CEnvP) by the Environment Institute of Australia and New Zealand (EIANZ) Accredited under section 6.10 of the <i>Biodiversity Conservation Act 2016</i> as a Biodiversity Assessment Method Assessor (No. BAAS17060)
Chris Thomson	Principal Ecologist – Technical review	Graduate Certificate in Natural Resources Bachelor of Applied Science (Environmental Management) Accredited under section 6.10 of the <i>Biodiversity Conservation Act 2016</i> as a Biodiversity Assessment Method Assessor (No. BAAS18058)

2. Methodology

This section documents the methodology applied in the preparation of the BDAR. The BDAR was prepared in accordance with the *Biodiversity Assessment Method* (Office of Environment and Heritage, 2017) and guidance provided in the *Biodiversity Assessment Method Operational Manual Stage 1* (State of NSW and Office of Environment and Heritage, 2018) and *Biodiversity Assessment Method Operational Manual Stage 2* (State of NSW and Department of Planning Industry and Environment, 2019). Further detail on the methodology for aquatic environments is provided in **Section 6**.

2.1 Study area

As defined in **Section 1.4**, the study area includes the development site and adjacent areas within a 50 metre buffer to capture areas around the development site that may be subject to indirect impacts (see **Figure 2-1**). The study area is located primarily in the suburb of Eastern Creek in the local government area (LGA) of Blacktown. The study area also extends into a small section of the suburb of Horsley Park in the Fairfield LGA.

2.2 Background research and data sources

A background review of existing information was carried out to identify the existing environment within a search area of 10 kilometres surrounding the development site. The review focussed on database searches, relevant ecological reports pertaining to the development site (where publicly available) and relevant GIS layers. The review was used to prepare a list of plant community types (PCTs), threatened species, populations and communities as well as important habitat for migratory species with a likelihood of occurrence in the survey area and locality. The searches were also carried out to identify if any Areas of Outstanding Biodiversity Value were present.

The following databases were searched or viewed:

- BioNet – the website for the Atlas of NSW Wildlife and Threatened Biodiversity Data Collection (searched 5 March 2020)
- NSW Department of Primary Industries (DPI) freshwater threatened species distribution maps (viewed 5 March 2020)
- The federal Department of Agriculture, Water and the Environment Protected Matters Search Tool (PMST) (searched 5 March 2020) (refer to **Appendix F**)
- BioNet NSW Vegetation Classification database (viewed February 2020)
- Atlas of Living Australia (viewed April 2020)
- The federal Bureau of Meteorology's Atlas of Groundwater Dependent Ecosystems (GDE) (viewed April 2020)
- Department of Agriculture, Water and the Environment directory of important wetlands (viewed April 2020).

Regional vegetation mapping, geology and soil mapping developments were reviewed including:

- *The Native Vegetation of the Sydney Metropolitan Area – Version 3.1* (VIS_ID 4489) (State Government of NSW and Office of Environment and Heritage, 2016)
- *Remnant Vegetation of the western Cumberland subregion, 2013 Update* (VIS_ID 4207) (State Government of NSW and Office of Environment and Heritage, 2015).
- *Southeast NSW Native Vegetation Classification and Mapping – SCIVI* (State Government of NSW and Office of Environment and Heritage (OEH), 2010)
- *Penrith 1:100 000 Geological Sheet 9030* (Clarke and Jones, 1991)
- *Soil landscapes of the Penrith 1:100,000 Sheet 9030* (Hazelton et al., 1989)
- *Australian Soil Classification (ASC) Soil Type map of NSW* (State Government of NSW and Office of Environment and Heritage (OEH), 2012).

Preliminary and provisional determinations to list species and ecological communities as threatened under the BC Act were viewed from the NSW Threatened Species Scientific Committee web resources. At the time of writing, there are no preliminary or provisional listings of relevance. The annual Final Priority Assessment List (FPAL) is the list of nominated species, ecological communities and key threatening processes that have been approved for assessment by the Minister responsible for the EPBC Act for a particular assessment year. These have a statutory timeframe in which the assessment must be completed.

2.3 Mapping extent of native vegetation cover

The extent of native vegetation in the development site was ground truthed and mapped using up to date aerial imagery. Polygons were digitised in a GIS (ArcGIS 10.6) at a scale of between 1:1,000 and 1:5,000. The vegetation extent within the development site has been mapped as accurately as possible although some boundary errors may still exist.

To assess per cent of current extent of native vegetation, a landscape buffer of 1,500 metres was placed around the boundary of the development site in accordance with section 4.2 of the BAM. Per cent native vegetation cover in the landscape buffer was calculated using a combination of regional vegetation mapping and aerial imagery, in some cases making assumptions of native vegetation where no mapping exists (e.g. along M4 Motorway).

2.3.1 Definition of native vegetation

Under the BAM, native vegetation has the same meaning as in section 1.6 of the BC Act which states that native vegetation and clearing native vegetation have the same meanings as in Part 5A of the *Local Land Services Act 2013*. Part 5A 60B of the *Local Land Services Act 2013* defines the meaning of native vegetation as any of the following types of plants native to New South Wales:

- a) Trees (including any sapling or shrub or any scrub)
- b) Understorey plants
- c) Groundcover (being any type of herbaceous vegetation)
- d) Plants occurring in a wetland.

A plant is native to New South Wales if it was established in New South Wales before European settlement. This includes planted vegetation which is important as the development site and study area contains several native species plantings.

2.4 Plant community type identification

Regional vegetation mapping was initially reviewed to assess the likely PCTs within the development site and study area. Three regional mapping datasets cover parts of the development site and surrounding land including:

- *The Native Vegetation of the Sydney Metropolitan Area – Version 3.1* (VIS_ID 4489) (State Government of NSW and Office of Environment and Heritage, 2016)
- *Remnant Vegetation of the western Cumberland subregion, 2013 Update* (VIS_ID 4207) (State Government of NSW and Office of Environment and Heritage, 2015).
- *Southeast NSW Native Vegetation Classification and Mapping – SCIVI* (State Government of NSW and Office of Environment and Heritage (OEH), 2010)

VIS ID 4489 and VIS ID 4207 provide classification of vegetation by PCT and were used during initial desktop investigations for preliminary vegetation mapping and to inform field survey effort.

The type and distribution of PCTs within the development site and study area were identified and mapped progressively during the field surveys. The identification of PCTs presented here in this BDAR is according to the NSW PCT classification as described in the BioNet Vegetation Classification database. Each PCT was assigned to the relevant corresponding Threatened Ecological Community (TEC) where applicable. A plot based floristic vegetation survey as described in section 5.2 of the BAM was carried out in areas where the vegetation was of sufficient size and shape to allow for plots to be completed. The plot based floristic vegetation surveys were carried out over three days in December 2019.

2.4.1 Stratification of native vegetation into survey units

Using existing vegetation mapping, survey sites (plots/midlines) were established within each area of mapped vegetation to provide a representative assessment of the vegetation prior to the field survey. Plots were also positioned to provide a wide spatial coverage of the development site and study area. Once the identification of PCTs had been finalised, each PCT was then divided into vegetation zones (an area of native vegetation that is the same PCT and has a similar broad condition state). The PCTs identified within the development site are described in detail in **Section 4** of this BDAR.

The vegetation within the development site has been assigned to a PCT as listed in the BioNet Vegetation Classification database based on the observed plant species composition, vegetation structure, landscape position, and underlying geology and soils.

2.4.2 Plot based floristic vegetation survey and Vegetation Integrity Assessment

A plot based full floristic survey and Vegetation Integrity Assessment was carried out according to the BAM using a series of 20 x 20 metre plots (or equivalent 400 square metre area) nested inside a 20 x 50 metre plot (or equivalent 1,000 square metre area). In some situations, along narrow PCT patches, 10 x 40 metre floristic plots were used. The location of each plot/midline completed during the survey is illustrated in **Figure 2-1**. Plots/midlines were established to provide a representative assessment of the vegetation integrity of the vegetation zone, accounting for the level of variation in the broad condition state of the vegetation zone.

A summary of the survey effort completed in each vegetation zone is provided in **Table 2-1**.

Table 2-1 Plant community types and vegetation zones identified in the development site

Vegetation zone	Plant community type ID No.	Plant community type name	Broad condition class	Vegetation zone area in development site (ha)	Minimum number of plots/midlines required	Number of plots/midlines completed
1	849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate	0.02	1	1
2	849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Poor	0.059	1	2
3	850	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Poor	0.246	1	1
4	850	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Revegetation	0.059	1	2

Vegetation zone	Plant community type ID No.	Plant community type name	Broad condition class	Vegetation zone area in development site (ha)	Minimum number of plots/midlines required	Number of plots/midlines completed
5	1071	<i>Phragmites australis</i> and <i>Typha orientalis</i> coastal freshwater wetlands of the Sydney Basin Bioregion	Drainage line	0.001	1	1

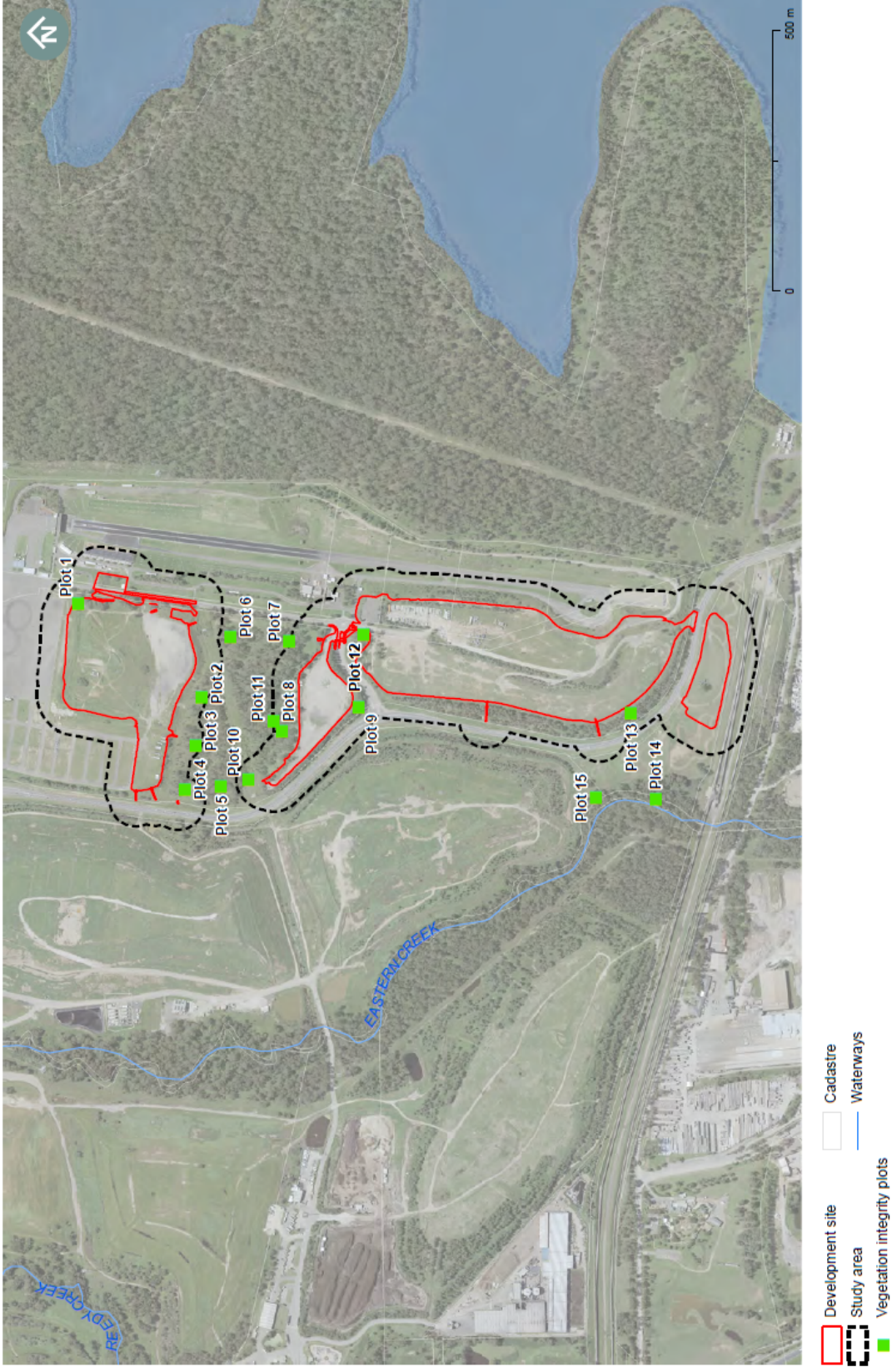


Figure 2-1 Location of plot based floristic vegetation survey and vegetation integrity assessments

2.5 Patch size

A patch is defined in the BAM as an area of intact native vegetation that occurs on the development site. The patch may extend onto adjoining land beyond the development site, and for woody ecosystems, includes native vegetation separated by less than or equal to 100 metres from the next area of intact native vegetation. For non woody vegetation, this gap is reduced to less than or equal to 30 metres. Patch size for each vegetation zone located on the development site was mapped in accordance with section 5.3.2 of the BAM using the following steps:

- Identify vegetation zones to be included in the same patch
- Identify the boundary of any adjoining intact native vegetation which extends beyond the limit of the development site
- Digitise each patch in a GIS using separate polygons where multiple patches exist
- Calculate the area of each patch in hectares in a GIS.

The patch was then allocated to a patch size class (being less than five hectares, five to 24 hectares, 25 to 100 hectares and greater than 100 hectares). Patch size class is used as a filter in the Biodiversity Assessment Calculator to predict threatened species likely to occur or use habitat on the development site. The patch size of all vegetation zones is greater than 100 hectares.

2.6 Threatened species habitat assessment – creating a candidate species list

Once the development site had been assessed for landscape context, and the PCTs present and vegetation integrity known, the list of candidate threatened species for assessment was developed. As outlined in section 6.4.1.3 of the BAM, the following criteria (a – f) were used to predict the threatened species that require assessment:

- a) The distribution of the species includes the IBRA subregion which the development site is, in the opinion of the assessor, mostly located within, and
- b) The development site is within any geographic constraints of the distribution of the species within the IBRA sub region, and
- c) The species is associated with any of the PCTs identified by the assessor under chapter 5 of the BAM as occurring within the development site, and
- d) The native vegetation cover within an assessment area 1,500 metres wide surrounding the boundary of the development site as determined by the assessor in accordance with section 4.3.2 of the BAM is equal to or greater than the minimum class that is required for the species (unless the development is, or is part of, a linear shaped development), and
- e) The patch size which the vegetation zone is part of, as identified in section 5.3.2 of the BAM is equal to or greater than the minimum specified for that species, and
- f) The species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

A threatened species was predicted as requiring assessment if that species meets all the criteria (a to f) that are relevant to the species. The Biodiversity Assessment Calculator was used to derive the list of candidate species based on criteria a to f. If any one of the criteria (a to f) relevant to a species was not met, the development site was considered not to be suitable habitat for the threatened species and no further assessment was carried out for that species.

The results of the BioNet search and the PMST search were also used to inform development of the candidate species list. Some species returned from the database searches (i.e. BioNet and the PMST) were removed from the assessment due to the absence of suitable habitat in the development site. The development site itself is highly disturbed and lacks high quality natural habitats, and species that are known to no longer occur in the Sydney urban area were removed from the assessment based on the lack of these habitat types from the development site.

The threatened species habitat suitability assessment is provided in **Section 5** and **Appendix A**. The candidate list of threatened species for assessment is provided in **Section 5**.

2.7 Targeted threatened species surveys

After the candidate species list had been developed (see **Section 5.3**), targeted threatened species surveys were carried out where possible. The surveys carried out for candidate threatened species of plants and animals are outlined in **Section 2.7.1** and **Section 2.7.2**, respectively. The habitat assessment identified that there is limited habitat in the development site for most threatened species. Targeted surveys were completed in December 2019 and February 2020.

2.7.1 Threatened plants

After the PCTs and finer scale habitats within the development site had been identified, and the threatened species habitat assessment had been completed, threatened plant surveys were completed across areas of suitable habitat. **Table 2-2** lists the species that were targeted. Most of the species in **Table 2-2** were identified by the BAM-Calculator, however an additional five species were added based on nearby records and suitable habitat on the development site. Two plants species identified by the BAM-Calculator, *Caladenia tessellata* and *Pterostylis saxicola*, were omitted from surveys due to a lack of suitable habitat in the development site.

Surveys for threatened plants were guided by the methodology and effort as outlined in the *NSW Guide to Surveying Threatened Plants* (Office of Environment and Heritage, 2016). Where possible, transects were walked by two ecologists through the habitats within the development site at 10 metre spacing. This was primarily carried out in the woodland between Carpark C and Carpark D in February 2020, which contains the highest quality habitat for threatened plants (refer to **Figure 2-2**). The artificial drainage line in this woodland was also targeted for aquatic and semi aquatic species, however the small area of the drainage line near the Ferrers Road culvert within the development site is highly degraded and likely dry most of the year. All other areas of vegetation were mostly considered low quality and only likely to contain larger conspicuous species and were therefore surveyed as part of initial vegetation transects of the development site. Habitats directly adjacent to the development site were also surveyed where possible to provide context for consideration of any potential indirect and/or off-site impacts.

Table 2-2 Summary of survey effort for threatened plant species

Species name	Common name	EPBC Act	BC Act	Required survey period	Survey completed
<i>Acacia bynoeana</i>	Bynoe's Wattle	V	E	All year	December 2019 and February 2020
<i>Acacia pubescens</i>	Downy Wattle	V	V	All year	December 2019 and February 2020
<i>Commersonia prostrata</i>	Dwarf Kerrawang	E	E	All year	December 2019 and February 2020
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E	E	All year	December 2019 and February 2020
<i>Dillwynia tenuifolia</i>	Dillwynia tenuifolia	-	V	August to October	*December 2019 and February 2020
<i>Eucalyptus benthamii</i>	Camden White Gum	V	V	All year	December 2019 and February 2020
<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	All year	December 2019 and February 2020

Species name	Common name	EPBC Act	BC Act	Required survey period	Survey completed
<i>Grevillea juniperina</i> subsp. <i>juniperina</i>	Juniper-leaved Grevillea	-	V	All year	December 2019 and February 2020
<i>Haloragis exalata</i> subsp. <i>exalata</i>	Square Raspwort	V	V	All year	December 2019 and February 2020
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> - endangered population	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	-	EP	All year	December 2019 and February 2020
<i>Maundia triglochinoides</i>	Maundia triglochinoides	-	V	November to March	December 2019 and February 2020
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	V	All year	December 2019 and February 2020
<i>Persicaria elatior</i>	Tall Knotweed	V	V	December to May	December 2019 and February 2020
<i>Persoonia bargoensis</i>	Bargo Geebung	V	E	All year	December 2019 and February 2020
<i>Persoonia nutans</i>	Nodding Geebung	E	E	All year	December 2019 and February 2020
<i>Pilularia novae-hollandiae</i>	Austral Pilwort	-	E	October to December	December 2019 and February 2020
<i>Pimelea curviflora</i> var. <i>curviflora</i>	Pimelea curviflora var. curviflora	V	V	October to March	December 2019 and February 2020
<i>Pimelea spicata</i>	Spiked Rice-flower	E	E	All year	December 2019 and February 2020
<i>Pultenaea parviflora</i>	Sydney-bush Pea	V	E	September to November	*December 2019 and February 2020
<i>Pultenaea pedunculata</i>	Matted Bush-pea	-	V	September to November	*December 2019 and February 2020
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	V	E	April, May, June	*December 2019 and February 2020
<i>Thesium australe</i>	Austral Toadflax	V	V	November to February	December 2019 and February 2020
<i>Zannichellia palustris</i>	Zannichellia palustris	-	E	October to January	*December 2019 and February 2020

Species name	Common name	EPBC Act	BC Act	Required survey period	Survey completed
Key: V = Vulnerable species, E = Endangered species, EP = Endangered population, CE = Critically Endangered species					

*Note: = the survey was completed outside of the allocated survey period for *Dillwynia tenuifolia*, *Pomaderris brunnea*, *Pultenaea pedunculata*, *Pultenaea pedunculata* and *Zannichellia palustris*. However, no species of *Dillwynia*, *Pomaderris* or *Pultenaea* were found during the surveys.

2.7.2 Threatened animals

Targeted threatened species surveys were completed for animals that had potential habitat within the development site and study area. The habitat assessment identified that there is limited habitat in the development site for most threatened species. However, two species, the Green and Golden Bell Frog (*Litoria aurea*) and Southern Myotis (*Myotis macropus*) were considered moderately likely to occur in the development site and surrounding habitat based on the presence of suitable habitat. To determine presence or absence from within or adjacent to the proposed development site, targeted surveys for these species were carried out in accordance with the following guidelines:

- Threatened species survey and assessment guidelines: field survey methods for fauna – Amphibians (Department of Environment and Climate Change, 2009)
- 'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method (State of NSW and Office of Environment and Heritage, 2018).

Table 2-3 outlines the threatened animal species that were identified by the BAM Calculator and assessed during surveys of the development site. Locations of targeted surveys are illustrated in **Figure 2-3**.

Table 2-3 Summary of survey effort for threatened animal species

Species name	Common name	EPBC Act	BC Act	Required survey period	Survey completed
<i>Anthochaera phrygia</i>	Regent Honeyeater (breeding habitat)	CE	CE	None allocated	Surveys not done. Species excluded through habitat assessment. No breeding habitat present.
<i>Burhinus grallarius</i>	Bush Stone-curlew	-	E	All year	Surveys not done. Species excluded through habitat assessment.
<i>Calidris ferruginea</i>	Curlew Sandpiper (Foraging)	CE	E	N/A	Surveys not done. Species excluded through habitat assessment.
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo (breeding habitat)	-	V	October, November, December, January	Surveys not done. Species excluded through habitat assessment.
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	-	V	October, November, December, January, February, March	Surveys not done. Species excluded through habitat assessment.
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	November, December, January	Surveys not done. Species excluded through habitat assessment. Only foraging habitat present in development site.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle (breeding habitat)	-	V	July, August, September, October, November, December	Surveys not done. Species excluded through habitat assessment.
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	September to May	Surveys not done. Species excluded through habitat assessment.
<i>Hieraaetus morphnoides</i>	Little Eagle (breeding habitat)	-	V	August, September, October	Surveys not done. Species excluded through habitat assessment.

Species name	Common name	EPBC Act	BC Act	Required survey period	Survey completed
<i>Lathamus discolor</i>	Swift Parrot (breeding habitat)	CE	E	None allocated	Surveys not done. No breeding habitat present. Foraging habitat assumed present.
<i>Limicola falcinellus</i>	Broad-billed Sandpiper (breeding)	-	V	N/A	Surveys not done. Species excluded through habitat assessment.
<i>Limosa limosa</i>	Black-tailed Godwit (breeding)	-	V	N/A	Surveys not done. Species excluded through habitat assessment.
<i>Litoria aurea</i>	Green and Golden Bell Frog	V	E	November December, January, February, March	Targeted survey completed in February 2020.
<i>Lophoictinia isura</i>	Square-tailed Kite (breeding habitat)	-	V	September, October, November, December, January	Surveys not done. Species excluded through habitat assessment.
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail	-	E	All year	Assumed present in moderate quality woodland between Carpark C and Carpark D. No habitat in the development site.
<i>Miniopterus australis</i>	Little Bent-winged Bat (breeding habitat)	-	V	December, January, February	Surveys not done. Species excluded through habitat assessment. Only foraging habitat present in development site.
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat (breeding habitat)	-	V	December, January, February	Surveys not done. Species excluded through habitat assessment. Only foraging habitat present in development site.
<i>Myotis macropus</i>	Southern Myotis	-	V	October, November December, January, February, March	Targeted survey completed in February 2020.
<i>Ninox connivens</i>	Barking Owl (breeding habitat)	-	V	May, June, July, August, September, October, November, December	Surveys not done. Species excluded through habitat assessment.
<i>Ninox strenua</i>	Powerful Owl (breeding habitat)	-	V	May, June, July, August	Surveys not done. Species excluded through habitat assessment.
<i>Pandion cristatus</i>	Eastern Osprey (Breeding)	-	V	April to November	Surveys not done. Species excluded through habitat assessment.
<i>Petaurus norfolcensis</i>	Squirrel Glider	-	V	All year	Surveys not done. Species excluded through habitat assessment.
<i>Phascolarctos cinereus</i>	Koala (breeding habitat)	V	V	All year	Surveys not done. Species excluded through habitat assessment.
<i>Pommerhelix duralensis</i>	Dural Land Snail	E	E	All year	Surveys not done. Species excluded through habitat assessment.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox (breeding habitat)	V	V	October, November December	Surveys completed in December 2019 and February 2020. No breeding habitat present.
<i>Tyto novaehollandiae</i>	Masked Owl (breeding habitat)	-	V	May, June, July, August	Surveys not done. Species excluded through habitat assessment.
Key: V = Vulnerable species, E = Endangered species, EP = Endangered population, CE = Critically Endangered species					

The fauna species which were identified from the background review and habitat assessment that were targeted during the survey are discussed in **Table 2-4**.

Table 2-4 Targeted fauna survey details

Threatened fauna species	Minimum survey requirements	Survey completed
Green and Golden Bell Frog	<p>All surveys should be completed within one week of heavy rainfall (>50 mm in seven days) during spring/summer (October – March).</p> <p>Initial habitat assessment surveys using a combination of call detection, call playback and spotlighting.</p> <p>A minimum of four nights under ideal conditions.</p> <p>Small wetlands (<50 m at greatest length) should be covered in about one hour.</p> <p>Large sites should be sampled systematically.</p>	<p>Sections of Eastern Creek and the drainage line within 100 to 200 m of the development site were assessed for their habitat value using criteria identified in the literature. This also included daytime searches for basking frogs.</p> <p>Potential habitats identified and each searched for one hour by two ecologists using call detection, call playback and spotlighting. Total survey effort was 4 nights. All surveys were completed within a week of heavy rainfall which ranged from 30 to 221 mm. Surveys were completed over a period of 4 nights from 17 February to 20 February 2020</p>
Southern Myotis	<p>All surveys are to be carried out during spring/summer from October – March.</p> <p>Harp trap or mist net is to be placed in areas of potential habitat. Harp traps are to be set beside or over pools of water along creeks or rivers. The minimum number of survey nights using harp traps is 4 nights per trap.</p> <p>Acoustic detection is to occur between October and March during spring/summer, for a duration of 4 nights.</p> <p>The range of Plant Community Types associated with the species, including 849 and 850, within 200 metres of any medium to large permanent creeks, rivers, lakes or other waterways. Potential habitat is within 2.5 km of riparian vegetation.</p>	<p>Two harp traps were assembled beside and in Eastern Creek (where possible) in separate locations, each for three nights. One harp trap remained in the same position for three nights. The other trap was moved after one night. Total survey effort was 6 trap nights covering 3 locations along Eastern Creek.</p> <p>Two Anabat Express bat call detectors were deployed, each for two nights. One positioned on Eastern Creek and one on a deep water section of the drainage line. Total survey effort was 4 trap nights. Recorded bat calls were analysed by Greg Ford (Balance Environmental).</p>

Green and Golden Bell Frog

Potential habitat for the Green and Golden Bell Frog was identified in and adjacent to the study area during initial surveys of the development site in December 2019 (see **Photos 1-3**). This includes parts of Eastern Creek within 100 to 200 metres of the development site and the artificial drainage line that runs through the moderate quality woodland between Carpark C and Carpark D.



Photo 1 – Survey site 1 (drainage line)



Photo 2 – Survey site 2 (drainage line)



Photo 3 – Survey site 3 (Eastern Creek)

Survey locations and transects are shown in **Figure 2-3**. Fauna survey sites 1 and 2 consisted of an artificial drainage line within an open grassy woodland. Both Site 1 and 2 had distinct patches of *Typha orientalis* around the culverts at either end. Site 3 was located on a section of Eastern Creek containing disturbed riparian woodland, dominated by *Eucalyptus tereticornis*, *Melaleuca styphelioides* and *Casuarina glauca*. To the east of Site 3, about 20 metres was cleared exotic grassland.

Table 2-5 Weather and rainfall conditions during nocturnal fauna surveys (Horsley Park Equestrian Centre AWS 067119)

Date	Min temp (°C)	Max temp (°C)	Wind (3pm)	Rainfall (24 hours)	Total rainfall in 7 days before survey	Observations
17/02/2020	21.3	22.8	Slight E 6 km/hr	16.6 mm	221 mm	Survey completed after thunderstorm with hail and flooding.
18/02/2020	20.1	28.3	Calm NNE 7 km/hr	0.6 mm	30 mm	Storm towards end of survey. High abundance of insects during survey.
19/02/2020	20.9	23.0	Slight W 9 km/hr	14.6 mm	30 mm	High abundance of insects during survey.
20/02/2020	19.4	19.7	Slight SE 7km/hr	0 mm	44.6 mm	100% cloud cover during survey period.

Nocturnal surveys were completed at three survey sites over four nights, between the 17 February and 20 February 2020. Weather conditions are shown in **Table 2-5**. Each survey site was searched by two ecologists on all four nights during the survey period. The duration of each sampling event extended between 20 and 40 minutes per site depending on the size of the site. The survey involved a spotlight search of the entire perimeter of the drainage lines / creek focusing on the upper water column and within emergent vegetation. Call playback was used at each survey site which involved playing calls through a 20W loudspeaker for a total of 2 to 5 minutes along multiple locations at each site. Details of the survey effort are described in Table 2-6 and illustrated in **Figure 2-3**.

Table 2-6 Green and Golden Bell Frog survey timing and sampling effort

Survey site	Survey nights				Total duration (hours)	No. sampling events
	1	2	3	4		
Survey site 1	17/02/2020	18/02/2020	19/02/2020	20/02/2020	1.92	4
Survey site 2	-	18/02/2020	19/02/2020	20/02/2020	0.92	3
Survey site 3	17/02/2020	18/02/2020	19/02/2020	20/02/2020	1.45	4

Southern Myotis

Southern Myotis was considered moderately likely to occur around the development site based on recent records in the locality and the presence of suitable habitat along Eastern Creek.

Two harp traps were installed along and, where possible, over Eastern Creek for three nights from 17 February to 19 February 2020. Harp traps were placed in potential flyways along the creek to capture foraging bats (see **Photos 4-6**). Two Anabat Express (Tittley Scientific) bat call detectors were also positioned along suitable habitat, 'Anabat 1' was placed on Eastern Creek and 'Anabat 2' on the artificial drainage line. Both Anabats were deployed for two nights each: 18 February and 19 February 2020. Weather conditions during the survey period are shown in **Table 2-5**. Survey locations for Southern Myotis are shown in **Figure 2-3**.



Photo 4 – Harp 1



Photo 5 – Harp 2



Photo 6 – Harp 3

Habitat assessment for candidate fauna species

Assessment of habitat suitability was undertaken for all fauna candidate species listed in **Table 5-3** with specific habitat requirements. Field surveys traversed the study area to identify the following habitat elements:

- Habitat trees that met the following criteria:
 - Nest trees and large stick nests – Square-tailed Kite (breeding) and Eastern Osprey (breeding)
 - Eucalypt tree species with hollows greater than 9 cm – Gang-gang Cockatoo (breeding)
 - Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground – Glossy Black-Cockatoo (breeding)

- Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines – White-bellied Sea-Eagle (breeding)
- Nest trees - live (occasionally dead), large old trees within vegetation – Little Eagle (breeding)
- Living or dead trees with hollow greater than 20cm diameter – Powerful Owl (breeding)
- Living or dead trees with hollows greater than 20cm diameter – Masked Owl (breeding) and Barking Owl (breeding)
- Fallen/standing dead timber including logs – Bush Stone-curlew
- Habitat for roosting bats:
 - Caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding by bats, and those within 200m of a riparian zone – Large Bent-winged Bat (breeding) and Little Bent-winged Bat (breeding)
 - Cliffs – Large-eared Pied Bat
 - Hollow-bearing trees, bridges, caves or artificial structures within 200 metres of riparian zone – Southern Myotis
 - Breeding camps – Grey-headed Flying-fox

2.8 Survey limitations

The desktop assessment and field survey carried out for this BDAR provides a limited view into the ecological values of the development site present at the time of the survey. The diversity of flora and fauna species recorded from this study should not be seen to be comprehensive. It is unlikely that every species present within the development site has been recorded. The field survey aimed to sample the development site and a comprehensive inventory of species was not made. A period of several seasons or years is often needed to identify all the species present in an area, especially as some species are only apparent at certain times of the year (e.g. orchids or migratory birds) and require specific weather conditions for optimum detection (e.g. breeding and flowering periods). The conclusions of this report are therefore based upon available data and are indicative of the environmental condition of the development site at the time of the survey. The vegetation integrity plot surveys were completed in December 2019 during a period of drought so the results must be considered with regard to the environmental conditions at the time of survey. Survey site conditions, including the presence of threatened species, can change with time. To address this limitation, the assessment has aimed to identify the presence and suitability of the habitat for threatened species.

The vegetation within the development site has been assigned to the most likely PCT as they are described in the BioNet Vegetation Classification database. In many cases there are no sharp boundaries defining the transition between PCTs, so the mapping provided in this BDAR is supported by on ground floristic surveys and observations of potential ecotones. Plant communities are naturally variable and the boundaries between different PCTs on the development site overlap considerably with a gradual transition from one community to another. However, a choice must be made to map and assign a PCT to an area of the development site. As mapping necessitates that a hard boundary is drawn to separate PCTs, boundaries of PCTs and vegetation zones have been mapped as best as possible based on observations made during the field survey and based on patterns observed on aerial photography. It is likely that the boundaries of PCTs and vegetation zones would change with time and in response to long term variation in biophysical conditions at the development site such as rainfall and surface drainage patterns.

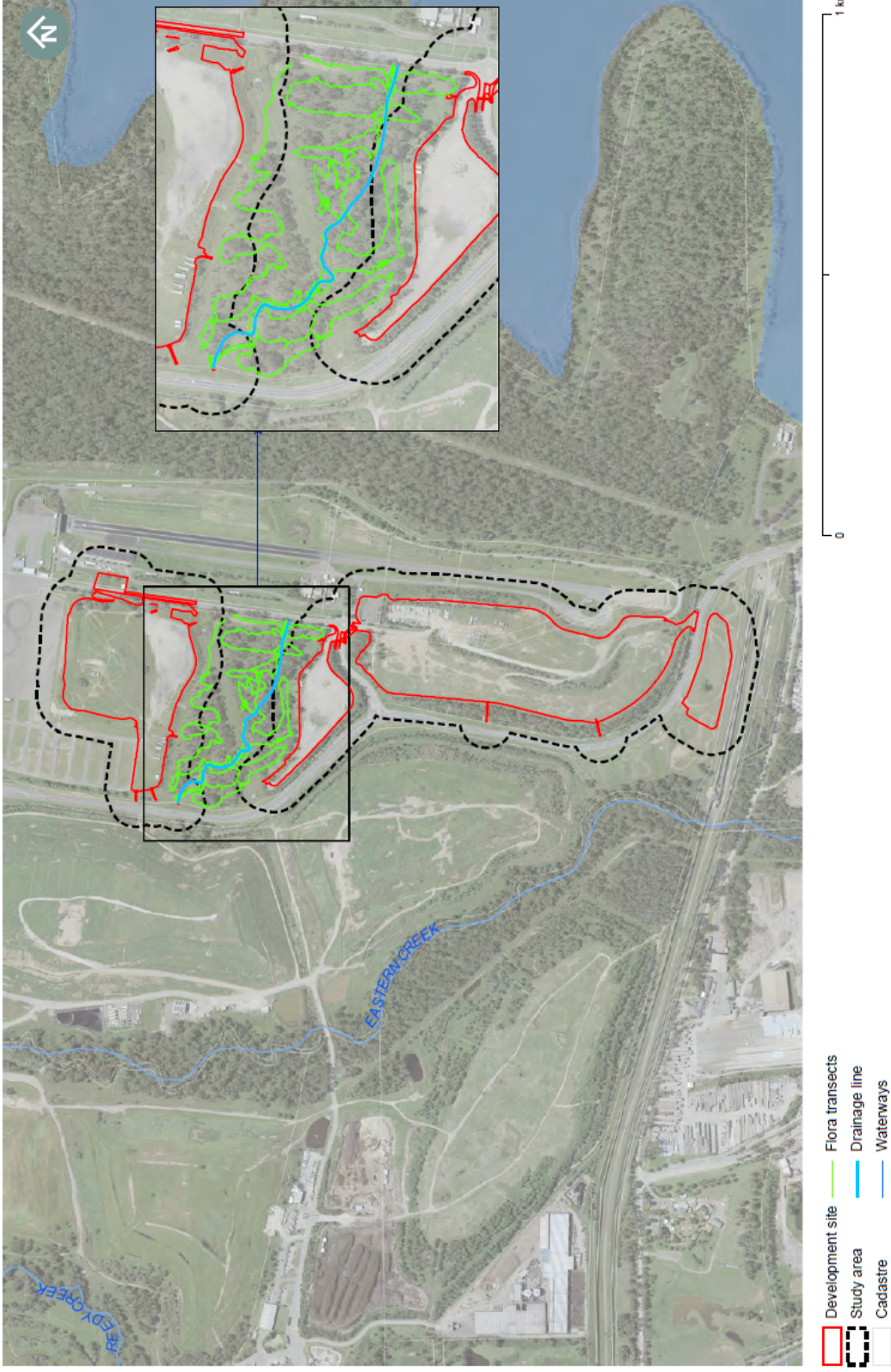


Figure 2-2 Threatened plant surveys

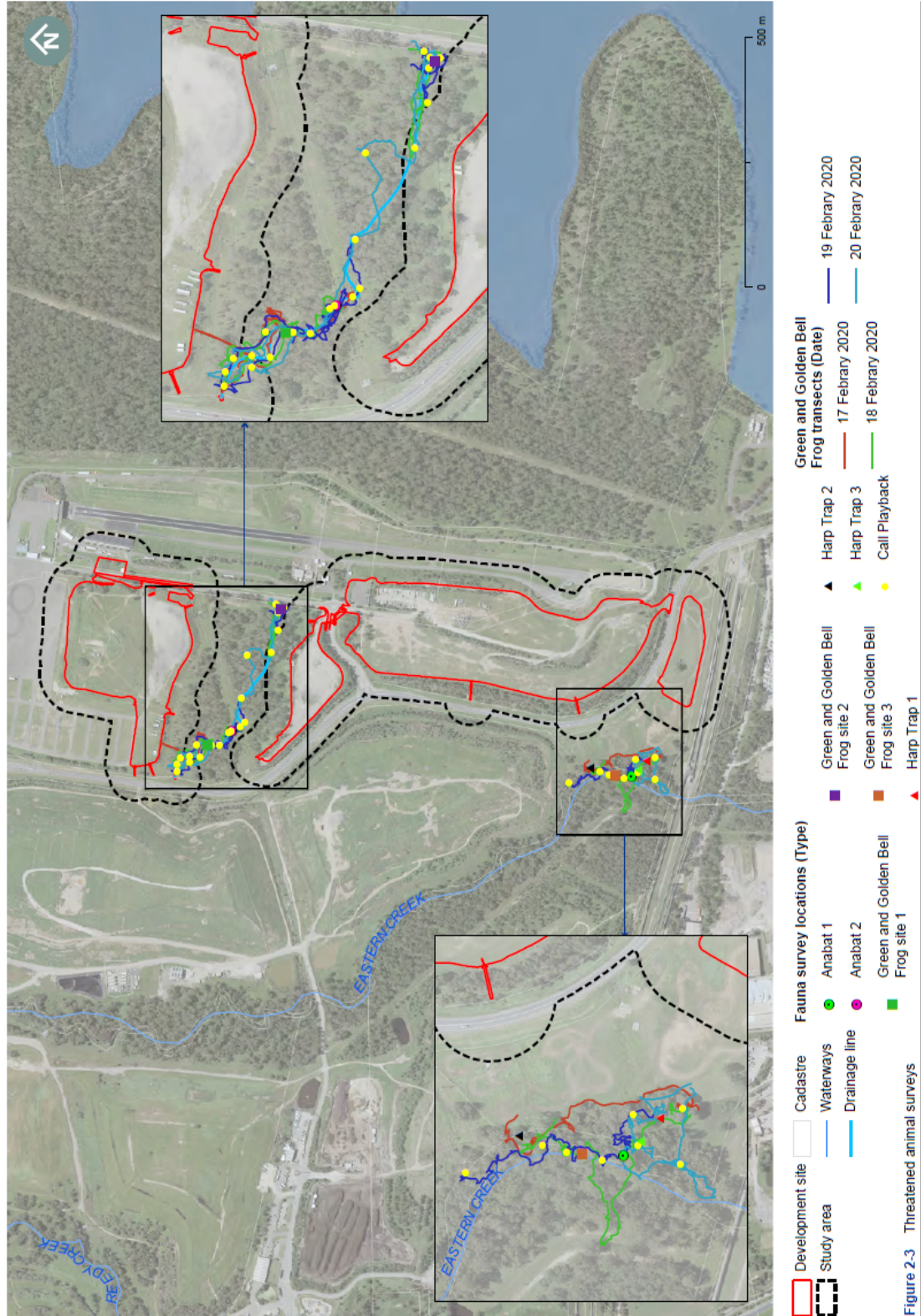


Figure 2-3 Threatened animal surveys

3. Landscape features

3.1 IBRA Bioregions and sub regions

The development site is located in the Sydney Basin bioregion, within the Cumberland subregion (Thackway and Cresswell, 1995) (see **Figure 1-1** and **Figure 1-2**).

3.2 BioNet NSW Landscapes

The development site is located on the Cumberland Plain landscape as mapped by the NSW National Parks and Wildlife Service (NPWS) (2002) and described by the then NSW Department of Environment and Climate Change (2001).

3.3 Rivers, streams and estuaries

The development site is located entirely within the Hawkesbury catchment. There are no rivers, streams or estuaries within the development site. However, a section of Eastern Creek (Strahler class 3) is about 160 metres west of the development site. A small unnamed and unmapped artificial drainage line runs in a northwest direction through woodland in part of the study area, outside of the development site. This appears to drain stormwater from parts of Sydney Dragway northwest through woodland and under Ferrers Road, where it eventually feeds into Eastern Creek.

Other waterways in the 1,500 metre landscape buffer include Reedy Creek (Strahler class 3) and several unnamed tributaries (see **Figure 1-1** and **Figure 1-2**).

3.4 Wetlands

Prospect Reservoir (artificial dam) is located about 600 metres to the east of the development site. There are no other wetlands located within the 1,500 metre landscape buffer apart from farm dams and small areas of impeded drainage.

3.5 Connectivity of habitat

According to the BAM, for development sites, the assessor must identify the connectivity of different areas of habitat that may facilitate the movement of threatened species across their range. While the habitats surrounding the Prospect Reservoir and Eastern Creek are not physically connected to the vegetation in the development site, these habitats are connected as there is woody vegetation separated by less than or equal to 100 metres from the next area of intact native vegetation creating corridors.

3.6 Areas of geological significance and soil hazard features

Areas of geological significance generally include karst, caves, crevices and cliffs. There are no areas of geological significance within or adjacent to the development site.

3.7 Areas of outstanding biodiversity value

The proposed development site does not contain any areas of outstanding biodiversity value listed on the register of declared areas of outstanding biodiversity value.

3.8 Native vegetation extent

The 1,500 metre landscape buffer is about 1,288 hectares in size and contains about 373 hectares of native vegetation (woody and non woody vegetation). This area was calculated with a combination of available regional mapping (i.e. VIS_ID 4489 and VIS_IS4407) and native vegetation mapped within the study area as part of this assessment. This results in a native vegetation cover in the landscape of about 29 per cent. It is apparent from aerial imagery that there is likely to be more native vegetation than has been mapped, so it is expected that this number is higher. Therefore, native vegetation cover in the landscape is in the '>30 – 70 per cent' cover class. These calculations are an estimate only based on existing regional mapping and aerial imagery.

4. Native vegetation and vegetation integrity

This section outlines the native vegetation within and directly adjacent to the development site.

4.1 Plant community type descriptions

This BDAR describes PCTs in terms of their floristic composition, geological substrate and relevant regional vegetation classification. The distribution of PCTs within the development site is outlined in **Figure 4-1**. Descriptions of the vegetation that occurs at the development site are provided below and matched to the most likely PCT as described in the BioNet Vegetation Classification database. In some cases, the vegetation at the development site does not strictly meet the definition of a PCT as per the BioNet Vegetation Classification database so the vegetation has been allocated to the PCT with which it most closely aligns. The mapping provided in this BDAR is supported by on ground observations and quantitative data. Plant communities are naturally variable and the boundaries between different PCTs at the development site overlap considerably. However, a choice must be made to map and assign a PCT to a particular area of the development site.

Table 4-1 provides a summary of the PCTs found within and adjacent to the development site.

Table 4-1 Plant community types and vegetation zones identified in the development site and study area

Vegetation zone	Plant community type ID No.	Plant community type name	Broad condition class	Vegetation zone area (ha)	
				Development site	Study area
1	849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate	0.02	0.152
2	849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Poor	0.059	0.842
3	850	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Poor	0.246	0.362
4	850	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Revegetation	0.059	2.291
5	1071	<i>Phragmites australis</i> and <i>Typha orientalis</i> coastal freshwater wetlands of the Sydney Basin Bioregion	Drainage line	0.001	0.068
6	849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Blackberry dominant	0	0.069
7	850	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Moderate	0	1.048
8	850	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Regeneration	0	0.074

Vegetation zone	Plant community type ID No.	Plant community type name	Broad condition class	Vegetation zone area (ha)	
				Development site	Study area
9	835	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate	0	0
TOTAL				0.379*	4.906

*The vegetation zone areas in the Development site and Study area have been rounded to three decimal places. As a result, the total vegetation zone area (ha) for the Development site and Study area do not equal the sum of each individual vegetation zone.

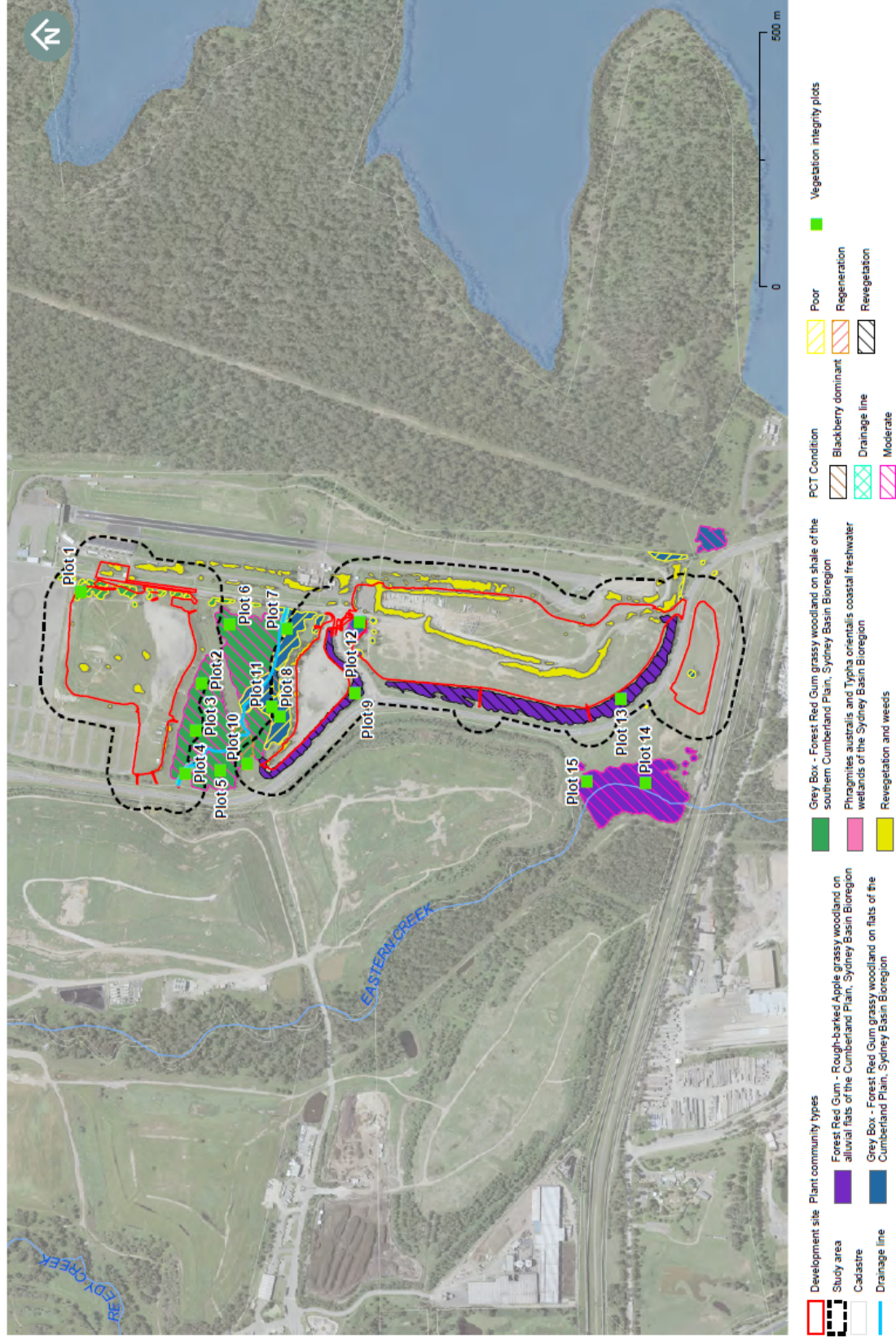


Figure 4-1 Plant community types and vegetation zones

4.1.1 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849) – Cumberland Shale Plains Woodland

Vegetation formation: Grassy Woodlands

Vegetation class: Coastal Valley Grassy Woodlands

Classification confidence level from VIS: High

Vegetation zones / survey effort / extent at the development site:

- Zone 1 (Moderate) / One plot (Plot 12) / 0.02 ha
- Zone 2 (Poor) / Two plots (Plot 7 and 8) / 0.059 ha
- Zone 6 (Blackberry dominant) / One plot (Plot 11) / not within development site

The Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion PCT (PCT 849) is described in the BioNet Vegetation Classification database as a grassy woodland located on the gentle topography associated with the shale plains of western Sydney.

The Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion PCT (PCT 849) directly corresponds to the Cumberland Shale Plains Woodland (GW p29) as described in the *Southeast NSW Native Vegetation Classification and Mapping – SCIVI* (State Government of NSW and Office of Environment and Heritage (OEH), 2010) and the Cumberland Shale Plains Woodland (S_GW03) as described in *The Native Vegetation of the Sydney Metropolitan Area – Version 3* (VIS_ID 4489) (State Government of NSW and Office of Environment and Heritage, 2016). PCT 849 is mapped around the development site between Carpark C and Carpark D by *Remnant Vegetation of the western Cumberland subregion, 2013 Update* (VIS_ID 4207) (State Government of NSW and Office of Environment and Heritage, 2015). The boundary of this PCT was verified during field surveys.

The Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion PCT (PCT 849) has a classification confidence level in the VIS of High. Therefore, classification of this vegetation to the PCT 849 is relatively straightforward and the vegetation is not considered likely to be representative of any other PCT.

This vegetation within the study area is highly disturbed and in poor to moderate condition. The vegetation lacks native species, particularly in the mid storey (shrub layer) and ground layer but is most likely to be PCT 849 for the following reasons:

- The upper stratum contains typical species of PCT 849 including *Eucalyptus tereticornis* and *Eucalyptus moluccana*.
- The ground cover contains typical species of PCT 849 including *Rytidosperma tenuius*.

A summary of the vegetation structure and floristics of PCT 849 as it occurs in the study area is provided in **Table 4-2**. The list of species recorded at each survey site is provided in **Appendix A** and reflects the local variation of species gathered from the survey.

This PCT forms part of the Cumberland Plain Woodland in the Sydney Basin Bioregion which is listed as a threatened ecological community under the BC Act (listed as Critically Endangered). This vegetation is not listed as a threatened ecological community under the EPBC Act. The condition of this PCT is such that it does not meet the condition criteria to be part of the Critically Endangered Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest as listed under the EPBC Act.



Photo 7: Plot 12 in Vegetation Zone 1 showing the Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion PCT (PCT 849)

Table 4-2 Floristic and structural summary of PCT 849 within the development site

Vegetation layer	Dominant species
Tree canopy (upper stratum)	<i>Eucalyptus tereticornis</i> , <i>Eucalyptus moluccana</i>
Midstorey (mid stratum)	Native species absent
Groundcovers (ground stratum)	<i>Einadia hastata</i> , <i>Einadia nutans</i> , <i>Einadia trigonos</i> , <i>Rytidosperma tenuius</i>
Exotic species	<i>Bidens Pilosa</i> , <i>Cirsium vulgare</i> , <i>Lepidium africanum</i> , <i>Plantago lanceolate</i> , <i>Sida rhombifolia</i> , <i>Solanum pseudocapsicum</i> , <i>Sonchus oleraceus</i>
High Threat Weeds	<i>Araujia sericifera</i> , <i>Chloris gayana</i> , <i>Eragrostis curvula</i> , <i>Lantana camara</i> , <i>Lycium ferocissimum</i> , <i>Pennisetum clandestinum</i> , <i>Rubus fruticosus</i> sp. agg.

4.1.2 Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850) – Cumberland Shale Hills Woodland

Vegetation formation: Grassy Woodlands

Vegetation class: Coastal Valley Grassy Woodlands

Classification confidence level from VIS: High

Vegetation zones / survey effort / extent at the development site:

- Zone 3 (Poor) / One plot (Plot 1) / 0.246 ha
- Zone 4 (Revegetation) / Two plots (Plot 9 and 13) / 0.059 ha
- Zone 7 (Moderate) / Four plots (Plot 2, 3, 5 and 6) / not within development site
- Zone 8 (Regeneration) / One plot (Plot 10) / not within development site

The Grey Box – Forest Red Gum grassy woodland on shale of the Cumberland Plain, Sydney Basin Bioregion PCT (PCT 850) is described in the BioNet Vegetation Classification database as a grassy woodland located on the gentle topography associated with the shale plains of western Sydney occupying the higher elevations associated with the hills and rises south from Prospect.

The Grey Box – Forest Red Gum grassy woodland on Shale of the Cumberland Plain, Sydney Basin Bioregion PCT (PCT 850) directly corresponds to the Cumberland Shale Hills Woodland (GW p28) as described in the *Southeast NSW Native Vegetation Classification and Mapping – SCIVI* (State Government of NSW and Office of Environment and Heritage (OEH), 2010) and the Cumberland Shale Hills Woodland (S_GW02) as described in *The Native Vegetation of the Sydney Metropolitan Area – Version 3* (State Government of NSW and Office of Environment and Heritage, 2016). PCT 850 is mapped around the development site between Carpark C and Carpark D by *Remnant Vegetation of the western Cumberland subregion, 2013 Update* (VIS_ID 4207) (State Government of NSW and Office of Environment and Heritage, 2015). The boundary of this PCT was verified during field surveys.

The Grey Box – Forest Red Gum grassy woodland on Shale of the Cumberland Plain, Sydney Basin Bioregion PCT (PCT 850) has a classification confidence level in the VIS of High. Therefore, classification of this vegetation to the PCT 850 is relatively straightforward and the vegetation is not considered likely to be representative of any other PCT.

This vegetation within the study area ranges from poor to moderate condition and includes some areas of revegetation that have been planted with species representative of the PCT. This vegetation is considered most likely to be PCT 850 for the following reasons:

- The upper stratum contains typical species of PCT 850 including *Eucalyptus tereticornis*.
- The midstorey contains the typical species *Bursaria spinosa*.
- The ground cover contains typical species of PCT 850 including *Dichondra repens*, *Brunoniella australis*, *Aristida* sp., *Microlaena stipoides*, and *Cyperus gracilis*.

A summary of the vegetation structure and floristics of PCT 850 as it occurs in the study area is provided in **Table 4-3**. The list of species recorded at each survey site is provided in **Appendix A** and reflects the local variation of species gathered from the survey.



Photo 8: Plot 1 in Vegetation Zone 3 showing the Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850)

This PCT forms part of the Cumberland Plain Woodland in the Sydney Basin Bioregion which is listed as a threatened ecological community under the BC Act (listed as Critically Endangered). Parts of this vegetation (moderate condition areas) meet the condition criteria to be part of the Critically Endangered Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest as listed under the EPBC Act. The PCT 850 is identified in the study area, however, these areas that meet the EPBC Act threshold are not within the constraints of the development site.

Table 4-3 Floristic and structural summary of PCT 850 within the development site

Vegetation layer	Dominant species
Tree canopy (upper stratum)	<i>Eucalyptus tereticornis</i> , <i>Eucalyptus crebra</i> , <i>Corymbia maculata</i>
Midstorey (mid stratum)	<i>Acacia decurrens</i> , <i>Casuarina glauca</i> , <i>Acacia falcata</i> , <i>Bursaria spinosa</i> , <i>Daviesia ulicifolia</i> , <i>Melaleuca styphelioides</i> , <i>Pittosporum undulatum</i>
Groundcovers (ground stratum)	<i>Brunoniella australis</i> , <i>Centella asiatica</i> , <i>Dianella longifolia</i> , <i>Dichondra repens</i> , <i>Dietes</i> sp., <i>Einadia hastata</i> , <i>Einadia nutans</i> , <i>Einadia trigonos</i> , <i>Eremophila debilis</i> , <i>Hypericum gramineum</i> , <i>Opercularia diphylla</i> , <i>Plantago gaudichaudii</i> , <i>Aristida</i> sp., <i>Cynodon dactylon</i> , <i>Cyperus gracilis</i> , <i>Cyperus</i> sp., <i>Lachnagrostis filiformis</i> , <i>Lomandra confertifolia</i> , <i>Lomandra filiformis</i> , <i>Lomandra longifolia</i> , <i>Microlaena stipoides</i> , <i>Panicum</i> sp., <i>Rytidosperma tenuius</i> , <i>Sporobolus creber</i> , <i>Glycine clandestine</i> , <i>Glycine tabacina</i> , <i>Passiflora herbertiana</i>
Exotic species	<i>Bidens pilosa</i> , <i>Brassica</i> sp., <i>Briza subaristata</i> , <i>Bromus catharticus</i> , <i>Cirsium vulgare</i> , <i>Dovyalis caffra</i> , <i>Foeniculum vulgare</i> , <i>Opuntia stricta</i> , <i>Pavonia hastata</i> , <i>Plantago lanceolate</i> , <i>Senecio pterophorus</i> , <i>Sida rhombifolia</i> , <i>Solanum nigrum</i> , <i>Solanum pseudocapsicum</i> , <i>Verbena bonariensis</i>

Vegetation layer	Dominant species
High Threat Weeds	<i>Araujia sericifera</i> , <i>Asparagus aethiopicus</i> , <i>Chloris gayana</i> , <i>Ehrharta erecta</i> , <i>Eragrostis curvula</i> , <i>Lantana camara</i> , <i>Ligustrum lucidum</i> , <i>Lycium ferocissimum</i> , <i>Megathyrsus maximus</i> , <i>Olea europaea</i> , <i>Paspalum dilatatum</i> , <i>Pennisetum clandestinum</i> , <i>Senecio madagascarensis</i>

4.1.3 *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071)

Vegetation formation: Freshwater Wetlands

Vegetation class: Coastal Freshwater Lagoons

Classification confidence level from VIS: Very Low

Vegetation zones / survey effort / extent at the development site:

- Zone 5 (Drainage line) / One plot (Plot 4) / 0.001 ha

The *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071) is described in the BioNet Vegetation Classification database as artificial water bodies, drainage lines and depressions across a wide variety of environments and includes modified former wetlands. It occurs also in original form in a wide variety of situations associated with coastal plains, valleys, lagoons and other areas of poor drainage. The version of PCT 1071 in the study area is a result of altered drainage and is therefore artificial.

The *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071) does not directly correlate to any map unit as described in the *Southeast NSW Native Vegetation Classification and Mapping – SCIVI* (State Government of NSW and Office of Environment and Heritage (OEH), 2010) or *The Native Vegetation of the Sydney Metropolitan Area – Version 3* (State Government of NSW and Office of Environment and Heritage, 2016). PCT 1071 is not mapped near the development site by regional mapping.



Photo 9: Plot 4 in Vegetation Zone 5 showing the *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071)

The *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071) has a classification confidence level in the VIS of Very Low. This PCT may be replaced or retired in future revisions of the BioNet Vegetation Classification database. However, this vegetation is not considered likely to be representative of any other PCT.

This vegetation within the study area is not a natural occurrence of a wetland. The vegetation has established naturally but has resulted from human interference causing impeded drainage within a drainage line. The description of PCT 1071 in the BioNet Vegetation Classification database lacks detail but the vegetation is dominated by native wetland species and is most likely to be PCT 1071 due to the dominance of *Typha orientalis*.

A summary of the vegetation structure and floristics of PCT 1071 as it occurs in the study area is provided in **Table 4-4**. The list of species recorded at each survey site is provided in **Appendix A** and reflects the local variation of species gathered from the survey. The quality of the vegetation is poor and is not comparable to a naturally occurring Freshwater Lagoon system.

The *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion PCT has developed at this location due to human alteration of the drainage line and is not a naturally occurring wetland. As such, this particular occurrence of this PCT is unlikely to be part of the TEC described as 'Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions' TEC and listed under the BC Act. This is because artificial wetlands created on previously dry land specifically for purposes such as sewerage treatment, stormwater management and farm production, are not regarded as part of this community (see NSW Scientific Committee, 2010). This PCT is not part of a threatened ecological community listed under the EPBC Act.

Table 4-4 Floristic and structural summary of PCT 1071 within the development site

Vegetation layer	Dominant species
Tree canopy (upper stratum)	<i>Eucalyptus tereticornis</i> at edges
Midstorey (mid stratum)	Absent
Groundcovers (ground stratum)	<i>Typha orientalis</i> , <i>Cynodon dactylon</i> , <i>Persicaria lapathifolia</i> (outside of plot)
Exotic species	<i>Sida rhombifolia</i> , <i>Sonchus oleraceus</i>
High Threat Weeds	<i>Rubus fruticosus</i> sp. agg.

4.1.4 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835) – Cumberland Riverflat Forest

Vegetation formation: Forested Wetlands

Vegetation class: Coastal Floodplain Wetlands

Classification confidence level from VIS: High

Vegetation zones / survey effort / extent at the development site:

- Zone 9 (Moderate) / Two plots (Plot 14 and 15) / not within development site

The Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835) is an open eucalypt forest situated on broad alluvial flats of the Hawkesbury and Nepean river systems. It also forms narrower ribbons alongside streams and creeks that drain the Cumberland Plain.

This vegetation is considered most likely representative of PCT 835 based on the species composition observed at the development site and the landscape position along Eastern Creek. The Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835) directly corresponds to the Cumberland River Flat Forest (FoW p33) as described in the *Southeast NSW Native Vegetation Classification and Mapping – SC/VI* (State Government of NSW and Office of Environment and Heritage (OEH), 2010) and the Cumberland Riverflat Forest (S_FoW06) as described in *The Native Vegetation of the Sydney Metropolitan Area – Version 3.1* (State Government of NSW and Office of Environment and Heritage, 2016). The closest mapping of PCT 835 to the development site is around Eastern Creek by *Remnant Vegetation of the western Cumberland subregion, 2013 Update* (VIS_ID 4207) (State Government of NSW and Office of Environment and Heritage, 2015). This mapping was verified during field surveys.



Photo 10: Plot 14 in Vegetation Zone 9 showing the Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835)

The Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835) has a classification confidence level in the VIS of High. Therefore, classification of this vegetation to the PCT 835 is relatively straightforward and the vegetation is not considered likely to be representative of any other PCT.

Based on the floristic composition of the vegetation observed at the development site and the landscape position the vegetation is considered most likely to be representative of PCT 835 for the following reasons:

- A canopy layer composed of *Eucalyptus tereticornis* and *Angophora floribunda* (listed as typical canopy species for PCT 835 in the VIS) and *Eucalyptus bosistoana* with a lower tree layer composed of *Casuarina glauca* and *Melaleuca styphelioides*.
- While native species in the middle stratum are lacking, species including *Bursaria spinosa* and *Sigesbeckia orientalis* are present which are species typical of PCT 835.
- The presence of species including *Microlaena stipoides*, *Dichondra repens*, *Solanum prinophyllum*, *Commelina cyanea*, *Entolasia* sp., and *Echinopogon* sp. that are species recognised as typical of PCT 835 in the VIS database.
- The PCT is located on the alluvial soils of the South Creek soil landscape along Eastern Creek.

A summary of the vegetation structure and floristics of PCT 835 as it occurs in the study area along Eastern Creek is provided in **Table 4-5**. The list of species recorded at each survey site is provided in **Appendix A** and reflects the local variation of species gathered from the survey.

This PCT forms part of the River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions which is listed as a threatened ecological community under the BC Act (listed as Endangered). This vegetation is not listed as a threatened ecological community under the EPBC Act.

Table 4-5 Floristic and structural summary of PCT 835 within the development site

Vegetation layer	Dominant species
Tree canopy (upper stratum)	<i>Eucalyptus tereticornis</i> , <i>Angophora floribunda</i> , <i>Eucalyptus bosistoana</i> , <i>Casuarina glauca</i> , <i>Melaleuca styphelioides</i>
Midstorey (mid stratum)	<i>Melaleuca styphelioides</i> , <i>Casuarina glauca</i> , <i>Bursaria spinosa</i> , <i>Sigesbeckia orientalis</i> , <i>Platynerium bifurcatum</i>
Groundcovers (ground stratum)	<i>Commelina cyanea</i> , <i>Dichondra repens</i> , <i>Geranium solanderi</i> , <i>Cynodon dactylon</i> , <i>Echinopogon caespitosus</i> , <i>Eragrostis leptostachya</i> , <i>Glycine clandestine</i> , <i>Entolasia</i> sp., <i>Einadia hastata</i> , <i>Solanum prinophyllum</i> , <i>Persicaria lapathifolia</i> , <i>Potamogeton</i> sp., <i>Alisma plantago-aquatica</i> , <i>Spirodela</i> sp., <i>Juncus sarophorus</i> , <i>Juncus usitatus</i>
Exotic species	<i>Bidens pilosa</i> , <i>Cirsium vulgare</i> , <i>Conyza bonariensis</i> , <i>Gamochaeta Americana</i> , <i>Lactuca serriola</i> , <i>Morus alba</i> , <i>Parietaria judaica</i> , <i>Rumex crispus</i> , <i>Senecio pterophorus</i> , <i>Solanum pseudocapsicum</i> , <i>Verbena bonariensis</i> , <i>Cyclosporum leptophyllum</i> , <i>Dovyalis caffra</i> , <i>Sida rhombifolia</i> , <i>Solanum linnaeanum</i> , <i>Solanum nigrum</i> , <i>Sonchus oleraceus</i>
High Threat Weeds	<i>Ageratina adenophora</i> , <i>Cardiospermum grandiflorum</i> , <i>Cestrum parqui</i> , <i>Cyperus eragrostis</i> , <i>Ehrharta erecta</i> , <i>Lantana camara</i> , <i>Tradescantia fluminensis</i> , <i>Lycium ferocissimum</i> , <i>Paspalum dilatatum</i> , <i>Senecio madagascarensis</i>

4.2 Vegetation zones and vegetation integrity score

A description of the vegetation zones identified within the development site and the corresponding vegetation integrity score developed from the Biodiversity Assessment Calculator is presented in **Table 4-6**. The vegetation integrity survey plot data is provided in **Appendix C**.

Table 4-6 Vegetation zones and vegetation integrity scores for the South East Highlands bioregion

Vegetation zone	Plant community type ID No.	Plant community type name	Broad condition class	Vegetation zone area in development site (ha)	Vegetation integrity score
1	849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate	0.02	18.7
2	849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Poor	0.059	11.3
3	850	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Poor	0.246	15.2
4	850	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Revegetation	0.059	23.9
5	1071	<i>Phragmites australis</i> and <i>Typha orientalis</i> coastal freshwater wetlands of the Sydney Basin Bioregion	Drainage line	0.001	44.4

4.3 Patch size

The native vegetation within the development site is all part of the same vegetation patch according to the definition of a patch as provided in the BAM. While the habitats surrounding the Prospect Reservoir and Eastern Creek are not physically connected to the vegetation in the development site, these habitats are connected as there is woody vegetation separated by less than or equal to 100 metres from the next area of intact native vegetation creating corridors.

As the vegetation within the development site is connected to the Prospect Nature Reserve and the vegetation along Eastern Creek, the patch size is at least 905 hectares so for the purposes of the assessment the patch size is in the greater than 100-hectare size class.

4.4 Threatened ecological communities

One Threatened Ecological Community (TEC) listed under the BC Act occurs in the development site:

- Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered).

This TEC is listed as a Serious and Irreversible Impact (SII) entity in the BAM-C.

This corresponds to PCT 849 and PCT 850. The areas of the TEC are mostly in poor condition represented by regrowth native species amongst plantings and weed growth. The largest occurrence of this TEC is represented by revegetated areas along Ferrers Road.

The woodland between Carpark C and Carpark D is also a patch of BC Act listed Cumberland Plain Woodland in the Sydney Basin Bioregion. Some areas of this vegetation, found within the study area, and outside of the development site, in moderate conditions are also part of the Commonwealth EPBC Act listed Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest ecological community (listed as Critically Endangered). There are no areas of EPBC Act listed TECs within the development site.

The two patches of PCT 1071 on the drainage line between Carpark C and Carpark D do not meet the definition of the BC Act listed Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions as this TEC does not include artificial waterways created on previously dry land for purposes such as stormwater management.

One additional TEC listed 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, is located outside of the development site to the west around Eastern Creek. This TEC corresponds directly with PCT 835. This TEC is not recognised as a SII entity.

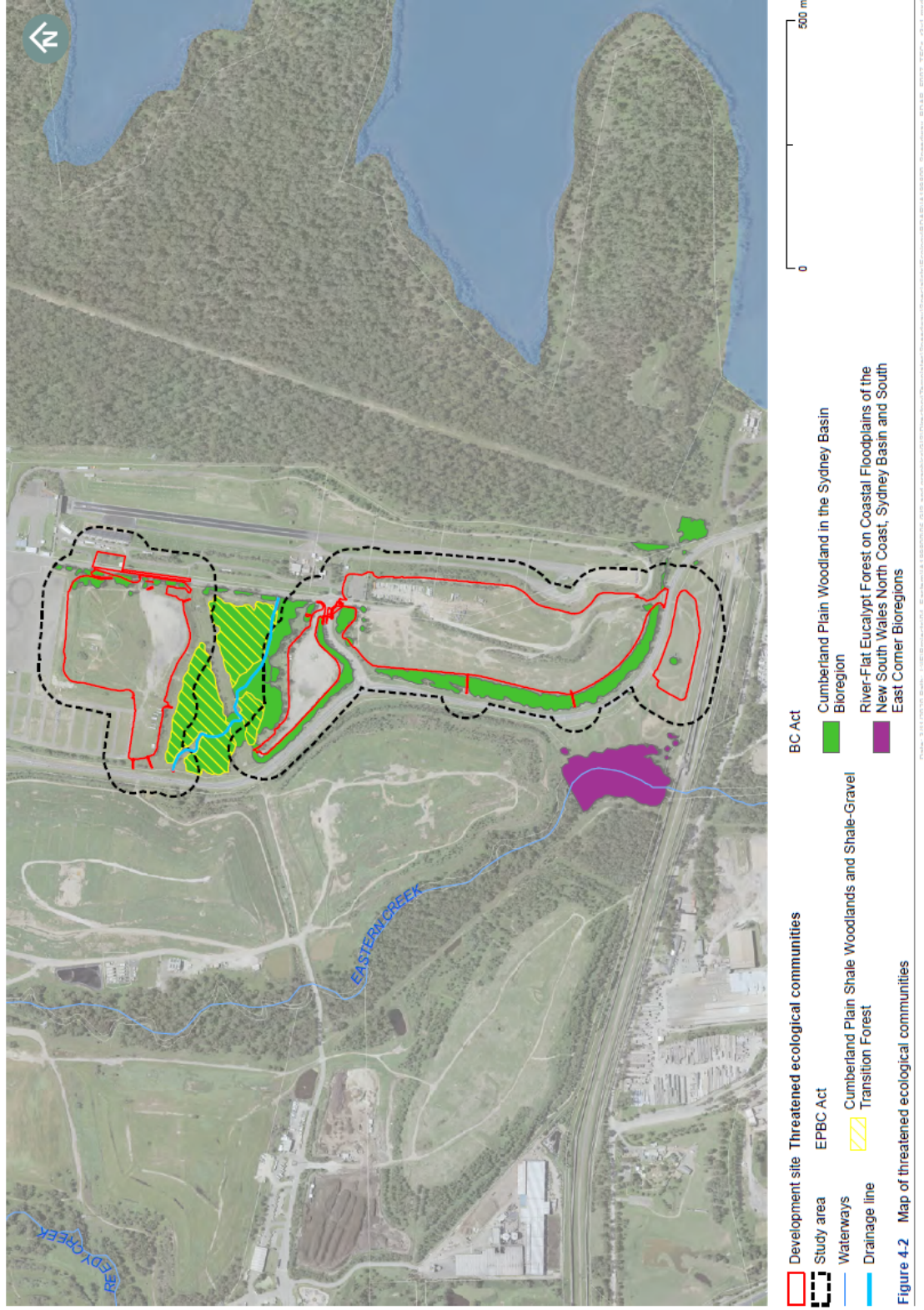


Figure 4-2 Threatened ecological communities

4.5 Groundwater dependent ecosystems

The level of groundwater dependence of vegetation communities in the development site has been identified using the *Atlas of Groundwater Dependent Ecosystems* (GDEs) (Bureau of Meteorology, 2017) and the *Risk Assessment Guidelines for Groundwater Dependent Ecosystems* released by the former NSW Department of Primary Industries (Kuginis et al., 2012). The list of high priority GDEs provided in Schedule 4 of the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011 was also reviewed. The mapping of GDEs provided by the Atlas of GDEs provides an indication whether a GDE may be present but the mapping is based on a coarse regional vegetation mapping dataset and does not accurately reflect project site conditions.

There are no mapped aquatic GDEs within the development site or the 1,500 metre landscape buffer. However, the *Atlas of Groundwater Dependent Ecosystems* (Bureau of Meteorology, 2017) identifies portions of the locality as containing some areas of high potential groundwater dependent terrestrial vegetation. Based on the results of the field surveys carried out for this BDAR and examination of the *Native Vegetation of the Sydney Metropolitan Area – Version 3* vegetation map (State Government of NSW and Office of Environment and Heritage, 2016), there is potential for groundwater dependent terrestrial vegetation types to be present.

Two terrestrial GDEs were identified on the Atlas of Groundwater Dependent Ecosystems within the development site. Based on these results and data collected during field surveys carried out for this assessment, there is potential for groundwater dependent terrestrial vegetation types to be present. The following plant community types were identified during field surveys and are considered with a moderate to high likelihood to be terrestrial GDEs:

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

However, these PCTs are not obligate GDEs (i.e. they are not entirely dependent on groundwater). These PCTs are likely to be opportunistic facultative GDEs that may depend on the subsurface presence of groundwater (often accessed via the capillary fringe – subsurface water just above the water table) in some locations but not in others. This capillary water may be accessed by the plants where an alternative source of water (i.e. rainfall) cannot be accessed to maintain ecological function. As the plants within these PCTs may at times rely on capillary water in the soil that rises from the water table, any lowering of the water table may result in a reduction in groundwater availability and declining vegetation health during low rainfall periods.

If the groundwater table is shallow where the potential GDE occurs, and there is no perched aquifer above the water table (separated from the water table by a layer of impermeable rock or sediment), then impacts on vegetation health may occur.

5. Habitat suitability for threatened species

The Biodiversity Assessment Calculator was used to derive the list of candidate species for this assessment, but the results were also supplemented with database searches, including a review of the Threatened Biodiversity Data Collection, to identify the threatened species that have been recorded by previous surveys or are considered likely to occur in the broader locality and development site. This section provides the results of the habitat suitability assessment for threatened species as outlined in section 6 of the BAM.

5.1 Habitat suitability for species that can be predicted by habitat surrogates (ecosystem credit species)

Ecosystem credit species are those threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or for which targeted survey has a low probability of detection. Ecosystem credit threatened species have been assessed in conjunction with information about development site context (section 4.3 and section 5.3.2 of the BAM), PCTs and vegetation integrity attributes (chapter 5 of the BAM), and data from the Threatened Biodiversity Data Collection (section 6.1 of the BAM).

The Biodiversity Assessment Calculator was used to generate a list of the predicted threatened species that met the criteria outlined in section 6.4.1.3 of the BAM. The results of the BioNet search and the federal Department of the Agriculture, Water and the Environment's PMST were also used to inform development of the species list.

The initial list of predicted ecosystem credit species is provided in **Table 5-1**. The full threatened species habitat suitability assessment is provided in **Appendix A**. Once the initial list of predicted ecosystem credit species was generated, the geographic limitations of each species (where applicable) were examined to see if they were met. Geographic limitations usually relate to altitude or topographic features. Where the development site is not within the geographic limitation described for a species, the species was removed from the predicted list of threatened species and no further assessment was completed.

In accordance with paragraphs 6.4.1.9 – 6.4.1.16 (Step 2) of the BAM, an on-site assessment was completed to determine the presence of any habitat constraints or microhabitats for the threatened species predicted to occur on the development site. Some species do not have any identified habitat constraints, in which case this step was not carried out. The justification for including or excluding ecosystem credit species from the assessment is provided in **Table 5-1**.

The remainder of the ecosystem credit species outlined in **Appendix A** have suitable habitat within and adjacent to the development site, albeit limited in size, and would therefore need to be addressed in future assessment under the BAM. Under the BAM, targeted survey is not required for ecosystem credit species. However, in some circumstances, the Threatened Biodiversity Data Collection may identify that a species requires assessment for ecosystem credits and species credits (a dual credit species). This occurs where part of the habitat is assessed as a species credit (e.g. breeding habitat, or mapped locations identified as an important area that is used by a species). The remaining part of the habitat is assessed as an ecosystem credit (e.g. foraging habitat, unmapped locations used by a species). Therefore, some species are listed in both **Table 5-1** and **Table 5-2** as an ecosystem credit species and a species credit species.

Table 5-1 Summary of predicted ecosystem credit species that were assessed

Species name	Common name	EPBC Act *	BC Act *	Justification for inclusion / exclusion	Sensitivity to gain class
Birds					
<i>Anthochaera phrygia</i>	Regent Honeyeater (foraging)	CE	CE	Included. This species may occasionally forage in vegetation, particularly winter flowering species such as <i>Eucalyptus tereticornis</i> .	High
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	-	V	Included. This species is commonly seen in the locality and may forage in or over the vegetation in and adjacent to the development site.	Moderate

Species name	Common name	EPBC Act *	BC Act *	Justification for inclusion / exclusion	Sensitivity to gain class
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	Excluded from the assessment as there is no habitat in the development site considered suitable for this species.	Moderate
<i>Calidris ferruginea</i>	Curlew Sandpiper (Foraging)	CE	E	Excluded from the assessment as there is no habitat in the development site considered suitable for this species.	High
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo (foraging)	-	V	Included. May occur in study area on occasion in winter. No breeding habitat in development site.	Moderate
<i>Chthonicola sagittata</i>	Speckled Warbler	-	V	Excluded from the assessment as the development site is low quality. Only one record in the locality suggests this species is quite rare and likely to stick to high quality remnant woodland. The likelihood of this species occurring in the development site is considered low.	High
<i>Circus assimilis</i>	Spotted Harrier	-	V	Excluded from the assessment as there is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.	Moderate
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	-	V	Excluded from the assessment as there is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.	High
<i>Daphoenositta chrysoptera</i>	Varied Sittella	-	V	Included. This species is commonly seen in the locality and may forage in or over the vegetation in and adjacent to the development site.	Moderate
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	-	V	Excluded from the assessment as there is no habitat in the development site considered suitable for this species.	Moderate
<i>Epthianura albifrons</i>	White-fronted Chat	-	V	Excluded from the assessment as there is no habitat in the development site considered suitable for this species.	Moderate
<i>Glossopsitta pusilla</i>	Little Lorikeet	-	V	Included. This species is commonly seen in the locality and may forage in or over the vegetation in and adjacent to the development site.	High
<i>Grantiella picta</i>	Painted Honeyeater	V	V	Excluded from the assessment as there is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.	Moderate
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle (foraging)	M	V	Excluded from the assessment as there is no habitat in the development site considered suitable for this species.	High
<i>Hieraaetus morphnoides</i>	Little Eagle (foraging)	-	V	Included. This species may fly over and perch in the development site on occasion. There is unlikely to be any suitable breeding habitat present.	Moderate
<i>Irediparra gallinacea</i>	Comb-crested Jacana	-	V	Excluded from the assessment as there is no habitat in the development site considered suitable for this species.	Moderate
<i>Ixobrychus flavicollis</i>	Black Bittern	-	V	Excluded from the assessment as there is no habitat in the development site considered suitable for this species.	Moderate

Species name	Common name	EPBC Act *	BC Act *	Justification for inclusion / exclusion	Sensitivity to gain class
<i>Lathamus discolor</i>	Swift Parrot (foraging)	CE	E	Included. The vegetation in the development site does not represent any significant foraging or nesting opportunities for this species. While this species is unlikely to use the development site on a permanent basis, temporary foraging cannot be discounted. Impacts on this species associated with the loss of vegetation associated with the development are discussed in Section 9.2 .	Moderate
<i>Limicola falcinellus</i>	Broad-billed Sandpiper (Foraging)	-	V	Excluded from the assessment as there is no habitat in the development site considered suitable for this species.	High
<i>Limosa limosa</i>	Black-tailed Godwit (Foraging)	-	V	Excluded from the assessment as there is no habitat in the development site considered suitable for this species.	High
<i>Lophoictinia isura</i>	Square-tailed Kite (foraging)	-	V	Included. This species may fly over and perch in the development site on occasion. There is unlikely to be any suitable breeding habitat present.	Moderate
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	-	V	Excluded from the assessment as there is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.	Moderate
<i>Melithreptus gularis Gularis</i>	Black-chinned Honeyeater (eastern subspecies)	-	V	Excluded from the assessment as there is no habitat in the development site considered suitable for this species.	Moderate
<i>Neophema pulchella</i>	Turquoise Parrot	-	V	Excluded from the assessment as there is no habitat in the development site considered suitable for this species.	High
<i>Ninox connivens</i>	Barking Owl (foraging)	-	V	Included. This species may fly over and perch in the development site on occasion. There is unlikely to be any suitable breeding habitat present.	High
<i>Ninox strenua</i>	Powerful Owl (foraging)	-	V	Included. This species may fly over and perch in the development site on occasion. There is unlikely to be any suitable breeding habitat present.	High
<i>Pandion cristatus</i>	Eastern Osprey (Foraging)	-	V	Included. This species may fly over the development site on occasion. There is unlikely to be any suitable breeding habitat present.	Moderate
<i>Petroica boodang</i>	Scarlet Robin	-	V	Excluded from assessment. This species may occur in higher quality vegetation around the development site and pass through it on occasion. However, there is no habitat in the development site considered suitable for this species.	Moderate
<i>Petroica phoenicea</i>	Flame Robin	-	V	Excluded from assessment. This species may occur in higher quality vegetation around the development site and pass through it on occasion. However, there is no habitat in the development site considered suitable for this species.	Moderate
<i>Rostratula australis</i>	Australian Painted Snipe	E	E	Excluded from the assessment as there is no habitat in the development site considered suitable for this species.	Moderate
<i>Stagonopleura guttata</i>	Diamond Firetail	-	V	Excluded from the assessment. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.	Moderate

Species name	Common name	EPBC Act *	BC Act *	Justification for inclusion / exclusion	Sensitivity to gain class
<i>Stictonetta naevosa</i>	Freckled Duck	-	V	Excluded from the assessment as there is no habitat in the development site considered suitable for this species.	Moderate
<i>Tyto novaehollandiae</i>	Masked Owl (foraging)	-	V	Included. This species may fly over and perch in the development site on occasion. There is unlikely to be any suitable breeding habitat present.	High
Mammals					
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	E	V	Excluded from the assessment. The development site does not provide optimal habitat for this species. There are eight records of this species from the locality, but it hasn't been recorded since 2013 and is unlikely to use the habitats in the development site.	High
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	-	V	Included. The highest quality foraging habitat is around the drainage line, though this species may also forage around trees within the development site. No hollow bearing trees were identified within the development site; however, some roosting habitat may be present. There is unlikely to be any breeding habitat in the development site.	High
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	-	V	Included. Analysis of bat calls recorded along the drainage line as part of this assessment identified this species on one night. The highest quality foraging habitat is around the drainage line, though this species may also forage around trees within the development site. No hollow bearing trees were identified within the development site; however, some roosting habitat may be present. There is unlikely to be any breeding habitat in the development site.	High
<i>Miniopterus australis</i>	Little Bent-winged Bat (foraging)	-	V	Included. This species is most likely to forage in the woodland around the drainage line and may occur in the development site as it flies around. However, there is no high-quality foraging habitat or breeding habitat in the development site.	High
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat (foraging)	-	V	Included. This species is most likely to forage in the woodland around the drainage line and may occur in the development site as it flies around. However, there is no high-quality foraging habitat or breeding habitat in the development site.	High
<i>Petaurus australis</i>	Yellow-bellied Glider	-	V	Excluded from the assessment. There is no habitat in the development site considered suitable for this species.	High
<i>Phascolarctos cinereus</i>	Koala (foraging)	V	V	Excluded from the assessment. <i>Eucalyptus tereticornis</i> is a primary food tree species. However, the known occurrence of this species within the locality is very rare. This species may pass through the development site on occasion, however the likelihood is considered low.	High
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox (foraging)	V	V	Included. This species is assumed to occur based on the presence of suitable foraging habitat and the proximity of several camps. There are no camps within the development site.	High

Species name	Common name	EPBC Act *	BC Act *	Justification for inclusion / exclusion	Sensitivity to gain class
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	-	V	Included. The highest quality foraging habitat is around the drainage line, though this species may also forage around trees within the development site. No hollow bearing trees were identified within the development site; however, some roosting habitat may be present. There is unlikely to be any breeding habitat in the development site.	High
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	-	V	Included. The highest quality foraging habitat is around the drainage line, though this species may also forage around trees within the development site. No hollow bearing trees were identified within the development site; however, some roosting habitat may be present. There is unlikely to be any breeding habitat in the development site.	High

*Key: CE = critically endangered, E = endangered, V = vulnerable, M = migratory

5.2 Habitat suitability for species that cannot be predicted by habitat surrogates (species credit species)

Habitat suitability is identified as the degree to which the habitat needs of threatened species are present at a particular site. Species credit species have been assessed in conjunction with information collected about the context of the development site (section 4.3 of the BAM), on PCTs and vegetation integrity attributes in (section 5 of the BAM), and data obtained from the Threatened Biodiversity Data Collection (section 6.1 of the BAM).

Species credit species are threatened species or components of species habitat that are identified in the Threatened Biodiversity Data Collection as requiring assessment for species credits. Species credit species are those species for which the likelihood of occurrence, or elements of suitable habitat, cannot be confidently predicted by vegetation surrogates or landscape features. Species credit species can be reliably detected by survey. Based on the assessment of habitat in the development site, and review of databases and published information, the species credit species as outlined in **Table 5-2** are considered 'candidate species' for the assessment. The full threatened species habitat suitability assessment is provided in **Appendix A**.

Table 5-2 Summary of candidate species credit species returned by the BAM-Calculator

Species name	Common name	EPBC Act*	BC Act*	Sensitivity to gain class
Plants				
<i>Acacia bynoeana</i>	Bynoe's Wattle	V	E	High
<i>Acacia pubescens</i>	Downy Wattle	V	V	High
<i>Caladenia tessellata</i>	Thick Lip Spider Orchid	V	E	Moderate
<i>Commersonia prostrata</i>	Dwarf Kerrawang	E	E	High
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E	E	High
<i>Dillwynia tenuifolia</i>	Dillwynia tenuifolia	-	V	Moderate
<i>Dillwynia tenuifolia</i> - endangered population	Dillwynia tenuifolia, Kemps Creek	-	EP	High
<i>Eucalyptus benthamii</i>	Camden White Gum	V	V	High
<i>Grevillea juniperina</i> subsp. <i>juniperina</i>	Juniper-leaved Grevillea	-	V	Moderate
<i>Haloragis exalata</i> subsp. <i>exalata</i>	Square Raspwort	V	V	Moderate

Species name	Common name	EPBC Act*	BC Act*	Sensitivity to gain class
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> - endangered population	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	-	EP	Moderate
<i>Maundia triglochinoides</i>	Maundia triglochinoides	-	V	High
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	V	High
<i>Persicaria elatior</i>	Tall Knotweed	V	V	High
<i>Persoonia bargoensis</i>	Bargo Geebung	V	E	High
<i>Pilularia novae-hollandiae</i>	Austral Pillwort	-	E	High
<i>Pimelea curviflora</i> var. <i>curviflora</i>	Pimelea curviflora var. curviflora	V	V	High
<i>Pimelea spicata</i>	Spiked Rice-flower	E	E	High
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	E	E	Moderate
<i>Pultenaea pedunculata</i>	Matted Bush-pea	-	E	High
<i>Thesium australe</i>	Austral Toadflax	V	V	Moderate
<i>Zannichellia palustris</i>	Zannichellia palustris	-	E	High
Birds				
<i>Anthochaera phrygia</i>	Regent Honeyeater (breeding)	CE	CE	High
<i>Burhinus grallarius</i>	Bush Stone-curlew	-	E	High
<i>Calidris ferruginea</i>	Curlew Sandpiper (breeding)	CE	E	High
<i>Collocephalon fimbriatum</i>	Gang-gang Cockatoo (breeding)	-	V	High
<i>Collocephalon fimbriatum</i> - endangered population	Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local government areas	-	EP	High
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle (breeding)	M	V	High
<i>Hieraaetus morphnoides</i>	Little Eagle (breeding)	-	V	Moderate
<i>Lathamus discolor</i>	Swift Parrot (breeding)	CE	E	Moderate
<i>Limicola falcinellus</i>	Broad-billed Sandpiper (breeding)	-	V	High
<i>Limosa limosa</i>	Black-tailed Godwit (breeding)	-	V	High
<i>Lophoictinia isura</i>	Square-tailed Kite (breeding)	-	V	Moderate
<i>Ninox connivens</i>	Barking Owl (breeding)	-	V	High
<i>Ninox strenua</i>	Powerful Owl (breeding)	-	V	High
<i>Pandion cristatus</i>	Eastern Osprey (breeding)	-	V	Moderate
<i>Tyto novaehollandiae</i>	Masked Owl (breeding)	-	V	High
Mammals				
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	-	V	High
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Very High
<i>Miniopterus australis</i>	Little Bent-winged Bat (breeding)	-	V	Very High
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat (breeding)	-	V	Very High
<i>Myotis macropus</i>	Southern Myotis	-	V	High
<i>Petaurus norfolcensis</i>	Squirrel Glider	-	V	High
<i>Phascolarctos cinereus</i>	Koala (breeding)	V	V	High

Species name	Common name	EPBC Act*	BC Act*	Sensitivity to gain class
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox (breeding)	V	V	High
Frogs				
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	Moderate
<i>Litoria aurea</i>	Green and Golden Bell Frog	V	E	High
Invertebrates				
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail	-	E	High
<i>Pommerhelix duralensis</i>	Dural Land Snail	E	E	High

Key: CE = critically endangered, E = endangered, EP = endangered population, V = vulnerable, M = migratory

5.2.1 Identifying geographic and habitat constraints

Once the initial list of predicted candidate species credit species was generated, the geographic limitations of each species (where applicable) were examined to see if they were met. Where the development site is not within the geographic limitation described for a species, the species was removed from the predicted list of threatened species and no further assessment was completed. In accordance with paragraphs 6.4.1.9 – 6.4.1.16 (Step 2) of the BAM, an on-site assessment was carried out to determine the presence of any habitat constraints or microhabitats for the threatened species predicted to occur on the development site. Some species do not have any identified habitat constraints, in which case this step was not carried out. The species included or excluded based on habitat constraints or geographic limitations are outlined below in **Table 5-3**.

Table 5-3 Summary of candidate species credit species with geographic or habitat constraints

Species name	Common name	EPBC Act	BC Act	Habitat constraint	Geographic limitation	Justification for inclusion / exclusion
Plants						
<i>Dillwynia tenuifolia</i> - endangered population	Dillwynia tenuifolia, Kemps Creek	-	EP	-	Bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool LGA.	Excluded. The development site is not in the area bounded by western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool Local government area.
<i>Haloragis exalata</i> subsp. <i>exalata</i>	Square Raspwort	V	V	Waterbodies Edges of coastal lakes after flooding has removed other vegetation, creek banks within flood zone, areas close to these features subject to human disturbance including road verges and powerline easements or within 100m	-	Included. The artificial drainage line may provide suitable habitat for this species.

Species name	Common name	EPBC Act	BC Act	Habitat constraint	Geographic limitation	Justification for inclusion / exclusion
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> - endangered population	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	-	EP	-	Blacktown, Camden, Campbelltown, Canterbury-Bankstown, Cumberland, Fairfield, Liverpool and Penrith LGAs.	Included. The development site is included in the Blacktown Local government area.
<i>Maundia triglochoides</i>	Maundia triglochoides	-	V	Riparian areas/drainage lines, water ponding, man-made dams and drainage channels up to 1 m deep. Semi-permanent/ephemeral wet areas. Swamps Shallow swamps up to 1 m deep. Waterbodies Shallow waterbodies up to 1 m deep	-	Included. The artificial drainage line may provide suitable habitat for this species.
<i>Persicaria elatior</i>	Tall Knotweed	V	V	Semi-permanent/ephemeral wet areas. Or within 50 m of swamps. Or within 50 m of waterbodies. Including Wetlands, or within 50 m.	-	Included. The artificial drainage line may provide suitable habitat for this species.
<i>Zannichellia palustris</i>	Zannichellia palustris	-	E	Waterbodies Freshwater or slightly brackish estuarine areas (10%)	-	Included. The artificial drainage line may provide suitable habitat for this species.
Birds						
<i>Anthochaera phrygia</i>	Regent Honeyeater (breeding)	CE	CE	As per mapped areas.	-	Excluded. The development site does not contain mapped Regent Honeyeater breeding habitat or Important Areas.

Species name	Common name	EPBC Act	BC Act	Habitat constraint	Geographic limitation	Justification for inclusion / exclusion
<i>Burhinus grallarius</i>	Bush Stone-curlew	-	E	Fallen/standing dead timber including logs.	-	Excluded. The development site does not contain any fallen/standing dead timber.
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo (breeding)	-	V	Hollow bearing trees. Eucalypt tree species with hollows greater than nine centimetres diameter.	-	Excluded. No trees with hollows greater than nine centimetres were identified on the development site.
<i>Callocephalon fimbriatum</i> - endangered population	Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local government areas	-	EP	-	Hornsby and Ku-ring-gai LGAs	Excluded. The development site is not within the Hornsby and Ku-ring-gai LGAs.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle (breeding)	M	V	Living or dead mature trees within suitable vegetation within one kilometres of a rivers, lakes, large dams or creeks, wetlands and coastlines.	-	Excluded. The development site is within one kilometre of Prospect Reservoir, however it lacks large emergent trees and the vegetation is generally in poor and disturbed condition.
<i>Hieraaetus morphnoides</i>	Little Eagle (breeding)	-	V	Nest trees - live (occasionally dead) large old trees within vegetation.	-	Excluded. The development site lacks large emergent trees and the vegetation is generally in poor and disturbed condition.
<i>Lathamus discolor</i>	Swift Parrot (breeding)	CE	E	As per mapped areas.		Excluded. The development site does not contain mapped Swift Parrot breeding habitat or Important Areas.
<i>Lophoictinia isura</i>	Square-tailed Kite (breeding)	-	V	Nest trees.	-	Excluded. The development site lacks large emergent trees and the vegetation is generally in poor and disturbed condition.
<i>Ninox connivens</i>	Barking Owl (breeding)	-	V	Hollow bearing trees. Living or dead trees with hollows greater than 20 centimetres diameter and greater than four metres above the ground.	-	Excluded. No trees with hollows greater than 20 centimetres were identified on the development site.

Species name	Common name	EPBC Act	BC Act	Habitat constraint	Geographic limitation	Justification for inclusion / exclusion
<i>Ninox strenua</i>	Powerful Owl (breeding)	-	V	Hollow bearing trees. Living or dead trees with hollow greater than 20 centimetres diameter.	-	Excluded. No trees with hollows greater than 20 centimetres were identified on the development site.
<i>Pandion cristatus</i>	Eastern Osprey (Breeding)	-	V	Presence of stick-nests in living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting)	-	Excluded. No trees with stick-nests were identified.
<i>Tyto novaehollandiae</i>	Masked Owl (breeding)	-	V	Hollow bearing trees. Living or dead trees with hollows greater than 20 centimetres diameter.	-	Excluded. No trees with hollows greater than 20 centimetres were identified on the development site.
Mammals						
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Cliffs Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	-	Excluded. The development site does not contain any cliffs and is not within two kilometres of rocky areas, old mines or tunnels.
<i>Miniopterus australis</i>	Little Bent-winged Bat (breeding)	-	V	Caves Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' observation type code 'E nest-roost' with numbers of individuals >500 or from the scientific literature.	-	Excluded. The development site does not contain any caves, tunnel, mine, culvert or other structure known to be used for breeding. There are no records of observation type 'IC' or 'E' in the locality.
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat (breeding)	-	V	Caves Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code 'IC - in cave' observation type code 'E nest-roost' with numbers of individuals greater than 500.	-	Excluded. The development site does not contain any caves, tunnel, mine, culvert or other structure known to be used for breeding. There are no records of observation type 'IC' or 'E' in the locality.

Species name	Common name	EPBC Act	BC Act	Habitat constraint	Geographic limitation	Justification for inclusion / exclusion
<i>Myotis macropus</i>	Southern Myotis	-	V	Hollow bearing trees. Within 200 metres of riparian zone. Bridges, caves or artificial structures within 200 metres of riparian zone. Waterbodies: This includes rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200 metres of the development site.	-	Included as the development site is within 200 metres of Eastern Creek.
<i>Phascolarctos cinereus</i>	Koala (breeding)	V	V	Areas identified via survey as important habitat. Note: 'Important' habitat (however this is not a mapped Important Area) is defined by the density of koalas and quality of habitat determined by on-site survey.	-	Excluded. The development site does not contain any important habitat.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox (breeding)	V	V	Breeding camps.	-	Excluded. There are no breeding camps on the development site.
Frogs						
<i>Litoria aurea</i>	Green and Golden Bell Frog	V	E	Semi-permanent/ephemeral wet areas. Within one kilometre of wet areas. Within one kilometre of swamp. Within one kilometre of waterbody.	-	Included as the development site is within one kilometre of wet areas.
Invertebrates						
<i>Pommerhelix duralensis</i>	Dural Land Snail	E	E	Other Leaf litter and shed bark or within 50 metres of litter or bark Rocky areas Rocks or within 50 metres of rocks Fallen/standing dead timber including logs	-	Excluded. The development site is within 50 metres of woodland with leaf litter. However, the development site is not within the known distribution of this species.

Species name	Common name	EPBC Act	BC Act	Habitat constraint	Geographic limitation	Justification for inclusion / exclusion
				Including logs and bark or within 50 metres of logs or bark		

Key: CE = critically endangered, E = endangered, EP = endangered population, V = vulnerable

5.2.2 Identifying candidate species for further assessment

In accordance with paragraphs 6.4.1.17 – 6.4.1.19 (Step 3) of the BAM, a field assessment was carried out to determine whether the habitats within the development site were substantially degraded to the point that a candidate species is unlikely to utilise the development site (or specific vegetation zones). There were a number of threatened species returned from the calculator that are species credit species if breeding habitat would be impacted. The development site does not contain breeding habitat for any of these identified species as follows:

- The Regent Honeyeater does not breed in the Sydney urban area. There are only four known key breeding regions remaining for the Regent Honeyeater: northeast Victoria (Chiltern-Albury), and in NSW at Capertee Valley, Hunter Valley and the Bundarra-Barraba region. There are also no mapped Important Areas for the Regent Honeyeater within the development site or study area. Therefore, the Regent Honeyeater was removed from the candidate species list.
- The Swift Parrot breeds in Tasmania. There are also no mapped Important Areas for the Swift Parrot within the development site or study area. As such, it was removed from the candidate species list.
- The Bush Stone-curlew is no longer known from the Sydney Region. Habitats on the development site are primarily managed (mown) and do not contain any areas of fallen-standing dead timber and logs. As such, the Bush Stone-curlew was removed from the candidate species list.
- The Gang-gang Cockatoo requires hollow bearing Eucalypt trees with hollows greater than nine centimetres in diameter for breeding. No hollows greater than nine centimetres were identified in the development site. The development site also does not fall within the Hornsby or Ku-ring-gai LGAs. As such, the Gang-gang Cockatoo and Endangered Populations were removed from the candidate species list.
- White-bellied Sea-Eagle breeding habitat is specified as live large old trees within one kilometre of rivers, lakes, large dams or creeks, wetlands and coastlines AND the presence of a large stick nest within tree canopy; or an adult with nest material; or adults observed duetting within breeding period. There are no live large old trees within the development site that contain large stick nests. The habitats within the development site contain relatively small to moderate sized *Eucalyptus* spp. trees that are not suitable as nesting sites for the White-bellied Sea-Eagle. Consequently, the White-bellied Sea-Eagle was removed from the candidate species list.
- Little Eagle breeding habitat is specified as live (occasionally dead) large old trees within suitable vegetation AND the presence of a male and female; or female with nesting material; or an individual on a large stick nest in the top half of the tree canopy. There are no live large old trees within the development site that contain large stick nests. The habitats within the development site contain relatively small to moderate sized *Eucalyptus* spp. trees that are not suitable as nesting sites for the Little Eagle. Consequently, the Little Eagle was removed from the candidate species list.
- The Square-tailed Kite also requires nest trees for breeding. It is difficult to identify a Kite nest (there are lots of comparable sized stick nests built by other species), especially given Kites have large territories and other stick nesters also nest where Kites might be recorded. Kites need to be in attendance to confirm breeding sites. As discussed, there are no large old trees that contain large stick nests. Consequently, the Square-tailed Kite was removed from the candidate species list.
- The Barking Owl, Powerful Owl and Masked Owl all require living or dead trees with hollow greater than 20cm diameter. There are no trees with hollows greater than 20 centimetres in the development site. As such, these three species were removed from the candidate species list.

- Migratory and wading wetland bird species such as the Curlew Sandpiper, Broad-billed Sandpiper and the Black-tailed Godwit require large open areas for breeding. The wetland habitat in the study area is a highly degraded artificial drainage line and is not suitable breeding habitat for these species. As such, these species were removed from the candidate species list.
- Breeding habitat for the Large-eared Pied Bat requires either cliffs or the development site to be within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels. The development site does not contain cliffs and an assessment of a two-kilometre radius did not identify any of these breeding features. As such, the Large-eared Pied Bat was removed from the candidate species list.
- Breeding habitat for the Large Bent-winged Bat and Little Bent-winged Bat is highly specific and is restricted to cave systems. There are only five Little Bent-winged Bat nursery sites /maternity colonies known in Australia and a single maternity colony in NSW which is in close association with a large maternity colony of Large Bent-winged bats. The breeding colonies of the Little Bent-winged Bat and Large Bent-winged Bat are not in the Sydney area and would not be affected. As such, these species were removed from the candidate species list.
- There are no Koala breeding colonies in or near the development site. Consequently, the Koala was removed from the candidate species list.
- There are no Grey-headed Flying-fox camps in the development site. The nearest camps are at Wetherill Park and Ropes Creek, but these camps would not be affected. Consequently, the Grey-headed Flying-fox was removed from the candidate species list.
- The Dural Land Snail was removed from the candidate species list as the development site is outside of the species' known distribution.
- The Giant Burrowing Frog was removed from the candidate species list as the development site does not contain suitable habitat for this species. The artificial drainage line captures and drains stormwater from the existing speedway and is highly degraded. The soils are compacted and there is minimal leaf litter available for burrowing. Additionally, there are no records of this species in the locality.

The Green and Golden Bell Frog has been included based on the potential for suitable habitat along Eastern Creek adjacent to the main operational site and sections of the artificial drainage line within woodland located between Carpark C and Carpark D. Although these areas would not be directly impacted by the development, this potential suitable habitat has been identified as at risk of being indirectly impacted by the development considering the proximity. For breeding, the Green and Golden Bell Frog needs water bodies that are still, shallow, ephemeral, unpolluted (but the frog can be found in polluted habitats), unshaded, with aquatic plants and free of mosquito fish and other predatory fish (refer to **Section 5.3.2** for assessment of habitat on the development site). Survey site 1 and 2 (artificial drainage line) meet most of the known habitat requirements (Pyke and White 1996) while Survey site 3 (Eastern Creek) is considered low quality. Additionally, there are both grassland habitats and open woodlands adjacent to the waterway's that would be suitable as terrestrial habitat for the Green and Golden Bell Frog.

The Southern Myotis has been included based on the presence of suitable habitat within the study area and recorded observations within the locality. According to the habitat requirements of this species, Eastern Creek and the unnamed drainage line between Carpark C and Carpark D may offer suitable aquatic fishing/foraging habitat, including most areas of vegetation. No breeding habitat is likely to be present.

The Cumberland Plain Land Snail has been included based on the presence of suitable habitat (though marginal) within the study area, represented by the moderate quality woodland between Carpark C and Carpark D. No snails were identified during surveys, however conditions in December 2019 were very dry. This woodland contains a low abundance of coarse wood debris and leaf litter. The occurrence of this woodland would not be directly impacted by the development.

The development site is largely composed of a highly modified landscape, with areas of native vegetation existing as disturbed remnant, regrowth and revegetation. Much of the vegetation in the development site is currently managed (e.g. mown and slashed). This historical and current disturbance regime has resulted in existing vegetation to be unsuitable habitat for many of the candidate threatened flora species identified by the BAM-Calculator. Due to the disturbance on the development site, the following plant species are considered unlikely to occur and were excluded from the assessment based on habitat degradation:

- *Caladenia tessellata* (Thick Lip Spider Orchid)
- *Pterostylis saxicola* (Sydney Plains Greenhood).

The following species were excluded from the assessment as they do not occur in the development site based on geographic limitations:

- *Dillwynia tenuifolia* – endangered population (Dillwynia tenuifolia, Kemps Creek)
- *Callocephalon fimbriatum* - endangered population (Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local government areas).

The list of species retained for further assessment is shown in **Table 5-4**. This list includes an additional four species that were not identified by the BAM-Calculator, including:

- *Eucalyptus nicholii* (Narrow-leaved Black Peppermint) – commonly planted in the Sydney region.
- *Persoonia nutans* (Nodding Geebung) – records within the locality and suitable habitat present.
- *Pultenaea parviflora* (Sydney-bush Pea) – records and suitable habitat present.
- *Syzygium paniculatum* (Magenta Lilly Pilly) - commonly planted in the Sydney region.

Table 5-4 Summary of candidate species credit species for further assessment

Species name	Common name	EPBC Act	BC Act	Sensitivity to gain class	SAIL*	Relevant habitat in the study area
Plants						
<i>Acacia bynoeana</i>	Bynoe's Wattle	V	E	High	No	Highest quality habitat represented by the woodland between Carpark C and Carpark D, outside of the development site.
<i>Acacia pubescens</i>	Downy Wattle	V	V	High	No	Highest quality habitat represented by the woodland between Carpark C and Carpark D, outside of the development site.
<i>Commersonia prostrata</i>	Dwarf Kewerang	E	E	High	No	Drainage line in woodland between Carpark C and Carpark D, outside of the development site.
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E	E	High	No	Highest quality habitat represented by the woodland between Carpark C and Carpark D, outside of the development site.
<i>Dillwynia tenuifolia</i>	Dillwynia tenuifolia	-	V	High	No	Highest quality habitat represented by the woodland between Carpark C and Carpark D, outside of the development site.
<i>Eucalyptus benthamii</i>	Camden White Gum	V	V	High	No	Highest quality habitat represented by the woodland between Carpark C and Carpark D, outside of the development site.

Species name	Common name	EPBC Act	BC Act	Sensitivity to gain class	SAII*	Relevant habitat in the study area
<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	High	No	Anywhere - a commonly planted street tree in the Sydney region.
<i>Grevillea juniperina</i> subsp. <i>juniperina</i>	Juniper-leaved Grevillea	-	V	High	No	Highest quality habitat represented by the woodland between Carpark C and Carpark D, outside of the development site.
<i>Haloragis exalata</i> subsp. <i>exalata</i>	Square Raspwort	V	V	Moderate	No	Drainage line in woodland between Carpark C and Carpark D, outside of the development site.
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> - endangered population	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	-	EP	High	No	Highest quality habitat represented by the woodland between Carpark C and Carpark D, outside of the development site.
<i>Maundia triglochinoides</i>	Maundia triglochinoides	-	V	High	No	Drainage line in woodland between Carpark C and Carpark D, outside of the development site.
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	V	High	No	Drainage line in woodland between Carpark C and Carpark D, outside of the development site.
<i>Persicaria elatior</i>	Tall Knotweed	V	V	High	No	Drainage line in woodland between Carpark C and Carpark D, outside of the development site.
<i>Persoonia bargoensis</i>	Bargo Geebung	V	E	High	No	Highest quality habitat represented by the woodland between Carpark C and Carpark D, outside of the development site.
<i>Persoonia nutans</i>	Nodding Geebung	E	E	Moderate	No	Highest quality habitat represented by the woodland between Carpark C and Carpark D, outside of the development site.
<i>Pilularia novae-hollandiae</i>	Austral Pilwort	-	E	High	No	Drainage line in woodland between Carpark C and Carpark D, outside of the development site.
<i>Pimelea curviflora</i> var. <i>curviflora</i>	Pimelea curviflora var. curviflora	V	V	High	No	Highest quality habitat represented by the woodland between Carpark C and Carpark D, outside of the development site.

Species name	Common name	EPBC Act	BC Act	Sensitivity to gain class	SAII*	Relevant habitat in the study area
<i>Pimelea spicata</i>	Spiked Rice-flower	E	E	High	No	Highest quality habitat represented by the woodland between Carpark C and Carpark D, outside of the development site.
<i>Pultenaea parviflora</i>	Sydney-bush Pea	V	E	Moderate	No	Highest quality habitat represented by the woodland between Carpark C and Carpark D, outside of the development site.
<i>Pultenaea pedunculata</i>	Matted Bush-pea	-	V	NA	No	Highest quality habitat represented by the woodland between Carpark C and Carpark D, outside of the development site.
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	V	E	High	No	Anywhere - a commonly planted street tree in the Sydney region.
<i>Thesium australe</i>	Austral Toadflax	V	V	Moderate	No	Highest quality habitat represented by the woodland between Carpark C and Carpark D, outside of the development site.
<i>Zannichellia palustris</i>	Zannichellia palustris	-	E	High	No	Drainage line in woodland between Carpark C and Carpark D, outside of the development site.
Mammals						
<i>Myotis macropus</i>	Southern Myotis	-	V	High	No	Potential habitat is associated vegetation within 200 metres of Eastern Creek.
Frogs						
<i>Litoria aurea</i>	Green and Golden Bell Frog	V	E	High	No	Potential habitat along Eastern Creek adjacent to Carpark B and sections of the artificial drainage line within woodland located between Carpark C and Carpark D, outside of the development site.
Invertebrates						
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail	-	E	High	No	Suitable habitat within the study area, represented by the moderate quality woodland between Carpark C and Carpark D, outside of the development site.

Note: SAII* = Serious and Irreversible Impact Entity.

5.3 Threatened species survey results

5.3.1 Threatened plant species

Twenty-three threatened plant species were targeted during surveys of the development site (refer **Table 2-2**). No threatened plant species were found in the development site during the surveys. The highest quality habitat for threatened plants was identified in woodland between Carpark C and Carpark D, outside of the development site (refer to **Figure 4-1**). Parallel transects were completed through this habitat on 18 February 2020 after a month of suitable rainfall and within the recommended survey period for most of the species identified in **Table 2-2**.

Surveys were conducted outside of the required survey period for *Dillwynia tenuifolia*, *Pomaderris brunnea*, *Pultenaea pedunculata*, *Pultenaea pedunculata* and *Zannichellia palustris*. However, no species of *Dillwynia*, *Pomaderris* or *Pultenaea* were found during the surveys at all, therefore most of these target species would have been detected if present.

Zannichellia palustris is known to dieback in summer. The drainage line was first surveyed in December 2019, which is within the survey period for this species, however the targeted surveys took place in mid-February. Surveys for *Zannichellia palustris* are required to be completed by the end of January. However, two to three weeks following the end of the required survey period is likely to have detected some amount of plant matter. There were no submerged fully aquatic plant species identified within the drainage line during targeted surveys. Additionally, the section of the drainage line that would be directly impacted by the development contained little water at the time of survey and is likely to be dry most of the year. Hence, it is highly likely that the artificial drainage line does not provide suitable habitat for *Zannichellia palustris* and this species would not be impacted by the development.

5.3.2 Threatened animal species

Surveys were carried out for *Litoria aurea* (Green and Golden Bell Frog) and *Myotis macropus* (Southern Myotis bat) in February 2020. The habitat-based assessment of these species suggested the existence of suitable habitat and therefore required further assessment.

Green and Golden Bell Frog

Potential habitat for the Green and Golden Bell Frog was identified in and adjacent to the study area during initial surveys of the development site in December 2019 (see **Photos 1-3** in **Section 2.7.2**). This includes parts of Eastern Creek within 100 to 200 metres of the development site and the artificial drainage line that runs through the moderate quality woodland between Carpark C and Carpark D outside of the development site. Habitat quality at the three survey sites is discussed in **Table 5-5** in relation to some of the known Green and Golden Bell Frog habitat requirements as reported by Pyke and White (1996). Survey site 1 and 2 (artificial drainage line in the woodland between Carpark C and Carpark D outside of the development site) meet most of the known habitat requirements, while Survey site 3 (Eastern Creek outside of the development site) is considered low quality (**Figure 2-3**).

Table 5-5 Assessment of Green and Golden Bell Frog habitat quality

Habitat Requirement (from Pyke and White 1996)	Survey site 1	Survey site 2	Survey site 3
Ephemeral or fluctuating water level, with still or slow-moving water	Yes, some deep pooled sections connected by slow moving shallow riffles. However, drain was flowing from recent rain and likely to be highly ephemeral.	Yes, some deep pooled sections connected by slow moving shallow riffles. However, drain was flowing from recent rain and likely to be highly ephemeral.	Slow flow, contains pools and riffles and has low ephemerality.
Shallow water depth <50 cm	Likely	Likely	Some shallow areas

Habitat Requirement (from Pyke and White 1996)	Survey site 1	Survey site 2	Survey site 3
No visible signs/sources of water pollution	Very likely to contain contaminated runoff from raceway (e.g. hydrocarbons). Litter and rubbish present.	Very likely to contain contaminated runoff from raceway (e.g. hydrocarbons). Site is on the down side of internal Sydney Dragway road. Litter and rubbish present.	Moderate considering high rainfall. Deposited rubbish along banks. Water opaque/light brown with foamy film.
Absence of shaded cover	Riparian vegetation is young open grassy woodland. <i>Typha orientalis</i> dominated depression near Ferrers Road culvert, which is not shaded.	Riparian vegetation is young open grassy woodland. <i>Typha orientalis</i> dominated culvert headwall depression next to drainage area from the Sydney Dragway road, which is partially shaded.	Moderate to high shade cover.
<i>Crinia signifera</i> or <i>Limnodynastes peronii</i> present	Both present	Both present	Both present
Absence of predatory fish (in particular <i>Gambusia</i> sp.)	None observed.	None observed.	<i>Gambusia holbrooki</i> observed in edge ponds.
Pond substrate is sand or rock	25% sand, 75% mud, with no rocks.	25% sand, 75% mud, rock present at artificial headwall.	40% mud, 40% clay, 20% sand. Scattered rock observed on banks.
Presence of emergent aquatic vegetation or rocks for diurnal shelter	Stand of <i>Typha orientalis</i> (400 m ²) in depression near Ferrers Road culvert. Most of drainage line covered with exotic grass.	Large artificial rocks around culvert headwall. <i>Typha orientalis</i> patch 30 metres long up to 15m wide tapering along drain.	Low, mostly herbaceous plants along creek banks. High abundance of exotic vines and shrubs.
Adjacent to grassy area	Yes, surrounded by grassy woodland.	Yes, surrounded by grassy woodland.	Cleared exotic grasslands about 20 metres east of Eastern Creek. Some patches of open grassy woodland within riparian corridor.
Adjacent vegetation is no higher than woodland	Adjacent vegetation is woodland.	Adjacent vegetation is woodland.	Adjacent vegetation is woodland.

*Note: = green shading indicates that habitat requirements are likely to be met at the relevant survey site; red shading indicates the habitat requirements are unlikely to be met.

Nocturnal surveys were completed at three survey sites over four nights, between the 17 February and 20 February 2020. Amphibian activity was moderate during the surveys and seven common species were recorded across the three survey sites. The Green and Golden Bell Frog was not identified during these surveys. An attempt was made to access a reference site in Sydney Olympic Park on 17 February 2020, however the park was closed and locked before any frogs could be identified. The Green and Golden Bell Frog was confirmed calling at a Port Kembla site on 17 February 2020 (confirmed by Jacobs ecologist). Weather conditions during the survey period were ideal for this species (refer **Table 2-5**).

Table 5-6 Results of nocturnal frog surveys (species present and general observations)

Date	Survey site 1	Survey site 2	Survey site 3	Calling Y/N	Observations
17/02/2020	<i>Crinia signifera</i>	N/A	<i>C. signifera</i>	Yes, all sites	Wind speed low to still, cloud cover about 20% at all sites.
	<i>Limnodynastes peronii</i>		<i>L. peronii</i>	Yes, all sites	
	<i>Litoria fallax</i>		-	No	
	-		<i>Litoria dentata</i>	Yes	
18/02/2020	<i>C. signifera</i>	<i>C. signifera</i>	<i>C. signifera</i>	Yes, all sites	Wind speed low to still. Raining towards the end of Site 3 survey at 21:45. Large electric storm to the south. 30% to 100% cloud cover.
	<i>L. peronii</i>	<i>L. peronii</i>	<i>L. peronii</i>	Yes, all sites	
	-	-	<i>L. fallax</i>	Yes	
	-	-	<i>Limnodynastes tasmaniensis</i>	Yes	
19/02/2020	<i>C. signifera</i>	<i>C. signifera</i>	<i>C. signifera</i>	Yes, all sites	0% cloud cover and wind speed low to still.
	<i>L. peronii</i>	-	<i>L. peronii</i>	Yes, all sites	
	<i>L. fallax</i>	-	-	No	
	<i>Crinia parinsignifera</i>	-	-	Yes	
	-	<i>Litoria caerulea</i>	-	Yes	
	-	<i>L. tasmaniensis</i>	-	Yes	
20/02/2020	<i>C. signifera</i>	<i>C. signifera</i>	<i>C. signifera</i>	Yes, all sites	Cloud cover was 100% at all sites.
	<i>L. peronii</i>	<i>L. peronii</i>	-	Yes	

The distribution of the Green and Golden Bell Frog has become very disjunct in the Cumberland Plain region. There is one record of this species from within the locality (10-kilometre radius database search zone) since 2000 recorded at the St Marys Leagues Club in 2001), which is almost 10 kilometres north west of the development site. There is another nearby more recent record from 2012 on Ropes Creek (though just outside the 10-kilometre database search zone), which may be evidence that a low density population is active around Ropes Creek in that area. Targeted surveys for the Archbold Road Extension REF (WSP | Parsons Brinckerhoff 2017) about five kilometres west of the development site near Ropes Creek were unsuccessful at identifying the Green and Golden Bell Frog. The key population at Mount Druitt was reported to have gone extinct in the late 1990s (Pyke and White 2001). The closest extant key population of Green and Golden Bell Frog is in Parramatta.

Based on the results of the targeted surveys, distribution of recent recorded sightings, the distance of the Parramatta key population and the relatively disconnected nature of the drainage line near the development site to surrounding potential habitats, it is considered that the potential for the Green and Golden Bell Frog to occur within the development site is low. No species polygons have been developed for the Green and Golden Bell Frog.

Southern Myotis

Surveys targeting the Southern Myotis were completed around the development site from 17 February to 20 February, involving the use of harp traps (total six trap nights at three locations) and Anabat call detectors (total 4 trap nights at two locations). Harp traps were placed in potential flyways along the creek to capture foraging bats (see **Photos 4-6** in **Section 2.7.2**). Two Anabat Express (Titley Scientific) bat call detectors were also positioned along suitable habitat both outside of the development site, 'Anabat 1' was placed on Eastern Creek and 'Anabat 2' on the artificial drainage line. Both Anabats were deployed for two nights each: 18 February and 19 February 2020. Refer to **Figure 2-3** for survey locations.

No bats were captured in the harp traps.

The two Anabat Express detectors recorded a total of 70 discernible calls over the two nights. Analysis of calls by Greg Ford (Balance Environmental) confidently identified four species from 42 of the calls and another possible two species from unresolved calls (refer **Table 5-7**). Six unresolved calls were thought to be very likely from Southern Myotis; however, the call quality and duration was insufficient to be certain of their identities. Additionally, Southern Myotis calls are very similar in frequency to *Nyctophilus* species and often it is not able to be confidently identified from calls alone. One other threatened species, Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*) was also positively identified by Anabat 2 (drainage line). The development site and surrounds are only likely to provide foraging habitat for this species.

Table 5-7 Results of bat call analysis (number of calls identified per species per detector night)

Night	Anabat 1		Anabat 2	
	18/04/20	19/04/20	18/04/20	19/04/20
Positively identified calls (n = 42)				
<i>Chalinolobus gouldii</i>	5	7	3	6
<i>Chalinolobus morio</i>	1	1		6
<i>Micronomus norfolkensis</i>				3
<i>Ozimops ridei</i>	6		3	1
Unresolved calls (n = 28)				
Probable <i>Myotis macropus</i>	1	2	3	
<i>C. gouldii</i> or <i>O. ridei</i>	6	1	2	7
<i>M. norfolkensis</i> or <i>O. ridei</i>				4
<i>Vespadelus</i> sp. or <i>Miniopterus orianae oceanensis</i>	1			1

For the Southern Myotis, the Threatened Biodiversity Data Collection states:

All habitat on the subject land where the subject land is within 200 metres of a waterbody with pools / stretches 3m or wider including rivers, creeks, billabongs, lagoons, dams and other waterbodies on the subject land must be mapped. Use aerial imagery to map waterbodies with pools / stretches 3m or wider on or within 200 metres of the subject land. Species polygon boundaries should align with PCTs on the subject land to which the species is associated that are within 200 metres of waterbodies mapped.

The Threatened Biodiversity Data Collection lists all the PCTs in the development site as being associated habitat, i.e.:

- Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849)
- Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850).

Eastern Creek and the artificial drainage line represent the only waterbodies within 200 metres of the development site. The drainage line contained water along some of the deeper sections during the survey, though this is likely due to the high rainfall experienced in February (461.8 mm recorded at Horsley Park Equestrian Centre station 067119). The drainage line is artificial and designed to quickly drain runoff from areas of Sydney Dragway into Eastern Creek. Naturally, some areas have eroded over time where water now pools, however these are not expected to hold water for long periods of time. The small sections of the drain that are greater than three metres wide are at either end around the road culverts and contain dense *Typha orientalis* with no open water suitable for foraging by the Southern Myotis. These sections of the drain are not considered to be consistent with the habitat requirements listed in the Threatened Biodiversity Data Collection. Therefore, the drainage line is not considered to be a waterway that would provide suitable habitat for the Southern Myotis. The culverts at either end of the drainage line were visually inspected though no potential roosting or breeding habitat was identified.

Eastern Creek is the only waterway that meets the habitat description listed in the Threatened Biodiversity Data Collection, containing some sections greater than three metres wide with open water (see **Photo 3**). All associated PCTs within a 200-metre buffer of the mapped sections of Eastern Creek (PCT 849 and PCT 850) have been included in the Southern Myotis species polygon. Impacts to the habitat for the Southern Myotis are outlined in **Section 9.1**. The species polygon for the Southern Myotis is estimated at 51 m² and is shown in **Figure 5-1**.

Cumberland Plain Land Snail

The Cumberland Plain Land Snail is assumed to be present in the study area in accordance with paragraph 6.4.1.21 of the BAM. The Cumberland Plain Land Snail is considered likely to occur based on the presence of suitable habitat in moderate quality woodland between Carpark C and Carpark D. None of this habitat is within the development site and would not be directly impacted by the development as shown in **Figure 5-2**.

5.3.3 Serious and irreversible impact entities

The concept of serious and irreversible impacts (SAIL) is fundamentally about protecting threatened entities that are most at risk of extinction from potential development. The Biodiversity Offsets Scheme recognises that there are some types of serious and irreversible impacts that the community expects would not occur except where the consent authority considers that this type of impact is outweighed by the social and economic benefits that a development would deliver to the State. There are no threatened species which are recognised as SAIL entities that would be affected.

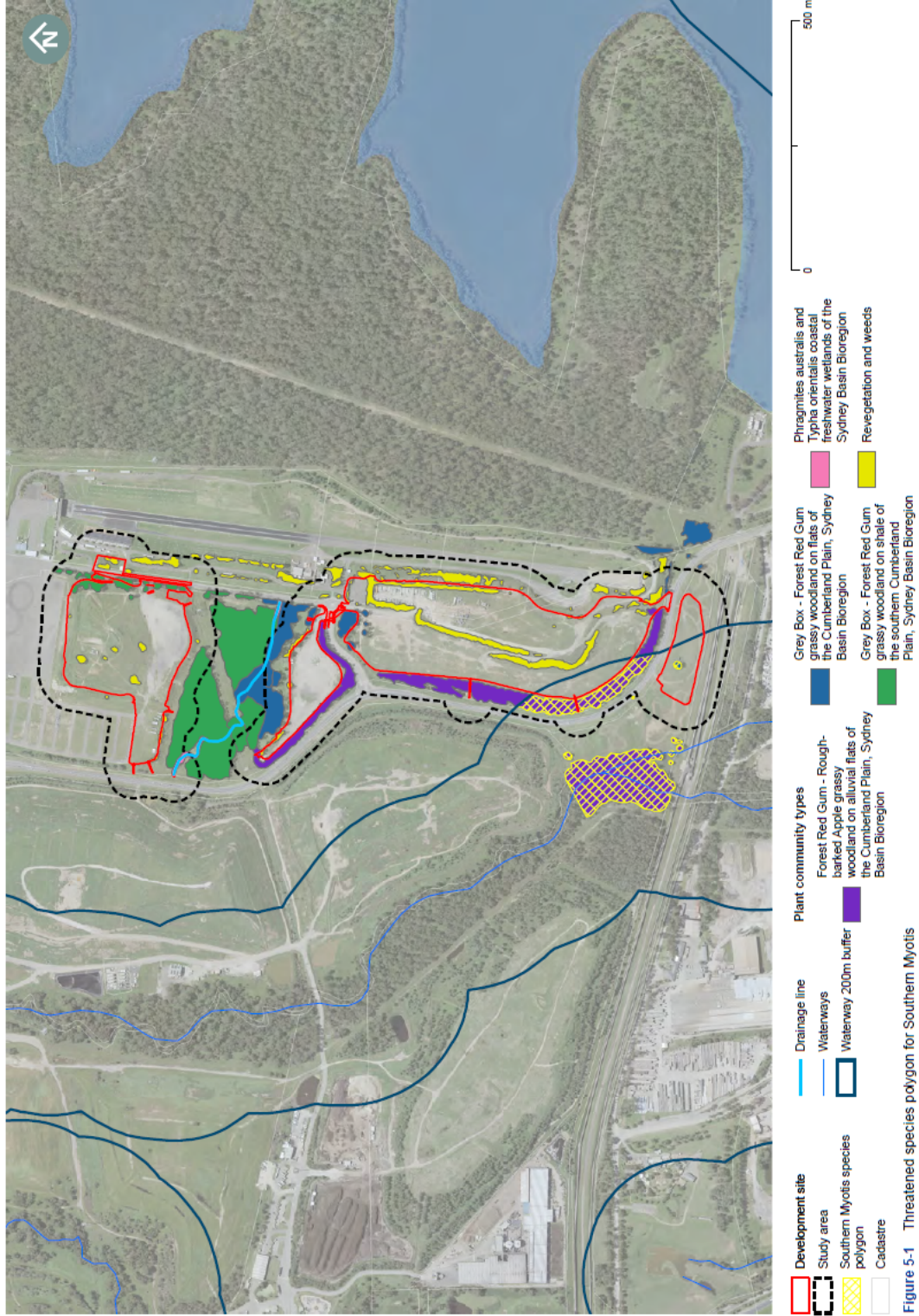


Figure 5-1 Threatened species polygon for Southern Myotis (Myotis macropus)

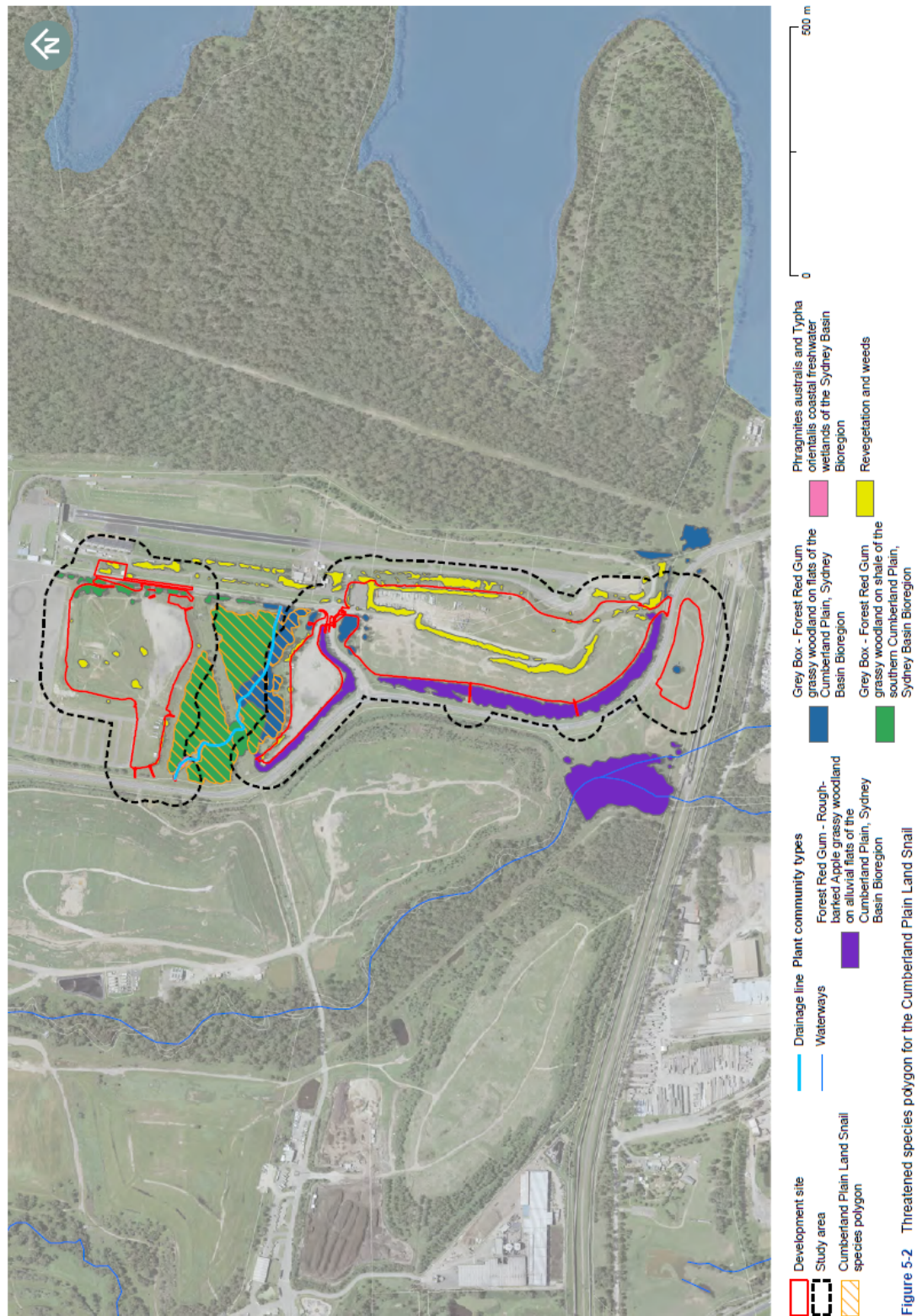


Figure 5-2 Threatened species polygon for the Cumberland Plain Land Snail

Figure 5-2 Threatened species polygon for the Cumberland Plain Land Snail

6. Aquatic assessment

Aquatic habitats within the development site and broader locality were assessed against the *Policy and guidelines for fish habitat conservation and management – Update 2013* (NSW Department of Primary Industries, 2013) and *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge, 2003). The Aquatic Ecology in Environmental Impact Assessment – EIA Guideline (Lincoln Smith, 2003) was used to guide the level of aquatic assessment required. There is enough existing information to describe the existing aquatic environment and to assess the quality and importance of the aquatic environments to be impacted by the development. As such, this assessment was based on a review of existing information and a habitat assessment.

Searches of databases, existing mapping and other literature were used to identify the locations of sensitive receptors. Sources included:

- Fisheries Spatial Data Portal
- Protected Matters Search Tool
- Atlas of GDEs (Bureau of Meteorology, 2017)
- SEED - NSW Wetlands mapping
- SEPP (Coastal Management) 2018 – Interactive map viewer
- Australian Wetlands Database (Department of the Environment and Energy, 2019).

6.1 Existing environment

The development site is located entirely within the Hawkesbury Nepean catchment, which includes Eastern Creek to the west. The catchment area around the development site is highly modified from its original state, being cleared for rural, urban, waste and industrial land uses. The development site is currently used as an entertainment and motorsport area, and the landform and drainage has been substantially modified to accommodate large cleared areas sealed by concrete and asphalt. These land uses influence the water quality and quantity/velocity of flows within the catchment.

Three waterways have been identified surrounding the development site and are discussed below. No threatened species listed under the *Fisheries Management Act 1994* have potential habitat within these watercourses. There are no Coastal wetlands as defined by the Coastal Management SEPP close to the development site.

The 1,500 metre landscape buffer also includes the western edge of Prospect Reservoir, an unnamed second order parallel offshoot from Eastern Creek to the south, and the end of Reedy Creek (third order stream) and an unnamed second order stream that both meet Eastern Creek just south of the M4 motorway (see **Figure 1-1** and **Figure 1-2**).

The proposed development would directly impact the artificial drainage line (see **Section 6.1.1**) through the construction of a concrete weir next to the existing culvert inlet under Ferrers Road (refer to **Section 9.3.7**).

6.1.1 Sydney Dragway Drainage line

A small unnamed and unmapped artificial drainage line runs in a northwest direction through woodland in part of the study area. This appears to drain stormwater runoff from parts (possibly most) of Sydney Dragway northwest through woodland between Carpark C and Carpark D and under Ferrers Road, where it eventually feeds into Eastern Creek through another concrete channel around the perimeter of the SUEZ Eastern Creek Resource Recovery Park.

In the woodland between Sydney Dragway and Ferrers Road, the drain varies in form from an established creek line with established banks, to a wide and shallow grassy overland flow. Sections of the drainage line have formed pools that hold water for periods of time, evidenced by the diversity of aquatic and macrophyte vegetation present. This is particularly evident around the road culverts at either end of the drain and through the disturbed transmission easement. Some areas toward the end of the drainage line have steep scoured banks and a small abundance of large woody debris.

6.1.2 Eastern Creek

Eastern Creek flows generally north, where it is joined by the Reedy, Angus, Bungarribee, Breakfast, Burdekin, Quakers and Bells Creeks before reaching its confluence with South Creek, located in Vineyard. South Creek then enters the Hawkesbury River at Pitt Town, 25 kilometres to the north of the development site. The section of Eastern Creek closest to the development site is a third order stream, surrounded by a disturbed riparian corridor that aligns with Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835).

Eastern Creek is about 180 metres west of the closest section of the development (Carpark A). Eastern Creek is adjoined to Sydney Dragway by a 750-metre-long drainage channel starting from Ferrers Road. The channel connects to the artificial drainage line discussed above. The development would not directly impact any part of Eastern Creek or its riparian vegetation, however there is potential for indirect impacts by contaminated runoff flowing into the drainage line, if improperly managed.

6.1.3 Prospect Reservoir

Prospect Reservoir is a storage reservoir that was built in the 1888 as part of the Upper Nepean Scheme to supply Sydney with water collected from the weirs on the Illawarra Plateau south of the city. The reservoir remains an integral part of Sydney's drinking water supply and is used regularly in times of high demand for water and when other parts of the water supply system are taken offline for maintenance.

The reservoir is surrounded by significant high-quality remnant of Cumberland Plain woodland and includes publicly accessible picnic areas and a cycleway. The freshwater wetlands occurring on the margins of the reservoir are an artefact of inundation but are significant because there are few large or intact examples in the region (State of NSW and the Office of Environment and Heritage, 2012).

Prospect Nature Reserve directly borders Sydney Dragway and the closest edge of the reservoir is around 600 metres from the edge of Carpark A of the development site. The development would not directly impact any part of Prospect Reservoir or its reserve, however there is low potential for indirect impacts by contaminated runoff.

6.2 Aquatic biota

No fish surveys or site inspections for aquatic ecology were completed as part of this assessment. No publicly available aquatic ecology studies of Eastern Creek could be found as part of this assessment. An assessment of the aquatic habitat around the development site against the basic 'Class' system (Fairfull and Witheridge et al. 2003) is provided in **Table 6-1**. Eastern Creek is mapped as 'Key Fish Habitat' by the NSW Department of Primary Industries, which is outside of the impact area.

Table 6-1 Fish habitat classification

Class	Characteristics	Habitat in the study area
<u>Class 1</u> Major fish habitat	Major permanently or intermittently flowing waterway (e.g. river or major creek); habitat of a threatened fish species.	Not present in the development site or immediate surrounds. The closest Class 1 waterway to the study area would be the Georges River.
<u>Class 2</u> Moderate fish habitat	Named permanent or intermittent stream, creek or waterway with clearly defined bed and banks with semi permanent to permanent waters in pools or in connected wetland areas. Marine or freshwater aquatic vegetation is present. Known fish habitat and/or fish observed inhabiting the area.	Not present in the development site. Eastern Creek is mapped as Key Fish Habitat and meets the description of Class 2 minimal fish habitat. Prospect Reservoir also likely meets the definition of Class 2, although there is no discussion about waterbodies.

Class	Characteristics	Habitat in the study area
<u>Class 3</u> Minimal fish habitat	Named or unnamed waterway with intermittent flow and potential refuge, breeding or feeding areas for some aquatic fauna (e.g. fish, yabbies). Semi permanent pools form within the waterway or adjacent wetlands after a rain event. Otherwise, any minor waterway that interconnects with wetlands or recognised aquatic habitats.	Not present in the development site or immediate surrounds.
<u>Class 4</u> Unlikely fish habitat	Named or unnamed waterway with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or freestanding water or pools after rain events (e.g. dry gullies or shallow floodplain depressions with no permanent aquatic flora present).	Present immediately adjacent to the development site in the unmapped unnamed drainage line in between Carpark C and Carpark D.

The drain is an unmapped and artificial waterway, draining runoff that is likely contaminated into Eastern Creek. The sections of semi permanent pools provide some aquatic habitat features for common amphibian species. There is no upstream connectivity within Eastern Creek and only very common fish species are likely to inhabit the drain. No threatened aquatic species have been recorded. One introduced species, the Eastern Gambusia (*Gambusia holbrooki*) was identified around Eastern Creek during surveys for this assessment.

6.3 Threatened fish

The desktop searches returned two threatened fish, Macquarie Perch (*Macquaria australasica*) and Australian Grayling (*Prototroctes maraena*), as having the potential to occur within the locality. An assessment of the likelihood of occurrence of all threatened species and endangered populations was completed to determine the potential for these species to occur within the development site (see **Appendix A**).

These two threatened fish species were identified by the Protected Matters Search Tool based on the presence of modelled suitable habitat and have not actually been recorded in the locality. There is no mapped threatened fish habitat within or adjacent to the development site. The Nepean River (west) and Georges River (south) are the closest waterways that are mapped habitat for a threatened fish species, the Macquarie Perch.

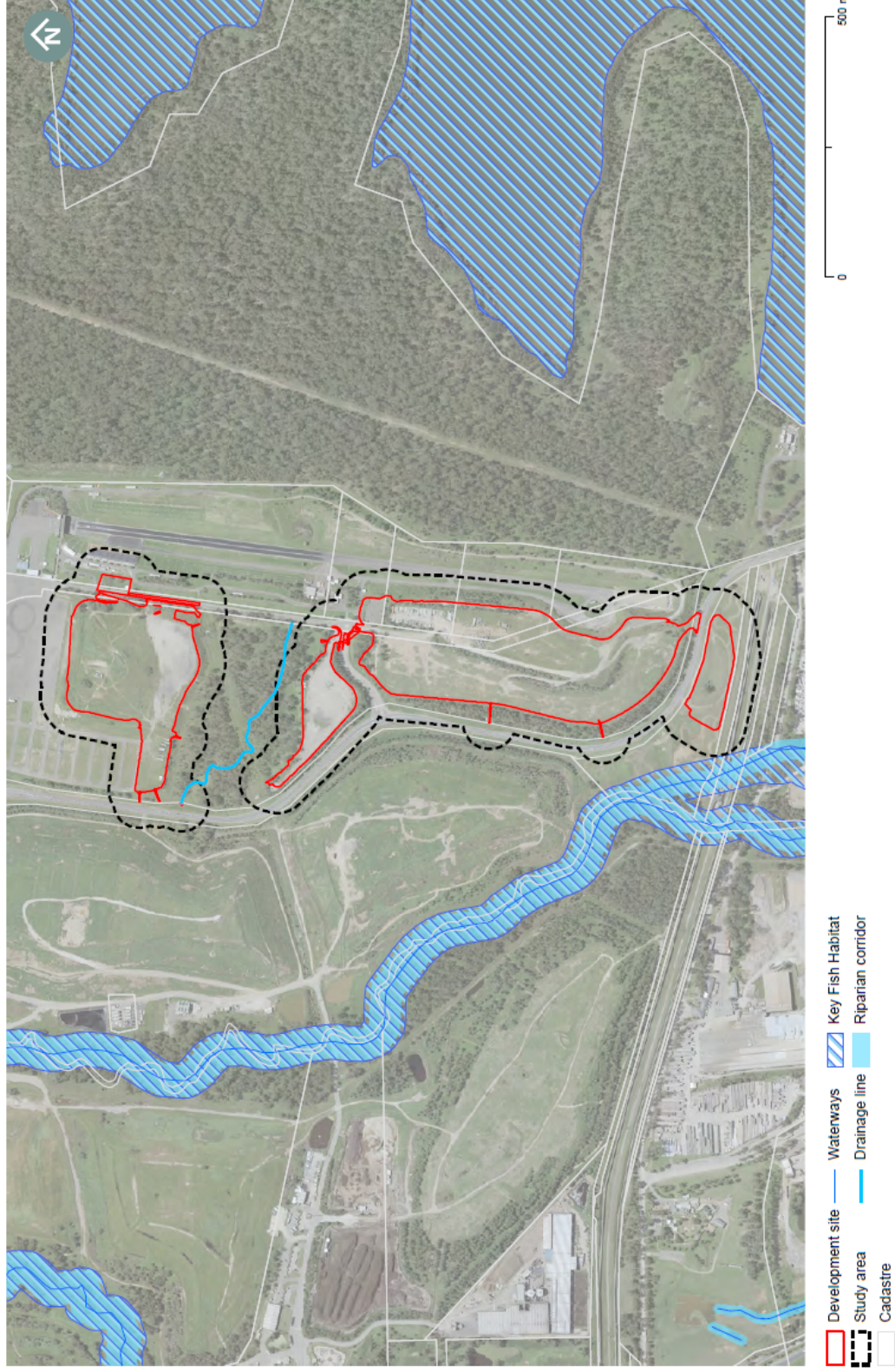


Figure 6-1 Aquatic habitats

7. Matters of National Environmental Significance

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places – defined as matters of national environmental significance. Matters relevant and applicable to this assessment include:

- Wetlands of international importance (often called 'Ramsar' wetlands after the international treaty under which such wetlands are listed)
- Nationally threatened species and ecological communities
- Migratory species.

For threatened biodiversity and migratory species listed under the EPBC Act, significance assessments have been completed in accordance with the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of Environment, 2013) (see **Appendix D**). Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment that is affected, and upon the intensity, duration, magnitude and geographic extent of the impacts (Department of Environment, 2013). Importantly, for a 'significant impact' to be 'likely', it is not necessary for a significant impact to have a greater than 50 per cent chance of happening; it is sufficient if a significant impact on the environment is a real or not a remote chance or possibility (Department of Environment, 2013). This advice has been considered while completing the assessments.

7.1 Wetlands of international and national importance

The development site and 1,500 metre landscape buffer does not contain any wetlands of international or national importance.

The nearest wetland of international importance is Towra Point Nature Reserve, located on the southern edge of Botany Bay and too great a distance to be affected by the development.

7.2 Nationally listed threatened ecological communities

According to the Protected Matters Search Tool (PMST) six EPBC Act listed TECs are known to occur, likely to occur, or may occur in the development site (see Table 7.1).

There would be no direct impacts to EPBC Act listed TECs. None of the PCTs within the development site correspond to EPBC Act listed TECs. All the occurrence of PCT 849 and PCT 850 in the development site are too small and degraded to meet the condition threshold criteria for the EPBC Act listed Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest TEC. However, the moderate condition woodland outside of the development site between Carpark C and Carpark D does meet the EPBC Act TEC condition criteria.

An assessment of the likely occurrence of these TECs in the 1,500 metre landscape buffer is shown in **Table 7-1** and has been completed using regional vegetation mapping, including:

- *The Native Vegetation of the Sydney Metropolitan Area – Version 3.1* (State Government of NSW and Office of Environment and Heritage, 2016) (see Table 7.1), and
- *Remnant Vegetation of the western Cumberland subregion, 2013 Update* (VIS_ID 4207) (State Government of NSW and Office of Environment and Heritage, 2015).

Table 7-1 EPBC Act listed TECs returned from the Protected Matters Search Tool and their predicted occurrence (based on PMST assessment)

Threatened ecological community	Predicted occurrence	Actual occurrence and mapped location
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion (Endangered Community)	May occur	Not mapped in the 1,500 metre landscape buffer.
Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community (Endangered Community)	Likely to occur	Not mapped in the 1,500 metre landscape buffer.
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion (Critically Endangered Community)	Likely to occur	Not mapped in the 1,500 metre landscape buffer.
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Critically Endangered Community)	Likely to occur	Confirmed between Carpark C and Carpark D, outside of the development site. Also occurs around Prospect Reservoir. PCT 849 and PCT 850 are mapped commonly in the 1,500 metre landscape buffer.
Shale Sandstone Transition Forest of the Sydney Basin Bioregion (Critically Endangered Community)	May occur	Not mapped in the 1,500 metre landscape buffer.
Western Sydney Dry Rainforest and Moist Woodland on Shale (Critically Endangered Community)	Likely to occur	Not mapped in the 1,500 metre landscape buffer.

7.3 Threatened plants

Sixteen EPBC Act listed threatened plant species were considered potentially likely to occur based on the presence of broadly associated habitat and nearby records. Refer to **Table 5-4** for a list of all EPBC Act listed species included in this assessment. These species were not found within or adjacent to the development site during the surveys completed for this BDAR. As such, these species are considered unlikely to be impacted.

7.4 Threatened animals

Targeted surveys for EPBC Act listed threatened animals were completed as part of the surveys for this BDAR. This included targeted surveys for the Green and Golden Bell Frog (*Litoria aurea*). Refer to **Section 2.7.2** for details of survey effort carried out and **Section 5.3.2** for the results of the surveys.

7.4.1 Green and Golden Bell Frog

The Green and Golden Bell Frog was not identified from the targeted surveys completed in February 2020. Areas of potential habitat are present along the artificial drainage line, with some lower quality habitat opportunities along Eastern Creek. Based on the results of the targeted surveys, distribution of recent recorded sightings, the distance of the Parramatta key population and the relatively disconnected nature of the drainage line near the development site to surrounding potential habitats, it is considered that the potential for the Green and Golden Bell Frog to occur within the development site is low. No species polygons have been developed for the Green and Golden Bell Frog.

7.4.2 Other species

The development site also provides some limited foraging habitat for three other EPBC Act listed threatened species. The Grey-headed Flying-fox, Swift Parrot and Regent Honeyeater are considered likely to forage on the flowers and/or fruit of trees within the development site. Impacts to foraging habitat would be of low magnitude, so impacts to these species would be negligible. Significance assessments have been completed for these species in accordance with the EPBC Act *Policy Statement 1.1 Significant Impact Guidelines* (Department of Environment, 2013) (see **Appendix D**). The White-throated Needletail and Fork-tailed Swift (migratory species) may fly over the development site on occasion but would not use the habitats and would not be impacted.

The estimated direct impacts to native vegetation that provides habitat for threatened species is outlined in **Table 7-2**. There is unlikely to be a significant impact to any threatened species (see **Appendix D**).

Table 7-2 Summary of direct impact to EPBC Act listed threatened species habitat (native vegetation) within the development site

Species	Associated plant community types	Area (ha) in development site
Large-eared Pied Bat	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (849) Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (850) Revegetation and weeds	1.66
Grey-headed Flying-fox Regent Honeyeater Swift Parrot	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (849) Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (850)	0.38

7.5 Migratory species

Based on the results of the Protected Matters Search Tool, 14 listed migratory species may occur in the broader locality (see **Appendix A**). An additional five species were recorded from the BioNet search. Suitable habitat does not exist within the development site for most migratory species identified by the database searches. The following species are considered moderately likely to occur in, or adjacent to, the development site based on the presence of suitable habitats:

- Migratory marine birds – Fork-tailed Swift
- Migratory terrestrial species – White-throated Needletail.

‘Important habitat’ for a migratory species is defined as (Department of Environment, 2013):

- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species
- Habitat that is of critical importance to the species at particular lifecycle stages
- Habitat utilised by a migratory species which is at the limit of the species range
- Habitat within an area where the species is declining.

According to the guidance provided in the EPBC Act Policy Statement 3.21—Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (Department of the Environment, 2015), important habitats in Australia for migratory shorebirds under the EPBC Act include those recognised as nationally or internationally important. A wetland habitat should be considered internationally important if it regularly supports one per cent of the individuals in a population of one species or subspecies of waterbird, or a total abundance of at least 20,000 waterbirds. Nationally important wetland habitat includes wetlands that regularly support 0.1 per cent of the flyway population of a single species of migratory shorebird, or 2,000 migratory shorebirds, or 15 migratory shorebird species. The habitats in the development site are not important habitats for migratory birds.

An assessment of the likely occurrence of these species and the presence of important habitat is included in **Appendix A**. While some migratory species of bird are likely to use the development site and locality, the development site would not be classed as an 'important habitat'. A nationally significant proportion of a population would not be supported by the habitats in the development site. The development would not substantially modify, destroy or isolate an area of important habitat for the migratory species and it would not seriously disrupt the lifecycle of an ecologically significant proportion of a population of migratory birds.

8. Impact avoidance and minimisation

This section of the BDAR demonstrates the efforts taken to avoid and minimise impacts on biodiversity values in accordance with section 8 of the BAM. Combined with management and mitigation measures implemented during construction (as outlined in Appendix C (Construction Environmental Management Framework) of the Environmental Impact Statement), the siting and planning of the development is likely to be sufficient to ensure that the requirements to avoid and minimise impacts on biodiversity values as set out in section 8 of the BAM are met.

Chapter 2 (Strategic need, justification and project alternatives) of the Environmental Impact Statement outlines the options considered for the Sydney International Speedway. As part of delivering Sydney Metro West, Sydney's next underground railway, the existing government land currently used for speedway racing is required for a future stabling and maintenance facility. The NSW Government has committed to relocating speedway racing to Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports. The process included consideration of strategic alternatives (i.e. 'Do nothing' and 'Build the development'), development alternatives and design refinements.

Three options for the development were evaluated within the Western Sydney Parklands at Eastern Creek. Two of these options (the eastern and the southern options) are within Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports. The three options are:

- A northern option located immediately east of the Light Horse Interchange, to the south of the M4 motorway
- An eastern option within the southwest area of Sydney Motorsport Park (operated by the Australian Racing Drivers' Club)
- A southern option to the west of Sydney Dragway (the preferred option).

Following assessment against the development site suitability criteria and consultation with key stakeholders, the southern option was identified as the preferred option. Part of the justification for the development site selection included the consideration that the development site has the least environmental constraints and is likely to result in the least environmental impact.

8.1 Avoiding and minimising impacts on native vegetation and habitat

The development site is located within a highly developed area that does not possess large expanses of intact native vegetation with high biodiversity value. As most of the development is within previously modified and developed areas, direct impacts to terrestrial biodiversity have been avoided and/or minimised. The development would result in minimal disturbance of native vegetation. Where this disturbance cannot be avoided, the vegetation is of poor to moderate quality and/or provides limited habitat for threatened species.

No areas of land declared as an area of outstanding biodiversity value in accordance with section 3.1 of the BC Act would be affected. Importantly, opportunities to further minimise native vegetation clearance would be refined during detailed design and reviewed as part of the pre clearing process.

As the design process for Sydney International Speedway has progressed, it has been informed by stakeholder feedback and the outcome of early environmental and engineering investigations. As a result, various aspects of the design have been developed and refined. **Table 8-1** shows an excerpt of some of the design refinements and changes considered in Chapter 2 (Strategic need, justification and project alternatives) of the Environmental Impact Statement, that relate to avoiding and minimising impacts to biodiversity.

Table 8-1 Design refinements noted to avoid impacts to native vegetation

Design aspect	Options considered	Rational for design refinement
Racetrack location	<ul style="list-style-type: none"> Northern racetrack location Central racetrack location (preferred option). 	<p>An initial design, with the speedway track located across the current Carpark C and D areas, was discounted due to the requirement for clearance of existing woodland areas that are protected under Commonwealth and State legislation. Locating the speedway track more centrally (the preferred design) avoided this area of vegetation and utilised the total area of land available most efficiently. This configuration also allows the inclusion of a second development site exit (at the southern end of the main operational site) to minimise congestion during post event peak periods.</p>
Parking areas	<ul style="list-style-type: none"> Main Spectator parking to the south of Ferrers Road, with either dedicated shuttlebuses or a pedestrian footbridge providing access to the main operational site Provision of parking bays in an area below the power transmission lines that traverse the lot Spectator parking in the northern part of the development site (preferred option). 	<p>The southern parking area was not pursued further in favour of maximising parking areas to the north that would:</p> <ul style="list-style-type: none"> Be closer to the main operational site, Sydney Dragway and Sydney Motorsports Park Avoid the Potential Archaeological Deposit within the area to the south of Ferrers Road Avoid the need to spectators to cross Ferrers Road and, as a result, remove any associated safety risks or additional infrastructure. <p>Parking bays located beneath the transmission lines would have been adjacent to two areas of woodland protected under the Commonwealth EPBC Act. To avoid potential impacts on these ecological areas, this parking area was not pursued further as part of the design process.</p>
Parking layout	Adjustments have also been made to the development boundaries to minimise vegetation clearance, particularly where vegetation is part of a threatened ecological community as listed under Commonwealth and State legislation.	
Drainage	<ul style="list-style-type: none"> Vegetated swales running north to south, linking Carparks A, C and D Use of existing Ferrers Road embankment and culvert Weir and throttle pipe for use in extreme event On-site detention basins (preferred option). 	<p>Although the use of vegetated swales would apply sustainable drainage principles to the development, their installation was discounted as it would require the clearance of vegetation which has been listed under Commonwealth and State legislation.</p> <p>The preferred option for development site drainage includes the provision of on-site detention basins, which would allow for the reuse of water within the development site, including for water suppression of the racetrack to manage dust generation during race events.</p> <p>The use and upgrade of (where necessary) existing drainage infrastructure near the development has been considered, including:</p> <ul style="list-style-type: none"> The existing embankment and culvert along Ferrers Road Installation of a weir and throttle pipe along the unnamed drainage line between Carpark C and Carpark D <p>The use and upgrade of this drainage infrastructure would enable more efficient use of space within the development site to maximise car parking provision and would result in a reduction in of the amount of on-site detention required. However, this infrastructure would be located in an area identified as a Potential Archaeological Deposit and adjacent to an area of vegetation protected under the EPBC Act.</p> <p>Further investigations would be carried out as part of design development of the development with regards to the installation of a weir design that would avoid impacts to environmentally sensitive</p>

Design aspect	Options considered	Rational for design refinement
		areas; however, this does not form part of the scope of the development nor is it assessed as part of this Environmental Impact Statement.
Footprint refinements	<p>A number of amendments to the project were incorporated into the project design in September 2020 as part of further design development, with the aim of reducing the construction footprint and the amount of vegetation clearance required for the project. The proposed amendments included:</p> <ul style="list-style-type: none"> Reconfiguration of the internal road and entry to Carpark A to minimise clearance of native, protected vegetation Reconfiguration of Carpark D to accommodate a revised vehicle and pedestrian entry and exit design, which minimises the amount of clearance of native, protected vegetation <p>In addition, a revised site stormwater and drainage design was incorporated into the project design to reduce the number of onsite detention tanks required. The revised design includes the installation of a discharge control pit and flow bypass pipe at the existing culvert under Ferrers Road between Carpark C and Carpark D, and a number of batter chutes that take advantage of existing terrain and minimises excavation requirements during construction.</p> <p>These amendments resulted in the minimisation of disturbance to revegetated Cumberland Plain Woodland CEEC along Ferrers Road, which is also foraging habitat for the Southern Myotis. This decreased the impact to the CEEC from 0.63 ha to 0.38 ha and completely avoided impacts to Southern Myotis foraging habitat.</p>	

8.2 Avoiding and minimising prescribed biodiversity impacts

Some types of developments may have impacts on biodiversity values (as defined in the BC Act and Biodiversity Conservation Regulation 2017) in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. For many of these impacts, the biodiversity values may be difficult to quantify, replace or offset, making avoiding and minimising impacts critical. Clause 6.1 of the Biodiversity Conservation Regulation 2017 identifies actions that are prescribed as impacts to be assessed under the biodiversity offsets scheme as follows:

- a) impacts of development on the habitat of threatened species or ecological communities associated with:
 - i. karst, caves, crevices, cliffs and other geological features of significance, or
 - ii. rocks, or
 - iii. human made structures, or
 - iv. non-native vegetation
- b) impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range
- c) impacts of development on movement of threatened species that maintains their life cycle
- d) impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining)
- e) impacts of wind turbine strikes on protected animals
- f) impacts of vehicle strikes on threatened species or on animals that are part of a TEC.

Importantly, the development would have negligible impact on prescribed biodiversity values as:

- There would be no impacts to karst, caves, crevices, cliffs and other geological features of significance
- There would be no impacts to rocks that provide habitat for threatened species
- The development is not a wind farm development so turbine strike is not an issue

- While there would be some additional construction vehicle movements on existing roads and likely increased vehicle movements when Sydney International Speedway is operational due to greater attendance at events, the development site is fenced and would normally have a large amount of vehicle traffic. Therefore, impacts of vehicle strike due to the development is unlikely to be substantially increased from current levels.

There is however potential for impacts on non-native vegetation, connectivity and species movement, and water quality water bodies and hydrological processes (see **Section 0**).

9. Assessment of impacts

The potential for direct impacts to biodiversity is limited to clearing of native vegetation and habitat. Indirect and other biodiversity related impacts of the development are identified below in **Section 0**. Potential aquatic biodiversity impacts are discussed in **Section 9.4**.

9.1 Impacts on native vegetation and habitat

Despite avoidance and minimisation measures (see **Section 8.1**), the development site would result in the direct removal of some native vegetation. The estimated clearing is about 0.38 hectares (3,787 square metres) consisting of the following PCTs:

- Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849) – 0.07 hectares (744 square metres).
- Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850) – 0.3 hectares (3,043 square metres).

Table 9-1 provides a summary of the native vegetation clearing that would occur within the development site including the corresponding BC Act TEC where applicable and the vegetation integrity loss. The biodiversity credit requirements for these impacts are outlined in **Section 12**. Vegetation clearing as part of this development would directly impact TECs listed under the BC Act. No direct impacts would occur to TECs listed under the EPBC Act.

The direct impacts on species credit threatened species habitat associated with the clearing of native vegetation are outlined in ***Area in development** site (hectares) has been rounded up based on square metres of impact, as in the BAM-C

Table 9-2. Other impacts to threatened species habitat, including impacts to connectivity and species movement, impacts to non-native vegetation and disturbed areas, and impacts to water quality and hydrology are discussed in **Section 0**.

Indirect impacts to vegetation retained directly adjacent to the areas of direct impact are expected to be negligible. The development site does not contain any large areas of native vegetation that would be broken up by the development. The vegetation that would remain is already adjacent to the existing Sydney Dragway infrastructure and subject to edge effects. No further loss of vegetation integrity is expected in these areas as a result of the development, therefore no indirect impacts have been calculated.

Table 9-1 Summary of native vegetation clearing within the development site

Zone	Plant community type ID No.	Plant community type name	Vegetation formation	PCT per cent cleared (historically across range)	Corresponding Threatened Ecological Community (TEC)	Area (ha) in development site*	Vegetation integrity loss
1	849	Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion - Moderate	Coastal Valley Grassy Woodlands	93 %	Cumberland Plain Woodland in the Sydney Basin Bioregion	0.02 (154 m ²)	18.7

Zone	Plant community type ID No.	Plant community type name	Vegetation formation	PCT per cent cleared (historically across range)	Corresponding Threatened Ecological Community (TEC)	Area (ha) in development site*	Vegetation integrity loss
2	849	Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion – Poor				0.059 (590 m ²)	11.3
3	850	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion - Poor	Coastal Valley Grassy Woodlands	88 %	Cumberland Plain Woodland in the Sydney Basin Bioregion	0.246 (2,457 m ²)	15.2
4	850	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion – Revegetation				0.059 (586 m ²)	23.9
5	1071	<i>Phragmites australis</i> and <i>Typha orientalis</i> coastal freshwater wetlands of the Sydney Basin Bioregion	Coastal Freshwater Lagoons	75 %	Does not meet definition of the TEC listing	0.001 (10 m ²)	44.4

*Area in development site (hectares) has been rounded up based on square metres of impact, as in the BAM-C

Table 9-2 Summary of direct impacts on threatened species credit species habitat associated with the loss of native vegetation

Species name	Common name	EPBC Act	BC Act	Sensitivity to gain class	SAII	Area (ha) in development site
<i>Myotis macropus</i>	Southern Myotis	-	V	High	No	0.005 (51 m ²)

9.2 Serious and irreversible impact entities

The concept of serious and irreversible impacts (SAII) is fundamentally about protecting threatened entities that are most at risk of extinction from potential development. The Biodiversity Offsets Scheme recognises that there are some types of serious and irreversible impacts that the community expects would not occur except where the consent authority considers that this type of impact is outweighed by the social and economic benefits that a development would deliver to the State.

Two PCTs within the development site (PCT 849 and PCT 850) form part of the 'Cumberland Plain Woodland in the Sydney Basin Bioregion' critically endangered ecological community listed under the BC Act. This CEEC has been identified as a potential SAI entity as it meets three of the four principles listed in Appendix A of the 'Guidance to assist a decision-maker to determine a serious and irreversible impact' (OEH 2019a), due to its listing as critically endangered under the BC Act.

To assess the potential for SAI, the following further information has been provided in accordance with Section 10.2.2 of the BAM:

a) the action and measures taken to avoid the direct and indirect impact on the potential entity for an SAI

Refer to **Section 8** of this BDAR for details on how the development has avoided and minimised impacts to Cumberland Plain Woodland in the Sydney Basin Bioregion CEEC. This includes design refinements such as racetrack location, parking areas, parking layout and drainage, which have all resulted in a reduction in impacts to native vegetation, threatened ecological communities and threatened species habitat.

b) the area (ha) and condition of the TEC to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone

Despite avoidance and minimisation measures (see **Section 8**), the development site would result in the direct removal of Cumberland Plain Woodland in the Sydney Basin Bioregion CEEC. The estimated clearing is approximately 0.38 hectares consisting of the following PCTs:

- Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849):
 - Moderate - 0.02 hectares (154square metres)
 - Poor - 0.059 hectares (590 square metres)
- Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850):
 - Poor – 0.246 hectares (2,457 square metres)
 - Revegetation - 0.059 hectares (586 square metres)

c) a description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guidance to assist a decision-maker to determine a serious and irreversible impact

No thresholds have been developed for threatened ecological communities, so this question is not applicable.

d) the extent and overall condition of the potential TEC within an area of 1000ha, and then 10,000ha, surrounding the proposed development footprint

The extent of the Cumberland Plain Woodland in the Sydney Basin Bioregion CEEC within 1,000 hectares and 10,000 hectares was calculated using regional vegetation mapping '*The Native Vegetation of the Sydney Metropolitan Area – Version 3.1 (VIS_ID 4489)*' (State Government of NSW and Office of Environment and Heritage, 2016) and '*Remnant Vegetation of the western Cumberland subregion, 2013 Update (VIS_ID 4207)*' (State Government of NSW and Office of Environment and Heritage, 2015). The potential extent of the CEEC was estimated by calculating the area of PCT 849 and PCT 850 within a buffer on the development footprint equivalent to the radius of a 1,000-hectare circle (1784 metres) and a 10,000-hectare circle (5642 metres). These areas are shown below in **Table 9-3**. There is approximately 267 hectares of the CEEC mapped within 1,000 hectares, and 1,006 hectares mapped within 10,000 hectares of the development site.

The condition of the CEEC within these areas is not known from the regional mapping, however the majority of the extent within the Cumberland Plain is patchy and disturbed, similar to vegetation within the development. Higher condition occurrences of PCT 849 and PCT 850 are located around riparian corridors and, in particular, Prospect Reservoir, which has been identified as a significant high-quality remnant of Cumberland Plain woodland (State of NSW and the Office of Environment and Heritage 2012).

Table 9-3 Area of Cumberland Plain Woodland CEEC (PCT 849 and PCT 850) within the development site and both a 1,000 ha and 10,000 ha radius of the development site

PCT	Area in development site	Area within 1.000 ha (1784 m radius of development site)	Area within 10,000 ha (1784 m radius of development site)
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849)	0.074 ha	244 ha	862 ha
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850)	0.304 ha	23 ha	144 ha
Total	0.378 ha	267 ha	1006 ha

e) an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration

An estimate of the extant area of the Cumberland Plain Woodland in the Sydney Basin Bioregion CEEC within the Cumberland Plain Subregion was calculated using regional vegetation mapping '*The Native Vegetation of the Sydney Metropolitan Area – Version 3.1 (VIS_ID 4489)*' (State Government of NSW and Office of Environment and Heritage, 2016) and '*Remnant Vegetation of the western Cumberland subregion, 2013 Update (VIS_ID 4207)*' (State Government of NSW and Office of Environment and Heritage, 2015). The extant area of the CEEC was estimated by calculating the area of PCT 849 and PCT 850 within a buffer on the development footprint equivalent to the radius of a 1,000-hectare circle (1784 metres) and a 10,000-hectare circle (5642 metres). These areas are shown below in **Table 9-4**. There is approximately 22,502 hectares of the CEEC mapped within the Cumberland Plain Subregion according to regional vegetation mapping (VIS_ID 4489 and VIS_ID 4207). This is substantially larger than the area estimates of 6,420 hectares reported in 1990 and 11,054 hectares reported in 1998 listed in the final determination (NSW Scientific Committee 2019). The development would impact 0.38 hectares, which is approximately 0.00002 per cent of the estimated occurrence of the Cumberland Plain Woodland in the Sydney Basin Bioregion CEEC in the subregion (assuming an extant area of approximately 22,502 hectares is correct).

As discussed in question d) above, the condition of the Cumberland Plain Woodland in the Sydney Basin Bioregion CEEC within the Cumberland Plain subregion is not known. Overall, the remaining intact patches of this CEEC are scattered across the subregion varying from remnant bushland to cleared derived grasslands, however almost all of the remaining area of the community is regrowth forest and woodland from past clearing activities (NSW Scientific Committee 2019). Good condition examples are located at places such as Scheyville National Park and Mulgoa Nature Reserve.

Table 9-4 Estimate of the extant area of Cumberland Plain Woodland CEEC (PCT 849 and PCT 850) within the Cumberland Plain Subregion and the proportional impact of the development

PCT	Development impact - area in development site	Area within the Cumberland Plain Subregion	Proportional impact of the development
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849)	0.074 ha	13,541 ha	0.0005 %
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850)	0.304 ha	8,961 ha	0.003 %
Total	0.378 ha	22,502 ha	0.002 %

f) an estimate of the area of the potential TEC that is in the reserve system within the IBRA region and the IBRA subregion

Cumberland Plain Woodland in the Sydney Basin Bioregion CEEC is known from the following conservation reserves; Mulgoa and Windsor Downs Nature Reserves, Scheyville National Park, and Leacock, Rouse Hill and Western Sydney Regional Parks. This is not an exhaustive list of conservation reserves where this CEEC is present. It is estimated that less than 8% is protected in formal conservation reserves (Department of Environment and Climate Change NSW 2008).

g) the development, clearing or biodiversity certification proposal's impact on:

i. abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns

The abiotic factors critical to the long-term survival of the Cumberland Plain Woodland in the Sydney Basin Bioregion CEEC are likely to be confined to oxygen, sunlight, water primarily from rainfall but in-part from groundwater (see **Section 4.5**) and pollinating vectors (wind and fauna). Fire may have also once been an abiotic factor that affected this community however this is no longer applied to much of the Cumberland Plain.

The development is unlikely to substantially affect any of these abiotic factors. Oxygen, sunlight, rainfall and pollination would remain the same. There would be some changes in hydrology from the new hard surfaces and drainage, however this is unlikely to be substantially different to the current highly modified regime. Any drawdown from construction activities that may occur in the process of excavating to the highest groundwater level would be very minor and unlikely to affect the long-term survival of an opportunistic-facultative GDE (see **Section 9.3.7**).

ii. characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants

The development is not expected to result in any edge effects to areas of retained vegetation as the condition of vegetation is already highly fragmented and disturbed. There would be no intended impacts to the understorey of retained vegetation.

The installation of a new weir along the culvert inlet underneath Ferrers Road would result in direct instream impacts and an eventual change in surface water hydrology of the drainage line upstream of the weir. The smaller weir would change the duration and extent of inundation of the upstream area between the two culverts during a 50-year and 100-year flood event (refer to the Sydney International Speedway Amendment Report). The result would be an increase in flood depth by 1.1 metres at the new weir location for around an additional 12 minutes during a 50-year flood event. There would also be an increase by 1.1 metres for a 100-year event, though the time of inundation would be the same. This change is considered to be too uncommon and temporary to cause any impact to the structure and function of the surrounding Cumberland Plain Woodland CEEC.

iii. the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC

As mentioned above, the development would have minor indirect impacts on areas of retained Cumberland Plain Woodland in the Sydney Basin Bioregion CEEC. Existing woodland around the development site is already highly modified and subject to disturbance from weed invasion. The edges along the existing roadways are already managed by slashing and possibly the use of chemical weed control. The development would not increase this impact and the growth of species within the TEC are not likely to be inhibited more than they currently are.

h) direct or indirect fragmentation and isolation of an important area of the potential TEC

The development site is located within a highly disturbed landscape where the majority of habitats have been cleared. The habitats that do remain are already fragmented and highly isolated. The development would result in a small increase between patches though would not fragment or isolate an important area of Cumberland Plain Woodland in the Sydney Basin Bioregion CEEC.

i) the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion

Chapter 10 of this BDAR details the proposed measures to be implemented during the construction of this development to protect areas of retained Cumberland Plain Woodland in the Sydney Basin Bioregion CEEC around the development site. There are no measures proposed to contribute to the recovery of this CEEC in the subregion.

9.3 Prescribed biodiversity impacts

This section identifies the potential prescribed biodiversity impacts on threatened species associated with the development in accordance with section 6.7 of the BAM. These are impacts that are in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat.

9.3.1 Impacts on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other features of geological significance

There are no occurrences of karst, caves, crevices and cliffs or other geological features of significance within the development site, or threatened species or ecological communities associated with these features. As such, this prescribed impact has not been considered further.

9.3.2 Impacts on the habitat of threatened species or ecological communities associated with rocks

There are no occurrences of rocks or rocky habitats within the development site or threatened species or ecological communities associated with rocks. As such, this prescribed impact has not been considered further.

9.3.3 Impacts on the habitat of threatened species or ecological communities associated with human made structures

There are seven threatened species that can use human made structures as habitat that may be affected by the development which are:

- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*)
- Little Bent-winged Bat (*Miniopterus australis*)
- Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- Southern Myotis (*Myotis macropus*).

The Large Bent-winged Bat, Little Bent-winged Bat and Southern Myotis are known to roost in cave-like human made structures including mine shafts, storm water channels, buildings, and under bridges. There is no human made structures in the development site that would be suitable for these bats to use as roosting habitat. There are road drainage culverts at either end of the artificial drainage line in the areas adjacent to Carpark C and Carpark D. Most of the existing buildings in the development site are subject to a high amount of human use. There are scattered derelict demountable buildings across the development site, though would be at best marginal as roost sites. The Eastern Coastal Free-tailed Bat, Eastern False Pipistrelle, Yellow-bellied Sheath-tail-bat and Greater Broad-nosed Bat roost mainly in tree hollows but also under bark or in artificial structures. There are likely to be minimal, if any, roosting opportunities for these species. It is unlikely that the development would detrimentally affect the bioregional persistence of these species.

9.3.4 Impacts on the habitat of threatened species or ecological communities associated with non-native vegetation

Up to 1.3 hectares of revegetation and weeds would be impacted by the development. This includes some areas of planted native non-indigenous trees.

Twelve threatened species may utilise the non-native vegetation, including both native and exotic planted trees and shrubs, that are found within the development sites.

The Grey-headed Flying-fox, Swift Parrot and Little Lorikeet are considered likely to forage on the flowers and/or fruit of both planted and exotic trees within the development site. The Dusky Woodswallow may forage in the air space above the planted trees and non-native vegetation and may use the vegetation for perching. The Eastern Coastal Free-tail Bat, Large Bent-winged Bat, Little Bent-winged Bat, Eastern False Pipistrelle, Yellow-bellied Sheath-tail-bat and Greater Broad-nosed Bat may forage in the air spaces around areas of non-native vegetation, feeding on the insects attracted to the vegetation. Although no high-quality hollow bearing trees were identified on the development site, potential roosting habitat in the form of small tree hollows may also be present in some of the larger trees for the Eastern Coastal Free-tailed Bat, Eastern False Pipistrelle, Yellow-bellied Sheath-tail-bat and Greater Broad-nosed Bat. In the case of the Southern Myotis, only tree hollows within 200 metres of water bodies are likely to be utilised, which are unlikely to be present. Large predatory birds such as the Powerful Owl and Masked Owl may also perch on larger non-native and planted trees while travelling through the development site.

Due to the marginal, unnatural, structure of the vegetation present in the development site, it is unlikely to be used as breeding habitat by any threatened species. It is unlikely that the development would detrimentally affect the bioregional persistence of these species.

9.3.5 Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range

Habitat connectivity is identified as the degree to which a particular site connects different areas of habitat of threatened species to facilitate the movement of those species across their range. Threatened species movement is identified as the degree to which a particular site contributes to the movement of threatened species to maintain their lifecycle.

In terms of habitat connectivity, the development site is located within a highly disturbed landscape where the majority of habitats have been cleared. The habitats that do remain are fragmented and highly isolated.

The development site is located directly between two areas that have been mapped as a biodiversity corridor of regional significance (see **Figure 1-1**) as identified by the Biodiversity Investment Opportunities Map (BIO Map). These areas are the vegetated riparian zone of Eastern Creek and the significant area of Cumberland Plain Woodland surrounding Prospect Reservoir. These corridors are only likely used by flying species or local common mammals, reptiles and amphibians. Neither of these areas would be directly impacted by the development.

The vegetation on the development site may facilitate movement between the corridors for highly mobile species. Flying animals such as birds and bats use the airspace to move between natural habitats and the patchy vegetation within the development site is likely to be used as a foraging or perching resource as part of daily movements. For example, a portion of the Grey-headed Flying-fox population leaves the nationally important Parramatta camp of an evening and likely passes over the development site as the animal's head to foraging grounds. The threatened Swift Parrot is likely to pass through the development site during seasonal movements. Threatened species known from the locality including

the Grey-headed Flying-fox, Swift Parrot and Southern Myotis (and other threatened bats) are powerful flyers capable of covering large distances between habitat patches. The landscape of the locality in its current form is permeable to these species and habitat connectivity for these species would not be detrimentally affected, and the bioregional persistence of these species would not be detrimentally affected by the development.

9.3.6 Impacts on movement of threatened species that maintains their life cycle

The life cycle of threatened species known from the locality including the Grey-headed Flying-fox, Swift Parrot and Southern Myotis is unlikely to be dependent on the habitats to be affected by the development site. The habitats to be affected are marginal foraging habitat and no breeding habitat is likely to be impacted. The development site is not part of a recognised movement corridor between breeding grounds, foraging grounds, or other habitats important for the lifecycle of these species such as staging points for migration. The movement of these species between foraging and breeding grounds would not be affected, and the bioregional persistence of these species would not be detrimentally affected by the development.

9.3.7 Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities

The construction of a drainage pit and flow bypass pipe upstream of the existing culvert under Ferrers Road between Carpark C and D would result in direct instream impacts and an eventual change in the surface water hydrology of the drainage line upstream. The reduction of the existing 1500 millimetre pipe with a smaller 900 millimetre diameter flow bypass pipe has been incorporated into the project design. This would change the duration and extent of inundation of the upstream area between the two culverts during a 50-year and 100-year flood event. The result would be an increase in flood depth by 1.1 metres for around an additional 12 minutes during a 50-year flood event. There would also be an increase by 1.1 metres for a 100-year event, though the time of inundation would be about the same as under existing conditions. This change is considered to be too uncommon and temporary to cause any impact to the structure and function of the surrounding vegetation communities.

There would be some disturbance to instream habitats as a result of the construction of the drainage pit and flow bypass pipe upstream of the existing culvert under Ferrers Road between Carpark C and D. However, the new drainage infrastructure at this location would be mostly preconstructed and dropped into place from the road verge with minimal instream works required. The total area of direct disturbance caused by the new drainage infrastructure at this location would be around 14 square metres, with nine square metres of direct impact to PCT 1071 (*Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion) expected as a result. Appropriate environmental controls would be established to minimise disturbance and sedimentation of downstream aquatic habitats during construction and operation of the project. The section of the drainage line that would be impacted is highly ephemeral and likely dry most of the year.

There is potential for indirect impacts to surrounding habitats from erosion and contaminated runoff from the development. The main risk would be to Eastern Creek via the artificial drainage line designed to drain stormwater from the existing development site. Construction activities adjacent to drainage areas across the proposed main operational site, and in Carpark C and Carpark D that are directly adjacent to the woodland and drainage line, are most likely to have an impact on water quality (if not mitigated). This may affect downstream environments due to potential changes in water quality and geomorphology associated with the construction of the development. The implementation of standard mitigation measures (i.e. sediment control, spill control) would control sediment and pollutants from any significant runoff events.

A groundwater assessment has been completed as part of the environmental assessment of the development and is included as Chapter 15 (Groundwater and geology) of the Environmental Impact Statement. Excavation works as part of construction of the development would involve a maximum cut depth of around six metres with a lowest finished level of 68 metres Australian Height Datum. The lowest finished level is consistent with the highest groundwater table previously recorded at the development site. Therefore, earthworks are not expected to intercept substantial groundwater. Any perched groundwater table in the clayey residual soils, if present, is intermittent and/or localised. Groundwater level

drawdown and groundwater take is therefore unlikely as a result of construction. Any actual drawdown that may occur in the process of excavating to the highest groundwater level, would be very minor.

The terrestrial GDEs identified in and around the study area, that are EPBC Act listed or BC Act listed TECs, are likely to be opportunistic facultative GDEs that depend on the subsurface presence of groundwater (often accessed via the capillary fringe – subsurface water just above the water table) in some locations but not in others, particularly where an alternative source of water (i.e. rainfall) cannot be accessed to maintain ecological function. Importantly, these GDEs are not obligate GDEs (meaning they are not entirely dependent on groundwater), therefore any minor drawdown associated with excavation works is unlikely to result in any impacts. The TECs/GDEs identified in the study area are outlined in **Table 9-5**.

Table 9-5 Threatened ecological communities that may be impacted by groundwater drawdown

Threatened Ecological Community	Location
Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act) Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act)	This TEC is mostly represented by poor and revegetated woodland in the study area. There is a patch of moderate condition woodland between Carpark C and Carpark D that aligns with the EPBC Act listed TEC.
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act)	This TEC is located outside of the development site and study area, though is around 100 metres from the western edge of Carpark A.

9.3.8 Impacts of wind turbine strikes on protected animals

This prescribed impact is not applicable to the development.

9.3.9 Impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC

Vehicle collision is a direct impact that reduces local population numbers and is a common occurrence in Australia. Mammals, reptiles, amphibians and birds are all at risk of vehicle strike, particularly those common species (e.g. birds) that are tolerant of disturbance and remain in the development site. The risk of an increase in the frequency of vehicle strike due to the development is low and would generally be limited to vehicle movements to and from construction areas along Ferrers Road, which already experiences moderate traffic levels. After the completion of the development, there would be an increase in traffic as a result of Sydney International Speedway events. Traffic movements within the development site are not expected to have a significant impact as the development site is fenced. Additional traffic movements along Ferrers Road are also not expected to have a significant impact because of the existing moderate levels of traffic. Vehicle strike associated with the development is unlikely to affect any threatened species of animals or animals that are part of a TEC.

9.4 Noise, vibration, dust, light and contaminants

Noise, vibration, dust, light and contaminant pollution are temporary impacts that are likely to result from proposal activities. These impacts are likely to have cumulative effects. Noise, vibration, dust, light and contaminant pollution are likely to occur during the construction of the proposal from all proposal activities, although impacts to biodiversity would be greatest where activities take place near vegetated areas (e.g. the moderate condition woodland between Carpark C and Carpark D).

Edge effects can create changes in a population or a community structure that occur at the boundary of differing habitats. Using a 50-metre edge effect buffer around the development site, these impacts of noise, vibration, dust and contaminated pollution may result in the modification of about 4.4 hectares of native vegetation that would remain at the edge of the development once construction is complete (refer **Figure 4-1**). However much of this vegetation is already disturbed and modified and the impacts of increased noise, vibration, dust, light and contaminated pollution is likely to be negligible.

9.4.1 Noise and vibration impacts

Anthropogenic noise can alter the behaviour of animals or interfere with their normal functioning (Bowles, 1997). During all phases of the project there would be increased noise and vibration levels in the study area and immediate surrounds due to vegetation clearing, ground disturbance, machinery and vehicle movements, and general human presence. Construction activities may occur 24 hours a day and seven days a week. It is assumed that there would also be operation at night as per the current operation of the existing speedway. However, the development site is located within a highly disturbed and modified landscape currently subject to anthropogenic noise from traffic (M7 Motorway, Ferrers Road), industry (landfill operations) and the existing motorsport park, which operates during the day and night.

Construction activities would likely result in a small increase in ambient noise levels (mainly an increase from current night noise levels) as well as potentially loud noises and vibration for short periods associated with earth works. The noise and vibration from activities associated with the project would potentially disturb fauna and may disrupt foraging, reproductive, or movement behaviours. The impacts from noise emissions are likely to be temporarily localised to the construction areas. These emissions are not considered likely to have a significant, long-term, impact on wildlife populations outside the area of impact. Within the area of impact (including habitats immediately adjacent to the disturbance area), some sensitive species (e.g. woodland birds) may avoid the noise and some more tolerant species, including arboreal mammals, would habituate over the longer-term.

9.4.2 Dust pollution

Elevated levels of dust may be deposited onto the foliage of vegetation adjacent to the project activities. This has the potential to reduce photosynthesis and transpiration and cause abrasion and radioactive heating resulting in reduced growth rates and decreases in overall health of the vegetation. Consequently, changes in the structure and composition of plant communities may occur.

Some level of dust is likely to be generated throughout the lifecycle of the project due to the clearing of vegetation, although dust pollution is likely to be greatest during construction, during periods of earthworks, vegetation clearing, vehicle movements for construction and decommissioning activities and during adverse weather conditions (i.e. high wind). However, deposition of dust on foliage is likely to be highly localised, intermittent, and temporary (particularly during the wetter seasons) and is therefore not considered likely to be a major impact of the project.

9.4.3 Light pollution

Ecological light pollution is the descriptive term for light pollution that includes direct glare, chronic or periodic increased illumination, and temporary unexpected fluctuations in lighting (including lights from passing vehicles), that can have potentially adverse effects on wildlife (Longcore and Rich, 2004).

Construction of the development would require nightworks. It is assumed that construction during some stages may be 24 hours, seven days a week, however this is unlikely to occur throughout the entire length of construction. Night works would require artificial lighting, which would cause light pollution into surrounding areas. The immediate area surrounding the proposal site, and the roadside during operation, would be subject to artificial lighting, essentially creating permanent 'daylight' conditions. Operation would also include night events on Saturdays until as late as 12am. The ecological light pollution may potentially affect nocturnal fauna by interrupting their life cycle. However, there is already existing light pollution around the current motorsport park, so the addition of light pollution associated with the construction and operation of the development would likely only be a minor increase on existing levels.

Some species such as light tolerant microchiropteran bats may benefit from the lighting due to increased food availability (e.g. 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 in the area of lighting is likely. This impact would be of low magnitude and mitigation measures are not deemed necessary.

9.4.4 Contaminant pollution

During the construction phase 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, waterways, and potential direct physical trauma to flora and fauna that come into contact with contaminants. Accidental release of contaminants is likely to be localised.

9.5 Contribution to Key Threatening Processes

A Key Threatening Process (KTP) is a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or an ecological community. KTPs are listed under the BC Act and EPBC Act. At present, there are currently 39 listed KTPs under the BC Act. There are eight KTPs listed under the *Fisheries Management Act 1994*. There are 21 KTPs listed under the EPBC Act. Of the listed KTPs, the development may directly or indirectly contribute to the following KTPs as outlined in **Table 9-6**. Aside from direct impacts to native vegetation, the potential for contribution to these KTPs can be minimised and avoided through the implementation of management and mitigation measures during construction of the development. These measures would be outlined in a Flora and Fauna Management Plan (refer to Appendix C (Construction Environmental Management Framework) of the Environmental Impact Statement).

Table 9-6 Summary of Key Threatening Processes that the development would directly or indirectly contribute to

Key Threatening Process	BC Act, FM Act or EPBC Act	Likelihood of the development directly or indirectly contributing to the KTP
Clearing of native vegetation	BC Act	High – clearing of native vegetation would occur. However, the magnitude of clearing is small (0.38 hectares).
Land clearance	EPBC Act	High – clearing of native vegetation would occur. However, the magnitude of clearing is small (0.38 hectares).
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	BC Act	Low – mitigation measures would be implemented to prevent the spread or introduction of amphibian chytrid fungus.
Infection of amphibians with chytrid fungus resulting in chytridiomycosis	EPBC Act	Low – mitigation measures would be implemented to prevent the spread or introduction of amphibian chytrid fungus.
Infection of native plants by <i>Phytophthora cinnamomi</i>	BC Act	Low – mitigation measures would be implemented to prevent the spread or introduction of <i>Phytophthora cinnamomi</i> .
Dieback caused by the root rot fungus (<i>Phytophthora cinnamomi</i>)	EPBC Act	Low – mitigation measures would be implemented to prevent the spread or introduction of <i>Phytophthora cinnamomi</i> .
Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	BC Act	Low – mitigation measures would be implemented to prevent the spread or introduction of Exotic Rust Fungi.
Invasion and establishment of exotic vines and scrambler	BC Act	Low – mitigation measures would be implemented to prevent the spread of weeds.
Invasion of native plant communities by African Olive <i>Olea europaea</i> subsp. <i>cuspidata</i> (Wall. ex G. Don) Cif.	BC Act	Low – mitigation measures would be implemented to prevent the spread of weeds.
Invasion of native plant communities by <i>Chrysanthemoides monilifera</i>	BC Act	Low – mitigation measures would be implemented to prevent the spread of weeds.

Key Threatening Process	BC Act, FM Act or EPBC Act	Likelihood of the development directly or indirectly contributing to the KTP
Invasion of native plant communities by exotic perennial grasses	BC Act	Low – mitigation measures would be implemented to prevent the spread of weeds.
Invasion, establishment and spread of Lantana (<i>Lantana camara</i> L. sens. Lat)	BC Act	Low – mitigation measures would be implemented to prevent the spread of weeds.
Degradation of native riparian vegetation along New South Wales water courses	FM Act	Low – mitigation measures would be implemented to avoid inadvertent impacts to vegetation outside of the development site associated with Eastern Creek.

9.6 Aquatic impacts

The construction of a drainage pit and flow bypass pipe upstream of the existing culvert under Ferrers Road between Carpark C and D would result in direct instream impacts and an eventual change in the surface water hydrology of the drainage line upstream. The reduction of the existing 1500 millimetre pipe with a smaller 900 millimetre diameter flow bypass pipe has been incorporated into the project design. This would change the duration and extent of inundation of the upstream area between the two culverts during a 50-year and 100-year flood event. The result would be an increase in flood depth by 1.1 metres for around an additional 12 minutes during a 50-year flood event. There would also be an increase by 1.1 metres for a 100-year event, though the time of inundation would be about the same as under existing conditions. This change is considered to be too uncommon and temporary to cause any impact to the structure and function of the surrounding vegetation communities.

There would be some disturbance to instream habitats as a result of the construction of the drainage pit and flow bypass pipe upstream of the existing culvert under Ferrers Road between Carpark C and D. However, the new drainage infrastructure at this location would be mostly preconstructed and dropped into place from the road verge with minimal instream works required. The total area of direct disturbance caused by the new drainage infrastructure at this location would be around 14 square metres, with nine square metres of direct impact to PCT 1071 (*Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion) expected as a result. Appropriate environmental controls would be established to minimise disturbance and sedimentation of downstream aquatic habitats during construction and operation of the project. The section of the drainage line that would be impacted is highly ephemeral and likely dry most of the year.

Unmitigated impacts to aquatic habitats may arise from construction activities. There is potential for indirect impacts to surrounding aquatic habitats from erosion and contaminated runoff from the development. The main risk would be to Eastern Creek via the artificial drainage line designed to drain stormwater from Sydney Dragway. Construction activities adjacent to drainage areas across the proposed main operational site, and in Carpark C and Carpark D that are directly adjacent to the woodland and drainage line, are most likely to have an impact on water quality (if not mitigated). This may affect downstream environments due to potential changes in water quality and geomorphology associated with the construction of the development. The implementation of standard mitigation measures (i.e. sediment control, spill control) would control sediment and pollutants from any significant runoff events.

9.7 Cumulative biodiversity impacts

Potential cumulative impacts were considered for assessment based on the likely interactions of the development with other developments and plans that met the adopted screening criteria. The approach to assessment and the other developments considered are described further in Chapter 23 (Cumulative impacts) of the Environmental Impact Statement.

The cumulative impacts of historic vegetation clearing for agriculture, urban development, and development and maintenance of infrastructure is likely to include continued loss of biodiversity on the Cumberland Plain. The Cumberland Plain is an over cleared landscape and due to the expansion of western Sydney and creation of housing and associated infrastructure, further impacts to biodiversity are likely to result in this region.

While data from all recent developments in the locality is not freely available, some information on recent developments with biodiversity impacts are listed in **Table 9-7**.

Table 9-7 Past, present and future developments within the Cumberland Plain region

Development	Impacts
Sydney Metro West – Stage 1	The estimated clearing is about 0.18 hectares; consisting of two PCTs, 0.03 hectares of Cumberland Plain Woodland in the Sydney Basin Bioregion (listed under the BC Act) and 0.15 hectares of habitat for the Southern Myotis.
Archbold Road Upgrade, Old Wallgrove Road to the Great Western Highway	The development, located in the Cumberland Plain region, would require the removal of about 9.81 ha of vegetation, of which 7.60 ha is native vegetation and is consistent with a threatened ecological community and habitat for threatened species (WSP Parsons Brinckerhoff 2017).
Parramatta Light Rail	Direct impact to 0.62 hectares of native vegetation within the Cumberland Plain region. Removal of about 300 individual trees that are mostly horticultural plantings (WSP 2017).
Clyde Terminal Conversion Development	Located within the Cumberland Plain region, there were no impacts to native vegetation, but potential impacts to tank farm habitat for the Green and Golden Bell Frog (AECOM 2013).
Viva Energy Clyde Western Area Remediation Development	No direct impacts to native vegetation all within the Cumberland Plain region. Removal of foraging habitat for the Green and Golden Bell Frog, however this was not considered to have a significant impact on the species. Potential direct and indirect impacts were identified (e.g. fragmentation of movement corridors and water quality impacts) but were considered manageable with mitigation measures (Biosis 2018).
WestConnex program of works	This includes M4 Widening (direct impact on up to 8.86 hectares of planted and remnant vegetation), M4 East (around 15.7 hectares of vegetation, of which 12.9 hectares comprises of planted trees and landscaped areas) and M4-M5 Link (with no direct impacts to native vegetation), located in the Cumberland Plain region. Other impacts (direct and indirect) were concluded to not have a significant impact or unlikely (including GDEs), and/or considered to be minimal and manageable.

When the impacts of the development are considered together with the impacts of the above developments, the contribution of Sydney International Speedway to cumulative biodiversity impacts in the Cumberland Plain region is relatively low.

10. Managing and mitigating impacts on biodiversity values

Once all practicable steps to avoid or minimise impacts have been implemented at the detailed design phase, management and mitigation measures would be implemented to further lessen the potential ecological impacts of the development.

Biodiversity impacts during construction would be managed in accordance with the Construction Environmental Management Framework, which is included as Appendix C of the Environmental Impact Statement. The Construction Environmental Management Framework includes biodiversity management objectives to maximise workers' awareness of biodiversity values and avoid or minimise potential impacts to biodiversity.

The Construction Environmental Management Framework also requires the preparation and implementation of a Flora and Fauna Management Plan, including (but not limited to):

- Procedures for the demarcation and protection of retained vegetation, including all vegetation outside and adjacent to the construction areas. Importantly, this would include the moderate quality woodland between Carpark C and Carpark D, that is listed under the EPBC Act and provides habitat for the Cumberland Plain Land Snail
- Measures to reduce disturbance to sensitive fauna.
- Procedures for the clearing of vegetation and the relocation of flora and fauna, including pre clearing surveys and hollow bearing tree identification
- Procedures for dealing with unexpected threatened species identified during construction
- Weed management measures in accordance with the *Biosecurity Act 2015*
- Pathogen management measures to prevent introduction and spread of amphibian chytrid fungus, *Phytophthora cinnamomi* and Exotic Rust Fungi
- Inspection and ecological monitoring requirements
- Compliance record generation and management.

Additional biodiversity mitigation measures are outlined in **Table 10-1**. These would be in addition to mitigation measures as detailed elsewhere in the Environmental Impact Statement relating to:

- Groundwater (refer to Chapter 15 (Groundwater and geology))
- Soils and surface water quality (refer to Chapter 13 (Soils and surface water quality))

Table 10-1 Mitigation measures

Refence	Mitigation measure
Design	
B1	Opportunities to minimise the amount of vegetation clearance within the development site would be considered as part of further design development where reasonable and feasible

11. Thresholds for the assessment and offsetting of impacts of development

This section of the BDAR identifies the impact thresholds that the assessor must apply including:

- a) impacts on a potential entity that are serious and irreversible impacts
- b) impacts for which the assessor is required to determine an offset requirement
- c) impacts that do not require further assessment by the assessor.

11.1 Impacts on a potential entity that are serious and irreversible impacts

. The development site would result in the direct removal of Cumberland Plain Woodland in the Sydney Basin Bioregion CEEC, which is recognised as an SAI entity. The estimated clearing is approximately 0.38 hectares (3,787 square metres) consisting of PCT 849 and 850 (see **Table 11-1**). The additional impact assessment provision outlined in section 10.2.3 of the BAM has been completed and is provided in **Section 0**. No thresholds have been developed for threatened ecological communities, so this section is not applicable. There are no impacts on threatened species that are recognised as a SAI entity.

11.2 Impacts for which the assessor is required to determine an offset requirement

The determination of impacts at the development site which require an offset was completed in accordance with section 10.3 of the BAM.

11.2.1 Impacts on native vegetation (ecosystem credits)

An offset is required for the impacts to most of the native vegetation in the development site as outlined in **Table 11-1**. Complete removal of the vegetation within the development site would occur. The location of the vegetation zones that would be impacted is shown in **Figure 11-1**.

Table 11-1 Impacts to PCTs which require an offset

Veg zone	PCT	TEC	Area (ha)	VI score
1	Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (849) - Moderate	Yes	0.02 (154 m ²)	18.7
3	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (850) - Poor	Yes	0.246 (2,457 m ²)	15.2
4	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (850) – Revegetation	Yes	0.059 (586 m ²)	23.9
5	<i>Phragmites australis</i> and <i>Typha orientalis</i> coastal freshwater wetlands of the Sydney Basin Bioregion (1071) – Drainage line	No	0.001 (10 m ²)	44.4

*Area in development site (hectares) has been rounded up based on square metres of impact, as in the BAM-C

11.2.2 Impacts on threatened species

An offset is required for impacts to threatened species as outlined in **Table 11-2**. The location of this habitat is shown in **Figure 11-1**.

Table 11-2 Impacts to threatened species which require an offset

Veg zone	PCT	TEC	Area (ha)	VI score
Southern Myotis (<i>Myotis macropus</i>)				
4	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (850) – Revegetation	Yes	0.005 (51 m ²)	23.9

11.3 Impacts for which the assessor is not required to determine an offset requirement

An offset is not required for impacts where the vegetation integrity score is below those set out in paragraph 10.3.1.1 of the BAM for impacts on native vegetation and paragraph 10.3.2.1 of the BAM for impacts on threatened species. Impacts not requiring offset are described in **Table 11-3**. The vegetation integrity score for the Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion PCT - Poor (PCT 849) is 11.3. As the vegetation integrity score for this vegetation zone is below 15 an offset is not required for this impact to native vegetation. Similarly, as the vegetation integrity score for this vegetation zone is below 17 an offset is not required for this impact to habitat for the Southern Myotis. The location of this vegetation zone is shown in **Figure 11-1**.

Table 11-3 Impacts which do not require an offset

Veg zone	PCT	Area (ha)	VI score	VI score threshold*	Offset required
Native vegetation					
2	Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (849) – Poor	0.059 (590 m ²)	11.3	≥15	No
Southern Myotis (<i>Myotis macropus</i>)					
2	Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (849) – Poor	0.02 (175 m ²)	11.3	≥17	No

*Note: Vegetation integrity score thresholds as set out by section 10.3 of the BAM

11.4 Impacts that do not require further assessment by the assessor

Areas of land on the development site without native vegetation do not need to be assessed for credits under chapter 4 or chapter 5 of the BAM. As such, areas of the development site that do not possess PCTs have not been assessed and credits have not been generated.

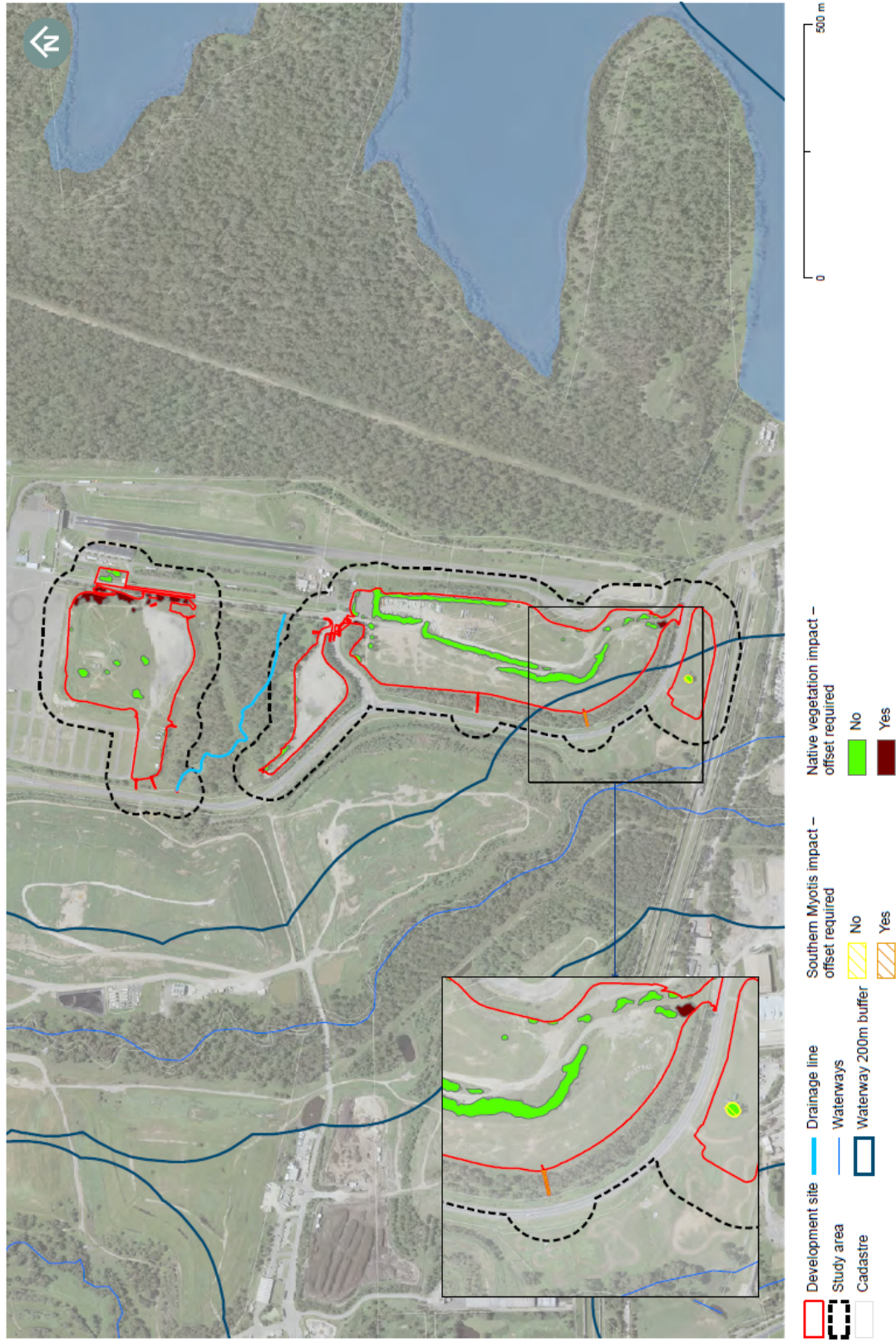


Figure 11-1 Impacts requiring offsets and impacts not requiring offsets

12. Biodiversity credit requirements

A summary of the biodiversity credit requirements for the development are provided below in **Table 12-1**. The credit report is provided in **Appendix E**.

The credit report shows an impact area of 0.01 hectares for vegetation zone 5, instead of 0.001 hectares. This is a purposeful edit to the BAM-C, as an area of 0.001 hectares was too small and being rounded down to zero by the calculator. Recent updates to the BAM-C (issued 12 October 2020) attempted to rectify this however the BAM-C case for this development is still affected by the issue. The credit requirement is not affected by this area change as all impact areas are now supposed to generate at least one credit.

Table 12-1 Ecosystem credits required

Veg zone	PCT	TEC	Credits
1	Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (849) - Moderate	Yes	1
3	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (850) - Poor	Yes	2
4	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (850) – Revegetation	Yes	1
5	<i>Phragmites australis</i> and <i>Typha orientalis</i> coastal freshwater wetlands of the Sydney Basin Bioregion (1071) – Drainage line	No	1
Total			5

The BAM-Calculator generated one credit for impacts to the Southern Myotis (**Table 12-2**).

Table 12-2 Species credits required

Species	Credits
<i>Myotis macropus</i> (Southern Myotis)	1

13. Conclusions

The Sydney International Speedway development is located within a highly disturbed landscape that does not possess large expanses of intact native vegetation with high biodiversity value. As most of the development site is in existing developed areas, direct impacts to terrestrial biodiversity has been avoided and/or minimised. The limited amount of native vegetation that would be disturbed is of poor to moderate quality and threatened species habitats are limited. No areas of land that the Minister for Energy and Environment has declared as an area of outstanding biodiversity value in accordance with section 3.1 of the BC Act would be affected. Importantly, the areas proposed for clearing would be refined during detailed design and reviewed as part of the pre-clearing process.

The direct impacts to biodiversity values that would occur as a result of the development construction includes 0.38 hectares (3,787 square metres) of native vegetation, which includes the following PCTs:

- Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849) – 0.074 hectares (744 square metres)
- Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850) – 0.304 (3,043 square metres)
- *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071) – 0.001 hectares (10 square metres)

One Threatened Ecological Community (TEC) listed under the BC Act would be impacted by the development:

- Cumberland Plain Woodland in the Sydney Basin Bioregion – 0.38 hectares (3,787 square metres) hectares comprising the combined extent of the two PCTs noted above.

The Development would not result in any direct impacts to TECs listed under the EPBC Act.

One species credit species is assumed to be directly impacted; the Southern Myotis. The extent of impact to this species is limited to a very small area of habitat (51 m²) that is within 200 metres of Eastern Creek. The artificial drainage line between Carpark C and Carpark D is not considered to meet the habitat requirements described for this species.

Targeted surveys for the Green and Golden Bell Frog did not identify this species around the artificial drainage line or along Eastern Creek. While these two areas meet many of the known habitat requirements for this species the development would not actually impact the potential habitat for this species. Further it was concluded that, due to the absence of the species from the survey, and the fact there are no known populations close to the development site, and all local records are very old, that the Green and Golden Bell Frog is unlikely to be impacted and species offsets are not required. No significant impacts to threatened species listed under the EPBC Act are likely to occur.

The construction of a drainage pit and flow bypass pipe upstream of the existing culvert under Ferrers Road between Carpark C and D would result in direct instream impacts and an eventual change in surface water hydrology of the drainage line upstream of the weir. The change in surface water hydrology is considered to be too uncommon and temporary to cause any impact to the structure and function of the surrounding vegetation communities. There would be some disturbance to instream habitats as a result of the construction of the drainage pit and flow bypass pipe upstream of the existing culvert under Ferrers Road between Carpark C and D. However, the drainage infrastructure at this location would be mostly preconstructed and dropped into place from the road verge with minimal instream works required. The section of the drainage line that would be impacted is highly ephemeral and likely dry most of the year. Appropriate controls would be established to minimise disturbance and sedimentation of downstream aquatic habitats.

Considering the highly disturbed nature of the landscape within which the development sits, there are not expected to be any indirect impacts that would adversely affect areas of vegetation that would be retained. There is potential for indirect impacts to surrounding aquatic habitats (e.g. Eastern Creek) from erosion and contaminated runoff from construction and operation. The implementation of standard mitigation measures (i.e. sediment control, spill control) would control sediment and pollutants from any significant runoff events.

Once all practicable steps to avoid or minimise impacts have been implemented at the detailed design phase, management and mitigation measures would be implemented to further lessen the potential ecological impacts of the development. Management and mitigation measures that would be implemented during the development would be

outlined in a Flora and Fauna Management Plan (refer to Appendix C (Construction Environmental Management Framework) of the Environmental Impact Statement).

An offset would be required for the impacts to native vegetation for which the credit requirement has been calculated using the BAM-C.

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Appendix A. Habitat assessment

State and nationally listed threatened species identified from the literature review, database searches (BioNet and PMST) and Biodiversity Assessment Method Calculator (BAM-C), were considered in terms of their likelihood to occur in the habitats present within the survey area based on identified habitat requirements. The habitat suitability assessment for threatened species is provided in **Table A-1** and **Table A-2**.

Table A-14-1 Habitat suitability assessment for threatened plant species

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Acacia bynoeana</i> (Bynoe's Wattles)	E	V	Found in central eastern NSW, from the Hunter District south to the Southern Highlands and west to the Blue Mountains. It has recently been found in the Colymea and Parma Creek areas west of Nowra. Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood (<i>Corymbia gummifera</i>), Scribbly Gum (<i>Eucalyptus haemastoma</i>), Drooping Red Gum (<i>E. parramattensis</i>), Old Man Banksia (<i>Banksia serrata</i>) and Small-leaved Apple (<i>Angophora bakeri</i>).	PMST BAM-C	Low in development site. There is no habitat considered suitable for this species in the development site. Surveys did not identify this species.
<i>Acacia pubescens</i> (Downy Wattle)	V	V	Concentrated around the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/ Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravelly soils, often with ironstone.	236 – BioNet PMST BAM-C	Low in development site. Recorded close to the development site around Prospect Reservoir. Only small amount of suitable habitat around the development site. Surveys did not identify this species.
<i>Allocasuarina glaucoila</i>	E	E	This species grows on tertiary alluvial gravels, with yellow clayey subsoil and lateritic soil. These soils are low in fertility and are strongly to very strongly acidic. Rainfall in the area is lower than surrounding regions. The median annual rainfall is 803 mm (measured at the University of Western Sydney), with a summer peak. It is found in the Castlereagh open woodland community, with <i>Eucalyptus parramattensis</i> , <i>E. fibrosa</i> , <i>E. sclerophylla</i> , <i>Angophora bakeri</i> and <i>Melaleuca decora</i> . Common associated understorey species include <i>Melaleuca nodosa</i> , <i>Hakea dactyloides</i> , <i>H. sericea</i> , <i>Dillwynia tenuifolia</i> , <i>Micromyrtus minutiflora</i> , <i>Acacia elongata</i> , <i>A. brownei</i> , <i>Themeda australis</i> and <i>Xanthorrhoea minor</i> .	1 – BioNet PMST	Low in development site. There is no habitat considered suitable for this species in the development site.

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Caladenia tessellata</i> (Thick-lipped Spider-orchid)	E	V	The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also recorded in the Huskisson area in the 1930s. The species occurs on the coast in Victoria from east of Melbourne to almost the NSW border. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	PMST BAM-C	Low in development site. Habitat in the development site is too degraded for this species.
<i>Commersonia prostrata</i> (Dwarf Kerrawang)	E	E	Dwarf Kerrawang occurs on the Southern Highlands and Southern Tablelands (one plant at Penrose State Forest, one plant at Tallong, a small population near the Corang and about 2000 plants at Rowes Lagoon), a larger population in the Thirlmere Lakes area (particularly among the dying reeds at the edge of the water), and on the North Coast (less than 100 plants at the Tomago sandbeds north of Newcastle). It is also found in Victoria. Occurs on sandy, sometimes peaty soils in a wide variety of habitats: Snow Gum (<i>Eucalyptus pauciflora</i>) Woodland and Ephemeral Wetland floor at Rowes Lagoon; Blue leaved Stringybark (<i>E. aggregata</i>) Open Forest at Tallong; and in Brittle Gum (<i>E. mannifera</i>) Low Open Woodland at Penrose; Scribbly Gum (<i>E. haemostoma</i>)/ Swamp Mahogany (<i>E. robusta</i>) Ecotonal Forest at Tomago. Associated native species may include <i>Imperata cylindrica</i> , <i>Empodisma minus</i> and <i>Leptospermum continentale</i> . Appears to respond positively to some forms of disturbance (e.g. some Victorian records are from gravel road surfaces and the Tomago population is on an area previously subject to sandmining), however, there are conflicting reports about the response of the species to fire.	BAM-C	Low in development site. Surveys did not identify this species. Generally low-quality habitat in the development site.
<i>Callistemon linearifolius</i>	V	-	Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Was more widespread across its distribution in the past. Some populations are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve, and Spectacle Island Nature Reserve. Further north it has been recorded from Yengo National Park and Werakata National Park. Grows in open dry sclerophyll forest on a substrate of sandy to clayey soils on sandstone on the coast and ranges e.g. with <i>Corymbia eximia</i> , <i>Eucalyptus punctata</i> , <i>E. umbra</i> , <i>Allocasuarina littoralis</i> , and <i>Angophora costata</i> .	2 - BioNet	Low in development site. Surveys did not identify this species. Generally low-quality habitat in the development site.
<i>Cynanchum elegans</i> (White-flowered Wax Plant)	E	E	Occurs from the Gloucester district to the Wollongong area and inland to Mt Dangar. Typically occurs in rainforest gullies, scrub and scree slopes and at the ecotone between dry rainforest vegetation and dry subtropical forest/woodland communities. Other associated vegetation types include littoral rainforest; Coastal Tea-tree (<i>Leptospermum laevigatum</i>) – Coastal Banksia (<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>) coastal scrub; Forest Red Gum (<i>Eucalyptus tereticornis</i>) aligned open forest and woodland; Spotted Gum (<i>Corymbia maculata</i>) aligned open forest and woodland; and Bracelet Honeymyrtle (<i>Melaleuca armillaris</i>) scrub to open scrub.	2 – BioNet PMST BAM-C	Low in development site. Surveys did not identify this species. Generally low-quality habitat in the development site.

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Darwinia biflora</i>	V	V	Occurs at 129 sites in the northern and north-western suburbs of Sydney, in the Ryde, Baulkham Hills, Hornsby and Ku-Ring-Gai Local government areas (LGAs). Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated overstorey species include <i>Eucalyptus haemastoma</i> , <i>Corymbia gummifera</i> and/or <i>E. squamosa</i> . The vegetation structure is usually woodland, open forest or scrub-heath.	PMST	Unlikely in development site. There is no habitat considered suitable for this species in the development site. This species has not been recorded in the locality.
<i>Dillwynia tenuifolia</i>	V	-	Core distribution is the Cumberland Plain from Windsor to Penrith east to Deans Park. Other populations in Western Sydney are recorded at Voyager Point and Kemps Creek in the Liverpool LGA, Luddenham in the Penrith LGA and South Maroota in the Baulkham Hills Shire. Disjunct localities include the Bulga Mountains at Yengo in the north, and Kurrajong Heights and Woodford in the Lower Blue Mountains. In western Sydney, it may be locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. At Yengo, is reported to occur in disturbed escarpment woodland on Narrabeen sandstone.	727 – BioNet BAM-C	Low in development site. Surveys did not identify this species. Generally low-quality habitat in the development site.
<i>Dillwynia tenuifolia</i> , Kemps Creek	EP	-	The endangered population occurs in the area bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool Local government area.	42 – BioNet BAM-C	Unlikely in development site. This population does not include the development site.
<i>Eucalyptus benthamii</i>	V	V	Occurs on the alluvial flats of the Nepean River and its tributaries. There are two major subpopulations: in the Kedumba Valley of the Blue Mountains National Park and at Bents Basin State Recreation Area. A further 18 trees are scattered along the Nepean River, south to The Oaks. Requires a combination of deep alluvial sands and a flooding regime that permits seedling establishment. Occurs in open forest. Associated species at the Bents Basin site include <i>Eucalyptus elata</i> , <i>E. baueriana</i> , <i>E. amplifolia</i> , <i>E. deanei</i> and <i>Angophora subvelutina</i> . Understorey species include <i>Bursaria spinosa</i> , <i>Pteridium esculentum</i> and a wide variety of agricultural weeds. The Kedumba Valley site lists <i>E. crebra</i> , <i>E. deanei</i> , <i>E. punctata</i> , <i>Leptospermum flavescens</i> , <i>Acacia flicifolia</i> and <i>Pteridium esculentum</i> among its associated species.	BAM-C	Unlikely in development site. Surveys did not identify this species. This species has not been recorded in the locality.
<i>Eucalyptus nicholii</i> (Narrow-leaved Black Peppermint)	V	V	This species is sparsely distributed but widespread on the New England Tablelands from Nundle to north of Tenterfield, being most common in central portions of its range. Found largely on private property and roadsides, and occasionally conservation reserves. Planted as urban trees, windbreaks and corridors. Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock.	2 - BioNet	Known to occur in the broader locality. Commonly planted as a street tree in Sydney but not present in the development site.

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Genoplesium baueri</i> (Bauer's Midge Orchid)	E	E	Recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. About half the records were made before 1960 with most of the older records being from Sydney suburbs including Asquith, Cowan, Gladesville, Longueville and Wahroonga. No collections have been made from those sites in recent years. The species has been recorded at locations now likely to be within the several conservation reserves including Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments. Found in sparse sclerophyll forest and moss gardens over sandstone	10 – BioNet PMST	Low in development site. There is no habitat considered suitable for this species in the development site.
<i>Grevillea juniperina</i> subsp. <i>juniperina</i>	V	-	Grows on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium (often with shale influence), typically containing lateritic gravels. Recorded from Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest.	449 – BioNet BAM-C	Low in development site. There is no alluvial habitat considered suitable for this species in the development site. Surveys did not identify this species.
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	V	V	Sporadically distributed throughout the Sydney Basin with the main occurrence centred around Picton, Appin and Bargo. Separate populations are also known further north from Putty to Wyong and Lake Macquarie on the Central Coast, and Cessnock and Kurri Kurri in the Lower Hunter. Grows in sandy or light clay soils usually over thin shales. Occurs in a range of vegetation types from heath and shrubby woodland to open forest. Found over a range of altitudes from flat, low-lying areas to upper slopes and ridge crests. Often occurs in open, slightly disturbed sites such as along tracks.	13 – BioNet PMST	Low in development site. Surveys did not identify this species.
<i>Haloragis exalata</i> subsp. <i>exalata</i>	V	V	Square Raspwort occurs in 4 widely scattered localities in eastern NSW. It is disjunct distributed in the Central Coast, South Coast and North Western Slopes botanical subdivisions of NSW. Square Raspwort appears to require protected and shaded damp situations in riparian habitats. Flowering specimens in NSW are recorded from November to January.	1 – BioNet PMST BAM-C	Low in development site. Surveys did not identify this species. Generally low-quality habitat in the development site.

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Marsdenia viridiflora</i> R. Br. subsp. <i>viridiflora</i> population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	EP	-	Endangered population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas. Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Grows in vine thickets and open shale woodland.	67 – BioNet BAM-C	Low in development site. Targeted surveys for this species were carried out in the development site and adjacent higher quality habitat.
<i>Maundia triglochinoides</i>	V	-	Restricted to coastal NSW and extending into southern Queensland. The current southern limit is Wyong; former sites around Sydney are now extinct. Grows in swamps, lagoons, dams, channels, creeks or shallow freshwater 30 - 60 cm deep on heavy clay, low nutrients. Flowering occurs during warmer months. Associated with wetland species e.g. <i>Triglochin procerum</i> .	BAM-C	Low in the development site. Targeted surveys for this species were carried out along the drainage line between Carpark C and Carpark D. Habitat quality for this species is low.
<i>Melaleuca biconvexa</i> (Biconvex Paperbark)	V	V	Found only in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	BAM-C	Unlikely in development site. Surveys did not identify this species.
<i>Micromyrtus minutiflora</i>	E	V	Restricted between Richmond and Penrith of western Sydney. Grows in Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest and open forest on sandy clay or gravelly soils tertiary alluvium.	PMST	Low in development site. There is no habitat considered suitable for this species in the development site. This species has not been recorded in the locality.

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Persicaria elatior</i> (Tall Knotweed)	V	V	Tall Knotweed has been recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Giberagee State Forests). This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	PMST BAM-C	Low in development site. Targeted surveys for this species were carried out along the drainage line between Carpark C and Carpark D. Habitat quality for this species is low.
<i>Persoonia bargoensis</i> (Bargo Geebung)	E	V	The Bargo Geebung is restricted to a small area south-west of Sydney on the western edge of the Woronora Plateau and the northern edge of the Southern Highlands. The historical limits are Picton and Douglas Park (northern), Yanderra (southern), Cataract River (eastern) and Thirlmere (western). The Bargo Geebung occurs in woodland or dry sclerophyll forest on sandstone and on heavier, well drained, loamy, gravelly soils of the Wianamatta Shale and Hawkesbury Sandstone. It favours interface soil landscapes such as between the Blacktown Soil Landscape and the complex Mittagong Formation soils (Lucas Heights Soil Landscape) with the underlying sandstone (Hawkesbury Soil Landscape and Gynea Soil Landscape).	BAM-C	Low in development site. There is no habitat considered suitable for this species in the development site. This species has not been recorded in the locality.
<i>Persoonia hirsuta</i> (Hairy Geebung)	E	E	<i>Persoonia hirsuta</i> is patchily distributed on the Central Coast and Tablelands of NSW, in an area bounded by Putty, Glen Davis and Gosford in the north, and Royal National Park (NP) and Hill Top in the south. It occurs in the Sydney coastal area (Gosford, Berowra, Manly and Royal NP), the Blue Mountains area (Springwood, Lithgow and Putty) and the Southern Highlands (Balmoral, Buxton, Yanderra and Hill Top). It is frequently found on ridge tops and the mid slopes of hills and rises in dry sclerophyll forest and woodland with a shrubby understorey, heath, shrubby thickets and sandstone scrubs from near sea level to 600 m altitude. Associated canopy species include <i>Eucalyptus sclerophylla</i> , <i>Corymbia gummifera</i> , <i>Leptospermum trinervium</i> , <i>Eucalyptus sieberi</i> , <i>Eucalyptus punctata</i> , <i>Eucalyptus sparsifolia</i> , <i>Corymbia eximia</i> and <i>Banksia ericifolia</i> . It grows on sandy to stony soils derived from sandstone or very rarely on shale and is often found in disturbed areas, like along track edges.	PMST	Low in development site. There is no habitat considered suitable for this species in the development site. This species has not been recorded in the locality.
<i>Persoonia nutans</i> (Nodding Geebung)	E	E	Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south. Core distribution occurs within the Penrith, and to a lesser extent, Hawkesbury LGAs, with isolated and relatively small populations also occurring in the Liverpool, Campbelltown, Bankstown and Blacktown LGAs. Confined to aeolian and alluvial sediments and occurs in a range of sclerophyll forest and woodland vegetation communities, with the majority of individuals occurring within Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland.	23 – BioNet PMST	Low in development site. There is no aeolian or alluvial habitat considered suitable for this species in the development site. Surveys did not identify this species.

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Ptilularia novae-hollandiae</i> (Austral Pilwort)	E	-	In NSW, Austral Pilwort has been recorded from suburban Sydney, Khancoban, the Riverina between Albury and Urana (including Henty, Walbundrie, Balldale and Howlong) and at Lake Cowal near West Wyalong. The population at Lake Cowal is the only known extant population in NSW. The species has also been recorded in the Australian Capital Territory, Victoria, Tasmania, South Australia and Western Australia. Austral Pilwort grows in shallow swamps and waterways, often among grasses and sedges. It is most often recorded in drying mud as this is when it is most conspicuous. Most of the records in the Albury-Urana area were from table drains on the sides of roads.	1 – BioNet BAM-C	Low in development site. Targeted surveys for this species were carried out along the drainage line between Carpark C and Carpark D. Habitat quality for this species is low.
<i>Pimelea curviflora</i> var. <i>curviflora</i> (Slender Curved Rice Flowers)	V	V	Confined to the coastal area of Sydney between northern Sydney in the south and Maroota in the north-west. Former range extended south to the Parramatta River and Port Jackson region including Five Dock, Bellevue Hill and Manly. Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Has an inconspicuous cryptic habit as it is fine and scraggly and often grows amongst dense grasses and sedges. It may not always be visible at a site as it appears to survive for some time without any foliage after fire or grazing, relying on energy reserves in its tuberous roots.	3 – BioNet PMST BAM-C	Low in development site. Targeted surveys for this species were carried out in the development site and adjacent higher quality habitat.
<i>Pimelea spicata</i> (Spiked-rice Flower)	E	E	Broad distribution in western Sydney, occurring on the Cumberland Plain (Narellan, Marayong, Prospect Reservoir areas). Another smaller population is recorded in districts (Landsdowne to Shellharbour to northern Kiama) Illawarra. It grows on well-structured clay soils. On the inland Cumberland Plain sites, it is associated with Grey Box and Ironbark. In the coastal Illawarra it occurs commonly in Coastal Banksia open woodland with a more well-developed shrub and grass understorey.	250 – BioNet PMST BAM-C	Low in development site. Targeted surveys for this species were carried out in the development site and adjacent higher quality habitat.
<i>Pomaderris brunnea</i> (Brown Pomaderris)	E	V	Found in a very limited area around the Nepean and Hawkesbury Rivers, including the Bargo area. It also occurs at Walcha on the New England tablelands and in far eastern Gippsland in Victoria. Grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	PMST	Low in development site. There is no habitat considered suitable for this species in the development site. This species has not been recorded in the locality.

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Pomaderris prunifolia</i> (a shrub) population, Parramatta, Auburn, Strathfield and Bankstown local government areas	EP	-	Endangered population in the Parramatta, Auburn, Strathfield and Bankstown Local government areas. Known from only three sites within the listed local government areas, at Rydalmere, within Rookwood Cemetery and at The Crest of Bankstown. At Rydalmere it occurs along a road reserve near a creek, among grass species on sandstone. At Rookwood Cemetery it occurs in a small gully of degraded Cooks River / Castlereagh Ironbark Forest on shale soils.	2 – BioNet	Low in development site. There is no habitat considered suitable for this species in the development site.
<i>Pterostylis gibbosa</i> (Illawarra Greenhood)	E	E	Known from a small number of populations in the Hunter region (Milbrodale), the Illawarra region (Albion Park and Yallah) and the Shoalhaven region (near Nowra). It is apparently extinct in western Sydney which is the area where it was first collected (1803).	PMST	Low in development site. There is no habitat considered suitable for this species in the development site. This species has not been recorded in the locality.
<i>Pterostylis saxicola</i> (Sydney Plains Greenhood)	E	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. There are very few known populations and they are all very small and isolated. Only one population occurs within a conservation reserve at Georges River National Park. Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where it occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	61 – BioNet PMST BAM-C	Low in development site. There is no habitat considered suitable for this species in the development site.
<i>Pultenaea parviflora</i> (Sydney-bush Pea)	E	V	Endemic to the Cumberland Plain the core distribution is from Windsor to Penrith and east to Dean Park. Outlier populations are recorded from Kemps Creek and Wilberforce. May be locally abundant, particularly within scrubby/dry heath areas of Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. Eucalyptus fibrosa is usually the dominant canopy species. Eucalyptus globoides, E. longifolia, E. parramattensis, E. sclerophylla and E. sideroxylon may also be present or co-dominant, with Melaleuca decora frequently forming a secondary canopy layer. Associated species may include Allocasuarina littoralis, Angophora bakeri, Aristida spp., Banksia spinulosa, Cryptandra spp., Daviesia ulicifolia, Entolasia stricta, Hakea sericea, Lissanthe strigosa, Melaleuca nodosa, Ozothamnus diosmifolius and Themeda australis.	184 – BioNet PMST	Low in development site. Targeted surveys for this species were carried out in the development site and adjacent higher quality habitat.

Scientific Name (Common Name)	BC Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Pultenaea pedunculata</i>	V	-	Widespread in Victoria, Tasmania, and south-eastern South Australia, however in NSW it is represented by just three disjunct populations on the Cumberland Plains in Sydney, the coast between Tathra and Bermagui and the Windellama area south of Goulburn. NSW populations are generally among woodland vegetation, but plants have also been found on road batters and coastal cliffs. It is largely confined to loamy soils in dry gullies in populations in the Windellama area.	2 – BioNet BAM-C	Low in development site. Targeted surveys for this species were carried out in the development site and adjacent higher quality habitat.
<i>Syzygium paniculatum</i> (Magenta Lilly Pilly)	E	V	The Magenta Lilly Pilly is found only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. On the south coast it occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast it occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	3 – BioNet PMST	Known to occur in the broader locality. Commonly planted as a street tree in Sydney but not present in development site.
<i>Thesium australe</i> (Austral Toadflax)	V	V	Found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (<i>Themeda australis</i>).	PMST BAM-C	Low in development site. Targeted surveys for this species were carried out in the development site and adjacent higher quality habitat.
<i>Zannichellia palustris</i>	E	-	A submerged aquatic plant. In NSW, known from the lower Hunter and in Sydney Olympic Park. Grows in fresh or slightly saline stationary or slowly flowing water. Flowers during warmer months. NSW populations behave as annuals, dying back completely every summer.	BAM-C	Low in the development footprint Targeted surveys for this species were carried out along the drainage line between Carpark C and Carpark D. Habitat quality for this species is low.
<p>* Distribution and habitat requirement information adapted from: Australian Government Department of the Environment http://www.environment.gov.au/biodiversity/threatened/index.html, NSW Office of Environment and Heritage http://www.environment.nsw.gov.au/threatenedspecies/</p> <p><u>Key:</u> CE = critically endangered E = endangered EP = endangered population Ex = extinct V = vulnerable</p>					

Table A-14-2 Habitat suitability assessment for threatened animal species

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
Birds					
<i>Anthochaera Phrygia</i> (Regent Honeyeater)	CE	CE	The Regent Honeyeater that has a patchy distribution between south-east Queensland and central Victoria. It mostly inhabits inland slopes of the Great Dividing Range, in areas of low to moderate relief with moist, fertile soils. It is most commonly associated with box-ironbark eucalypt woodland and dry sclerophyll forest, but also inhabits riparian vegetation such as sheoak (<i>Casuarina</i> spp) where it feeds on needle-leaved mistletoe and sometimes breeds. It sometimes utilises lowland coastal forest, which may act as a refuge when its usual habitat is affected by drought. It also uses a range of disturbed habitats within these landscapes including remnant patches in farmland and urban areas and roadside vegetation. It feeds primarily on the nectar of eucalypts and mistletoes and, to a lesser extent, lerps and honeydew; it prefers taller and larger diameter trees for foraging. It is nomadic and partly migratory with its movement through the landscape being governed by the flowering of select eucalypt species. There are four known key breeding areas: three in NSW and one in Victoria. Breeding varies between regions and corresponds with flowering of key eucalypt and mistletoe species. It usually nests in horizontal branches or forks in tall mature eucalypts and Sheoaks.	9 – BioNet PMST BAM-C	Moderate in development site. No breeding habitat present. This species may occasionally forage in vegetation, particularly winter flowering species such as <i>Eucalyptus tereticornis</i> .
<i>Artamus cyanopterus</i> (Dusky Woodswallow)	V	-	The Dusky Woodswallow has two separate populations. The eastern population is found from Atherton Tableland, Queensland south to Tasmania and west to Eyre Peninsula, South Australia. The other population is found in south-west Western Australia. The Dusky Woodswallow is found in open forests and woodlands and may be seen along roadsides and on golf courses.	25 – BioNet BAM-C	Moderate. May forage over the development site and perch on trees.
<i>Botaurus poiciloptilus</i> (Australasian Bittern)	E	E	Occurs from south-east Queensland to south-east South Australia, Tasmania and the south-west of Western Australia. The Australasian Bittern's preferred habitat is comprised of wetlands with tall dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. It favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds (e.g. Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, Bolboschoenus) or cutting grass (Gahnia) growing over a muddy or peaty substrate.	1 – BioNet PMST BAM-C	Low in development site. This species may occur in the drain habitat in the development site on occasion, however the likelihood is considered low.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Burhinus grallarius</i> (Bush Stone-curlew)	E	-	Open forests and woodlands with a sparse grassy ground layer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch.	1 – BioNet BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species.
<i>Calidris ferruginea</i> (Curlew Sandpiper)	E	CE, M	In Australia, Curlew Sandpipers occur around the coasts of all states and are also quite widespread inland, though in smaller numbers. They occur in Australia mainly during the non-breeding period but also during the breeding season when many non-breeding one-year old birds remain. Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh and in mangroves.	PMST BAM-C	Unlikely in development site. There is no habitat in the development site considered suitable for this species.
<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	V	-	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests with an acacia understorey. Also occur in subalpine Snow Gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box ironbark assemblages, or in dry forest in coastal areas, occasionally feeding on exotic plant species on urban fringe areas. Favours old growth forest and woodland attributes for nesting and roosting. Nesting occurs in Spring and Summer with nests located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts.	2 – BioNet BAM-C	Moderate. May occur in study area on occasion in winter. No breeding habitat in development site.
Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local government areas	EP	-	This endangered population is found in the Ku-ring-gai and Hornsby local government areas. The population is believed to be largely confined to an area bounded by Thornleigh and Wahroonga in the north, Epping and North Epping in the south, Beecroft and Cheltenham in the west and Turramurra/South Turramurra to the east. It is known to inhabit areas of Lane Cove National Park, Pennant Hills Park and other forested gullies in the area.	BAM-C	Moderate. May occur in study area on occasion in winter. No breeding habitat in development site.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Calyptrorhynchus lathamii</i> (Glossy-black Cockatoo)	V	-	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of Sheoak occur. Black Sheoak (<i>Allocasuarina littoralis</i>) and Forest Sheoak (<i>A. torulosa</i>) are important foods. Inland populations feed on a wide range of Sheoaks, including Drooping Sheoak, <i>Allocasuarina diminuta</i> , and <i>A. gymnanthera</i> . Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah (<i>Casuarina cristata</i>).	1 – BioNet	Low in development site. There is no habitat in the development site considered suitable for this species. There are no <i>Allocasuarina</i> spp in the development site.
<i>Chthonicola sagittata</i> (Speckled Warbler)	V	-	The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt re-growth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding. The rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a low dense plant, often among fallen branches and other litter. A side entrance allows the bird to walk directly inside.	1 – BioNet BAM-C	Low in development site. The habitat in the development site is considered to be low quality. Only one record in the locality suggests this species is quite rare and likely to stick to high quality remnant woodland. The likelihood of this species occurring in the development site is considered low.
<i>Circus assimilis</i> (Spotted Harrier)	V	-	The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Climacteris picumnus victoriae</i> (Brown Treecreeper (eastern subspecies))	V	-	Endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (<i>Eucalyptus camaldulensis</i>) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. Hollows in standing dead or live trees and tree stumps are essential for nesting.	BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.
<i>Daphoenositta chrysoptera</i> (Varied Sittella)	V	-	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticated bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. Nests in an upright tree fork high in the living tree canopy.	19 – BioNet BAM-C	Moderate. This species may forage and fly through the development site.
<i>Dasyornis brachypterus</i> (Eastern Bristlebird)	E	E	The distribution of the Eastern Bristlebird has contracted to three disjunct areas of south-eastern Australia. There are three main populations: Northern - southern Queensland/northern NSW, Central - Barren Ground NR, Budderoo NR, Woronora Plateau, Jervis Bay NP, Booderee NP and Beecroft Peninsula and Southern - Nadgee NR and Croajingalong NP in the vicinity of the NSW/Victorian border. Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a healthy understorey. In northern NSW the habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone; all of these vegetation types are fire prone.	PMST	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Ephippiorhynchus asiaticus</i> (Black-necked Stork)	V	-	In Australia, Black-necked Storks are widespread in coastal and subcoastal northern and eastern Australia, as far south as central NSW (although vagrants may occur further south or inland, well away from breeding areas). In NSW, the species becomes increasingly uncommon south of the Clarence Valley, and rarely occurs south of Sydney. Since 1995, breeding has been recorded as far south as Bulahdelah. Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers are the key habitat in NSW for the Black-necked Stork. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries. Storks usually forage in water 5-30cm deep for vertebrate and invertebrate prey. Eels regularly contribute the greatest biomass to their diet, but they feed on a wide variety of animals, including other fish, frogs and invertebrates (such as beetles, grasshoppers, crickets and crayfish). Black-necked Storks build large nests high in tall trees close to water. Trees usually provide clear observation of the surroundings and are at low elevation (reflecting the floodplain habitat).	BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species.
<i>Ephianura albifrons</i> (White-fronted Chat)	V	-	The White-fronted Chat is found across the southern half of Australia, from southernmost Queensland to southern Tasmania, and across to Western Australia as far north as Carnarvon. Found mostly in temperate to arid climates and very rarely sub-tropical areas, it occupies foothills and lowlands up to 1000 m above sea level. In NSW, it occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Along the coastline, it is found predominantly in saltmarsh vegetation but also in open grasslands and sometimes in low shrubs bordering wetland areas. Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground. Have been observed breeding from late July through to early March, with 'open-cup' nests built in low vegetation. Nests in the Sydney region have also been seen in low isolated mangroves. Nests are usually built about 23 cm above the ground (but have been found up to 2.5 m above the ground).	BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species.
<i>Falco subniger</i> (Black Falcon)	V	-	Widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres. The Black Falcon occurs as solitary individuals, in pairs, or in family groups of parents and offspring.	1 - BioNet	Low in development site. There is no habitat in the development site considered suitable for this species.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Glossopsitta pusilla</i> (Little Lorikeet)	V	-	In NSW it is found from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. The species forages primarily in the canopy of dry open eucalypt forest and woodland but also utilises paperbark (<i>Melaleuca</i> sp.) dominated forests. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country (e.g. paddocks, roadside remnants) and urban trees also help sustain viable populations of the species. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited; riparian trees are often chosen, including non-eucalypt species such as she-oaks.	7 – BioNet BAM-C	Moderate. This species may forage in trees in the development site on occasion.
<i>Grantiella picta</i> (Painted Honeyeater)	V	V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of birds, and almost all breeding, occur on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus <i>Amyema</i> .	PMST BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.
<i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)	V	M	Distributed along the coastline (including offshore islands) of mainland Australia and Tasmania. Found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. Habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, and the sea). It feeds opportunistically on a variety of fish, birds, reptiles, mammals and crustaceans, and on carrion. It generally forages over large expanses of open water; this is particularly true of birds that occur in coastal environments close to the sea-shore. However, it also forages over open terrestrial habitats (such as grasslands). Nests may be built in a variety of sites including tall trees (especially <i>Eucalyptus</i> species), bushes, mangroves, cliffs, rocky outcrops, crevices, on the ground or even on artificial structures.	3 – BioNet BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Hieraaetus morphnoides</i> (Little Eagle)	V	-	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.	21 – BioNet BAM-C	Moderate. This species may fly over and perch in the development site on occasion. There is unlikely to be any suitable breeding habitat present.
<i>Hirundapus caudacutus</i> (White-throated Needletail)	-	V, M	Widespread in eastern and south-eastern Australia. Almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. They also commonly occur over heathland but less often over treeless areas, such as grassland or swamps.	PMST	Low. Likely to use airspace above the development site. Unlikely to utilise the affected vegetation or be impacted.
<i>Irediparra gallinacea</i> (Comb-crested Jacana)	V	-	Occurs on freshwater wetlands in northern and eastern Australia, mainly in coastal and subcoastal regions, from the north-eastern Kimberley Division of Western Australia to Cape York Peninsula then south along the east coast to the Hunter region of NSW, with stragglers recorded in south-eastern NSW (possibly in response to unfavourable conditions further north). Inhabit permanent freshwater wetlands, either still or slow-flowing, with a good surface cover of floating vegetation, especially water-lilies, or fringing and aquatic vegetation.	BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.
<i>Ixobrychus flavicollis</i> (Black Bittern)	V	-	The Black Bittern is found along the coastal plains within NSW, although individuals have rarely been recorded south of Sydney or inland. It inhabits terrestrial and estuarine wetlands such as flooded grasslands, forests, woodlands, rainforests and mangroves with permanent water and dense waterside vegetation. The Black Bittern typically roosts on the ground or in trees during the day and forages at night on frogs, reptiles, fish and invertebrates. The breeding season extends from December to March. Nests are constructed of reeds and sticks in branches overhanging the water.	1 – BioNet BAM-C	Low in development site. This species may occur in the drain habitat in the development site on occasion, however the likelihood is considered low.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Lathamus discolor</i> (Swift Parrot)	E	CE	The swift parrot breeds in Tasmania during the summer and the entire population migrates north to mainland Australia for the winter. Whilst on the mainland the swift parrot disperses widely to forage on flowers and psyllid lerps in eucalypt species, with the majority being found in Victoria and NSW. In NSW they forage in forests and woodlands throughout the coastal and western slopes regions each year. Coastal regions tend to support larger numbers of birds when inland habitats are subjected to drought. Non-breeding birds preferentially feed in inland box-ironbark and grassy woodlands, and coastal swamp mahogany (<i>E. robusta</i>) and spotted gum (<i>Corymbia maculata</i>) woodland when in flower; otherwise often in coastal forests. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as <i>Eucalyptus robusta</i> , <i>Corymbia maculata</i> , <i>C. gummifera</i> , <i>E. sideroxylon</i> , and <i>E. albens</i> . Commonly used lerp infested trees include <i>E. microcarpa</i> , <i>E. moluccana</i> and <i>E. pilularis</i> .	51 – BioNet PMST BAM-C	Moderate. This species is known to occasionally visit street trees and disturbed vegetation around Sydney during migration. However, the vegetation in the site is not important habitat and the likelihood of birds using the trees within the development site as a continual source of habitat is low.
<i>Limicola falcinellus</i> (Broad-billed Sandpiper)	V	-	The eastern form of this species breeds in northern Siberia before migrating southwards in winter to Australia. In Australia, Broad-billed Sandpipers overwinter on the northern coast, particularly in the north-west, with birds located occasionally on the southern coast. In NSW, the main site for the species is the Hunter River estuary, with birds occasionally reaching the Shoalhaven estuary. There are few records for inland NSW. Broad-billed Sandpipers favour sheltered parts of the coast such as estuarine sand flats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs as feeding and roosting habitat. Occasionally, individuals may be recorded in sewage farms or within shallow freshwater lagoons. Broad-billed Sandpipers roost on banks on sheltered sand, shell or shingle beaches.	BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.
<i>Limosa limosa</i> (Black-tailed Godwit)	V	M	A migratory wading bird that breeds in Mongolia and Eastern Siberia and flies to Australia for the southern summer, arriving in August and leaving in March. In NSW, it is most frequently found at Kooragang Island (Hunter River estuary). Occurs in sheltered bays, estuaries and lagoons with large intertidal mudflats and sand flats. Also found at inland mudflats, swamps.	BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Lophoictinia isura</i> (Square-tailed Kite)	V	-	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by <i>Eucalyptus longifolia</i> , <i>Corymbia maculata</i> , <i>E. elata</i> , or <i>E. smithii</i> . Individuals appear to occupy large hunting ranges of more than 100 km ² . They require large living trees for breeding, particularly near water with surrounding woodland /forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.	2 – BioNet BAM-C	Moderate. This species may fly over and perch in the development site on occasion. There is unlikely to be any suitable breeding habitat present.
<i>Melanodryas cucullata</i> (Hooded Robin (south-eastern form))	V	-	The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. However, it is common in few places, and rarely found on the coast. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. The nest is a small, neat cup of bark and grasses bound with webs, in a tree fork or crevice, from less than 1 m to 5 m above the ground.	BAM-C	Low in development site. There is no habitat considered suitable for this species. Vagrant birds may appear on occasion. There are no records of this species in the locality.
<i>Melithreptus gularis</i> (Black-chinned Honeyeater (eastern subsp.))	V	-	Extends south from central Queensland, through NSW, Victoria into south-eastern South Australia, though it is very rare in the last state. In NSW it is widespread, with records from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (<i>Eucalyptus sideroxylon</i>), White Box (<i>E. albens</i>), Inland Grey Box (<i>E. microcarpa</i>), Yellow Box (<i>E. melliodora</i>), Blakely's Red Gum (<i>E. blakelyi</i>) and Forest Red Gum (<i>E. tereticornis</i>). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees.	1 – BioNet BAM-C	Low in development site. There is no habitat considered suitable for this species. Vagrant birds may appear on occasion.
<i>Neophema pulchella</i> (Turquoise Parrot)	V	-	Range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	1 – BioNet BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Ninox connivens</i> (Barking Owl)	V	-	Found throughout continental Australia except for the central arid regions. Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas.	3 – BioNet BAM-C	Moderate. This species may fly over, perch and forage in the development site on occasion. There is no suitable breeding habitat present.
<i>Ninox strenua</i> (Powerful Owl)	V	-	In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. Now at low densities throughout most of its eastern range, rare along the Murray River and former inland populations may never recover. The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation.	14 – BioNet BAM-C	Moderate. This species may fly over, perch and forage in the development site on occasion. There is no suitable breeding habitat present.
<i>Numenius madagascariensis</i> (Eastern Curlew)	-	CE, M	Within Australia, the Eastern Curlew has a primarily coastal distribution. The species is found in all states, particularly the north, east, and south-east regions including Tasmania. The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sand flats, often with beds of seagrass.	PMST	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.
<i>Pandion cristatus</i> (Eastern Osprey)	V	-	The Osprey has a global distribution with four subspecies previously recognised throughout its range. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	BAM-C	Low in the development site. This species may fly over the development site on occasion passing between areas of suitable habitat. However, there is no habitat in the development site considered suitable for this species.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Petroica boodang</i> (Scarlet Robin)	V	-	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and re-growth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. This species' nest is built in the fork of tree usually more than 2 metres above the ground; nests are often found in a dead branch in a live tree, or in a dead tree or shrub.	2 – BioNet BAM-C	Low in development site. This species may occur in higher quality vegetation around the development site and pass through it on occasion. However, there is no habitat in the development site considered suitable for this species.
<i>Petroica phoenicea</i> (Flame Robin)	V	-	The Flame Robin ranges from near the Queensland border to south-east South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgeland at high altitudes.	1 – BioNet BAM-C	Low in development site. This species may occur in higher quality vegetation around the development site and pass through it on occasion. However, there is no habitat in the development site considered suitable for this species.
<i>Rostratula australis</i> (Australian Painted Snipe)	E	E, M	Most records are from south-east Australia, particularly the Murray Darling Basin, with scattered records across northern Australia. They generally inhabit shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use undated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of <i>lignum</i> <i>Muehlenbeckia</i> or canegrass. Breeding habitat requirements may be quite specific; shallow wetlands with areas of bare wet mud and both low cover and canopy cover nearby; nest records nearly all from or near small islands in freshwater wetlands. Has also been recorded nesting in and near swamps, canegrass swamps, flooded areas including samphire, grazing land, among cumbungi, sedges and grasses; one nest has been found in the centre of a cow-pat in a clump of long grass.	1 – BioNet PMST BAM-C	Low in development site. This species may occur in the drain habitat in the development site on occasion, however the likelihood is considered low.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Stagonopleura guttata</i> (Diamond Firetail)	V	-	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum (<i>Eucalyptus pauciflora</i>) Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests. Birds roost in dense shrubs or in smaller nests built especially for roosting.	BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.
<i>Stictonetta naevosa</i> (Freckled Duck)	V	-	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	BAM-C	There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.
<i>Tyto novaehollandiae</i> (Masked Owl)	V	-	Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within about 90% of NSW, excluding the most arid northwest corner. There is no seasonal variation in its distribution. Dry eucalypt forests and woodland typically prefers open forest with low shrub density. Requires old trees for roosting and nesting.	6 – BioNet BAM-C	Moderate. This species may fly over, perch and forage in the development site on occasion. There is no suitable breeding habitat present.
Frogs					
<i>Heleioporus australiacus</i> (Giant Burrowing Frog)	V	V	The Giant Burrowing Frog is distributed in south-eastern NSW and Victoria and appears to exist as two distinct populations: a northern population largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. The home ranges of both sexes appear to be non-overlapping suggesting exclusivity of non-breeding habitat. Home ranges are about 0.04 ha in size.	PMST BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Litoria aurea</i> (Green and Golden Bell Frog)	E	V	Since 1990 there have been about 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range; however, they are widely separated and isolated. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands. Ephemeral and permanent freshwater wetlands, ponds, dams with an open aspect and fringed by Typha and other aquatics, free from predatory fish.	26 – BioNet PMST	Low in development site. Surveys for this species were carried out in suitable habitat around the development site. No frogs were detected. The closest known population is at Parramatta Park. All records of this species within the locality are greater than 20 years old, with most being from the 1960s and 1970s. While there is still moderate potential that dispersing individuals may occur in habitats around the study area on occasion, there is no habitat inside the development site that would be impacted.
<i>Litoria raniformis</i> (Southern Bell Frog)	E	V	The species is currently widespread throughout the Murray River valley and has been recorded from six Catchment Management Areas in NSW: Lower Murray Darling, Murrumbidgee, Murray, Lachlan, Central West and South East. Found mostly amongst emergent vegetation, including Typha sp. (bullrush), Phragmites sp. (reeds) and Eleocharis sp.(sedges), in or at the edges of still or slow-flowing water bodies such as lagoons, swamps, lakes, ponds and farm dams.	PMST	Low in development site. There is no habitat in the development site considered suitable for this species. This species is not known from the Sydney area.
Invertebrates					
<i>Meridolum carneovirens</i> (Cumberland Plain Land Snail)	E	-	Primarily inhabits Cumberland Plain Woodland (an endangered ecological community). This community is grassy, open woodland with occasional dense patches of shrubs. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.	359 - BioNet	Low in development site. There is moderate to high likelihood that this species is present in the moderate condition woodland between Carpark C and Carpark D. This species was not located during surveys however conditions were very dry in December 2019. The vegetation within the development site is considered poor quality for this species.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Pommerhelix duralensis</i> (Dural Land Snail)	E	E	The Dural land snail is endemic to New South Wales. The species is a shale-influenced habitat specialist, which occurs in low densities along the northwest fringe of the Cumberland Plain on shale-sandstone transitional landscapes. The species has been observed resting in exposed areas, such as on exposed rock or leaf litter, however it also shelters beneath logs, rocks and light woody debris.	BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species. The development site is not within this species natural range.
<i>Synemon plana</i> (Golden Sun Moth)	E	CE	The Golden Sun Moth's NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. The species' historical distribution extended from Bathurst (central NSW) through the NSW Southern Tablelands, through to central and western Victoria, to Bordertown in eastern South Australia. Occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which groundlayer is dominated by wallaby grasses <i>Austrorhizonia</i> spp. Grasslands dominated by wallaby grasses are typically low and open - the bare ground between the tussocks is thought to be an important microhabitat feature for the Golden Sun Moth, as it is typically these areas on which the females are observed displaying to attract males. Habitat may contain several wallaby grass species, which are typically associated with other grasses particularly spear-grasses <i>Austrorhiza</i> spp. or Kangaroo Grass <i>Themeda australis</i> .	PMST	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.
Mammals					
<i>Cercartetus nanus</i> (Eastern Pygmy-possum)	V	-	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; soft fruits are eaten when flowers are unavailable. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Important habitat requirements include trees with hollows >2cm, loose bark of eucalypts or accumulations of shredded bark in tree forks for nesting; and associated vegetation types and with an understorey containing heath, banksias or myrtaceous shrubs and soft-fruited plants in rainforests.	BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Chalinolobus dwyeri</i> (Large-eared Pied Bat)	V	V	Forages over a broad range of open forest and woodland habitats, this species is a cave roosting bat which favours sandstone escarpment habitats for roosting, in the form of shallow overhangs, crevices and caves.	1 – BioNet PMST BAM-C	Moderate. This species is most likely to forage in the woodland around the drainage line and may occur in the development site as it flies around. However, there is no high quality foraging habitat or breeding habitat in the development site.
<i>Dasyurus maculatus</i> (Spotted-tailed Quoll)	V	E	Wet and dry sclerophyll forests and rainforests, and adjacent open agricultural areas. Generally associated with large expansive areas of habitat to sustain territory size. Requires hollow bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites.	8 – BioNet PMST BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species.
<i>Falsistrellus tasmaniensis</i> (Eastern False Pipistrelle)	V	-	Prefers moist habitats, with trees taller than 20 m. Generally, roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	18 – BioNet BAM-C	Moderate. The highest quality foraging habitat is around the drainage line, though this species may also forage around trees within the development site. No hollow bearing trees were identified within the development site; however, some roosting habitat may be present. There is unlikely to be any breeding habitat in the development site.
<i>Micronomus norfolkensis</i> (Eastern Coastal Free-tailed Bat)	V	-	Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roosts mainly in tree hollows but also roosts under bark or in huartifical structures.	48 – BioNet BAM-C	High. Analysis of bat calls recorded along the drainage line as part of this assessment identified this species on one night. The highest quality foraging habitat is around the drainage line, though this species may also forage around trees within the development site. No hollow bearing trees were identified within the development site; however, some roosting habitat may be present. There is unlikely to be any breeding habitat in the development site.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Miniopterus australis</i> (Little Bent-winged Bat)	V	-	East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	6 – BioNet BAM-C	Moderate. This species is most likely to forage in the woodland around the drainage line and may occur in the development site as it flies around. However, there is no high quality foraging habitat or breeding habitat in the development site.
<i>Miniopterus orianae oceanensis</i> (Large Bent-winged Bat)	V	-	Occurs on east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other manmade structures.	72 – BioNet BAM-C	High. This species is most likely to forage in the woodland around the drainage line and may occur in the development site as it flies around. However, there is no high quality foraging habitat or breeding habitat in the development site.
<i>Myotis macropus</i> (Southern Myotis)	V	-	Roost in groups close to water in caves, mine shafts, hollow bearing trees, and storm water channels, buildings, under bridges and in dense foliage. Forages over streams and pools catching insects and small fish.	37 – BioNet	Moderate. Targeted surveys for this species were carried out as part of this assessment. No bats were trapped in harp traps. Bat call analysis concluded some recorded calls were probably this species, though it is not possible to determine from calls alone. The highest quality foraging habitat is around the drainage line, though this species may also forage around trees within the development site. There are no associated PCTs within 200 metres of a waterway in the development site.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Petauroides volans</i> (Greater Glider)	-	V	The Greater Glider occurs in eucalypt forests and woodlands along the east coast of Australia from north-east Queensland to the Central Highlands of Victoria from sea level to 1200 m altitude. It feeds exclusively on eucalypt buds, flowers and mistletoe and favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. It roosts in tree hollows, with a particular selection for large hollows in large, old trees. Individuals use multiple hollows and a relatively high abundance of tree hollows (at least 4-8 suitable hollows per hectare) seems to be needed for the species to persist. Individuals occupy relatively small home ranges with an average size of 1 to 3 ha, but the species has relatively low persistence in small forest fragments and disperses poorly across vegetation that is not native forest. Forest patches of at least 160 km ² may be required to maintain viable populations.	PMST	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.
<i>Petaurus australis</i> (Yellow-bellied Glider)	V	-	Found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein. Extract sap by incising (or biting into) the trunks and branches of favoured food trees, often leaving a distinctive 'V'-shaped scar.	1 – BioNet BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species.
<i>Petaurus norfolcensis</i> (Squirrel Glider)	V	-	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey.	1 – BioNet BAM-C	Low in development site. There is no habitat in the development site considered suitable for this species.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Petrogale penicillata</i> (Brush-tailed Rock- wallaby)	E	V	This species prefers rocky habitats, including loose boulder-piles, rocky outcrops, steep rocky slopes, cliffs, gorges and isolated rock stacks. It also utilises tree limbs. While it appears that most Brush-tailed Rock-wallaby colonies are on north-facing slopes and cliff lines, colonies have been found on south-facing cliffs in Kangaroo Valley, in the Macleay River Gorge, in the Warrumbungles and at Mt Kaputar, although usually in lower densities. Rocky outcrops appear crucial to current habitat selection by rock-wallabies; however, vegetation structure and composition is also considered to be an important factor. In many parts of their range, including at the Warrumbungles, rock-wallabies are closely associated with dense arboreal cover, especially fig trees. The vegetation on and below the cliff appear to be important to this species as a source of food and shelter and in some cases may provide some protection from predation. A range of vegetation types are associated with Brush-tailed Rock-wallaby habitat, including dense rainforest, wet sclerophyll forest, vine thicket, dry sclerophyll forest, and open forest.	PMST	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.
<i>Phascolarctos cinereus</i> (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory	V	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area selects preferred browse species.	7 – BioNet PMST BAM-C	Low in development site. <i>Eucalyptus tereticornis</i> is a primary food tree species. However, the known occurrence of this species within the locality is very rare. This species may pass through the development site on occasion, however the likelihood is considered low.
<i>Pseudomys novaehollandiae</i> (New Holland mouse)	V	-	Distribution is fragmented across all eastern states of Australia, where it inhabits open heath lands, open woodlands with heath understorey and vegetated sand dunes.	PMST	Low in development site. There is no habitat in the development site considered suitable for this species. There are no records of this species in the locality.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Pteropus poliocephalus</i> (Grey-headed Flying-fox)	V	V	Generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young.	900 – BioNet PMST BAM-C	High. This species is assumed to occur based on the presence of suitable foraging habitat and the proximity of several camps. There are no camps within the development site.
<i>Saccolaimus flaviventris</i> (Yellow-bellied Sheath-tail-bat)	V	-	Wide-ranging species found across northern and eastern Australia. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	4 – BioNet BAM-C	Moderate. The highest quality foraging habitat is around the drainage line, though this species may also forage around trees within the development site. No hollow bearing trees were identified within the development site; however, some roosting habitat may be present. There is unlikely to be any breeding habitat in the development site.
<i>Scoteanax rueppellii</i> (Greater Broad-nosed Bat)	V	-	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings.	20 – BioNet BAM-C	Moderate. The highest quality foraging habitat is around the drainage line, though this species may also forage around trees within the development site. No hollow bearing trees were identified within the development site; however, some roosting habitat may be present. There is unlikely to be any breeding habitat in the development site.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
Fish					
<i>Macquaria australasica</i> (Macquarie Perch)	E	E	Macquarie Perch have declined considerably from their historical distribution within NSW and they are now considered isolated to the upper reaches of the Lachlan and Murrumbidgee Rivers in southern NSW. It is also found in low numbers in the Mongarlowe River, where the population is considered likely to be the result of a translocation from the Murray-Darling Basin. Other populations exist in Cataract Dam in the Nepean River catchment, as well as a 2008 record from Georges River near Campbelltown, the first record from the river since 1894. It persists in the Burrinjuck, Cotter (Murrumbidgee) and Wyangala impoundments. A breeding population in the Queanbeyan River upstream of the Googong Reservoir exists solely due to a translocation of individuals from the reservoir past a natural barrier. The Googong reservoir population is believed to be effectively extinct. Macquarie perch may occasionally become displaced downstream from the Queanbeyan River into Googong, but they do not form a population in the reservoir. The New South Wales Rivers Survey (1994–1996) demonstrated that the Macquarie Perch was present only in low numbers at three sites in streams above Lake Wyangala and Burrinjuck Dam. Hawkesbury and Shoalhaven River populations, including in large impoundments, seem abundant and generally occur upstream of Australian Bass (<i>Macquaria novemaculata</i>) populations. The Macquarie Perch is a riverine, schooling species. It prefers clear water and deep, rocky holes with lots of cover. As well as aquatic vegetation, additional cover may comprise of large boulders, debris and overhanging banks. Spawning occurs just above riffles (shallow running water). Populations may survive in impoundments if able to access suitable spawning sites.	PMST	Low in development site. There is no habitat considered suitable for this species.
<i>Prototroctes maraena</i> (Australian Grayling)	E	V	The Australian Grayling is diadromous, spending part of its lifecycle in freshwater and at least part of the larval and/or juvenile stages in coastal seas. Adults (including pre spawning and spawning adults) inhabit cool, clear, freshwater streams with gravel substrate and areas alternating between pools and riffle zones such as the Tambo River, which is also known to have granite outcrops. The species has also been associated with clear, gravel-bottomed habitats in the Mitchell and Wonnangatta Rivers (Victoria) and in a muddy-bottomed, heavily silted habitat in the Tarwin River (Victoria). The species has been found over 100 km upstream from the sea	PMST	Low in development site. There is no habitat considered suitable for this species.
Migratory species					

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Actitis hypoleucos</i> (Common Sandpiper)	-	M	Found along all coastlines of Australia and in many areas inland, the Common Sandpiper is widespread in small numbers. The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats.	PMST	Low in development site. There is no habitat considered suitable for this species.
<i>Apus pacificus</i> (Fork-tailed Swift)	-	M	Recorded in all regions of NSW. The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher.	PMST	Low in development site. May fly over the site on occasion but would not use the habitats and would not be impacted.
<i>Calidris acuminata</i> (Sharp-tailed Sandpiper)	-	M	The Sharp-tailed Sandpiper spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Many inland records are of birds on passage. Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation; this includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, salt pans and hypersaline salt lakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgeland and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season. Sometimes they occur on rocky shores and rarely on exposed reefs.	PMST	Low in development site. There is no habitat considered suitable for this species.
<i>Calidris melanotos</i> (Pectoral Sandpiper)	-	M	In New South Wales (NSW), the Pectoral Sandpiper is widespread, but scattered. Records exist east of the Great Divide, from Casino and Ballina, south to Ulladulla. West of the Great Divide, the species is widespread in the Riverina and Lower Western regions. Prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	PMST	Low in development site. There is no habitat considered suitable for this species.
<i>Cuculus optatus</i> (Oriental Cuckoo)	-	M	The Oriental cuckoo is a non-breeding visitor to Australia. Inhabits rainforest margins, monsoon forest, vine scrub and mangroves, wet sclerophyll forest or open Casuarina, Acacia or Eucalyptus woodlands. It frequently occurs at edges or ecotones between habitat types.	PMST	Low in development site. There is no habitat considered suitable for this species.
<i>Gallinago hardwickii</i> (Latham's Snipe)	-	M	Recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia. Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level.	PMST	Low in development site. There is no habitat considered suitable for this species.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<i>Hirundapus caudacutus</i> (White-throated Needletail)	-	M	Widespread in eastern and south-eastern Australia. Almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. They also commonly occur over heathland but less often over treeless areas, such as grassland or swamps.	PMST	Low in development site. May fly over the site on occasion but would not use the habitats and would not be impacted.
<i>Monarcha melanopsis</i> (Black-faced Monarch)	-	M	Widespread in eastern Australia. Mainly occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest.	PMST	Low in development site. There is no habitat considered suitable for this species.
<i>Monarcha trivirgatus</i> (Spectacled Monarch)	-	M	Occurs along the entire east coast of Australia. Breeds in dense scrub in gullies of coastal ranges.	PMST	Low in development site. There is no habitat considered suitable for this species.
<i>Motacilla flava</i> (Yellow Wagtail)	-	M	Rare but regular visitor around Australian coast, especially in the NW coast Broome to Darwin. Found in open country near swamps, salt marshes, sewage ponds, grassed surrounds to airfields, bare ground; occasionally on drier inland plains.	PMST	Low in development site. There is no habitat considered suitable for this species.
<i>Myiagra cyanoleuca</i> (Satin Flycatcher)	-	M	Widespread in eastern Australia and vagrant to New Zealand. Inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests.	PMST	Low in development site. There is no habitat considered suitable for this species.
<i>Pandion haliaetus</i> (Osprey)	-	M	The Osprey has a global distribution with four subspecies previously recognised throughout its range. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	PMST	Low in development site. There is no habitat considered suitable for this species.
<i>Rhipidura rufifrons</i> (Rufous Fantail)	-	M	Occurs in coastal and near coastal districts of northern and eastern Australia. In east and south-east Australia, the Rufous Fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (Eucalyptus microcorys), Mountain Grey Gum (E. cypellocarpa), Narrow-leaved Peppermint (E. radiata), Mountain Ash (E. regnans), Alpine Ash (E. delegatensis), Blackbutt (E. pilularis) or Red Mahogany (E. resinifera); usually with a dense shrubby understorey often including ferns.	PMST	Low in development site. There is no habitat considered suitable for this species.
<i>Tringa nebularia</i> (Common Greenshank)	-	M	The Common Greenshank does not breed in Australia, however, the species occurs in all types of wetlands and has the widest distribution of any shorebird in Australia.	PMST	Low in development site. There is no habitat considered suitable for this species.

Scientific Name (Common Name)	BC Act / FM Act	EPBC Act	Habitat Requirements	No. records in locality	Likelihood of occurrence
<p>Distribution and habitat requirement information adapted from: Australian Government Department of the Environment http://www.environment.gov.au/biodiversity/threatened/index.html NSW Office of Environment and Heritage http://www.environment.nsw.gov.au/threatenedspecies/ and IUCN red list https://www.iucnredlist.org/.</p> <p>Key: CE = critically endangered E = endangered V = vulnerable M = migratory</p>					

Appendix B. Floristic survey composition and structure data

Table B-1 Species and estimated cover recorded in each of the Vegetation Integrity survey plots

Species	GF code	Cover (%)														
		Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 10	Plot 11	Plot 12	Plot 13	Plot 14	Plot 15
<i>Acacia decurrens</i>	TG					10										
<i>Acacia falcata</i>	SG	0.1														
<i>Ageratina adenophora</i>	HT															0.5
<i>Alisma plantago-aquatica</i>	FG															0.1
<i>Angophora floribunda</i>	TG															10
<i>Araujia sericifera</i>	HT						0.1	0.1					0.1			
<i>Aristida spp.</i>	GG		0.1	0.1												
<i>Asparagus aethiopicus</i>	HT								0.1							
<i>Bidens pilosa</i>	EX		0.2	0.2		0.1	0.2	0.1			0.1		0.1			
<i>Brassica spp.</i>	EX												0.1			
<i>Briza subaristata</i>	EX										50					
<i>Bromus catharticus</i>	EX			0.1					0.1				0.1			
<i>Brunoniella australis</i>	FG					0.1										
<i>Bursaria spinosa</i>	SG												0.3	0.5		
<i>Cardiospermum grandiflorum</i>	HT													5	20	
<i>Casuarina glauca</i>	TG									30				10	2	
<i>Centella asiatica</i>	FG		0.1			0.1					0.3					
<i>Cestrum parqui</i>	HT															0.1
<i>Chloris gayana</i>	HT	0.2														
<i>Chloris gayana</i>	HT											1	0.5			
<i>Cirsium vulgare</i>	EX			0.1		0.1				0.1		0.1		0.1		
<i>Commelina cyanea</i>	FG													0.1	0.1	
<i>Corymbia maculata</i>	TG												10			
<i>Cyclospermum leptophyllum</i>	EX													0.1		

[illegible]

Appendix C. Vegetation integrity assessment plot data

Table C-1: Vegetation integrity assessment plot data for vegetation zones in the Sydney Basin bioregion

plot	PCT	Area on site	Patch size	Condition class	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTree	funHollowtre	funLitterCove	funLenFallen	funTreeStem	funTreeStem	funTreeStem	funTreeStem	funTreeStem	funTreeRege	funHighThrea
1	850	0.24	101	Poor	56	3024 92	625566 6.7	161	1	1	3	2	0	2	15.0	0.1	5.2	0.2	0.0	0.2	0	0	66.0	0.0	1	1	1	1	0	1	81.9
2	850	0	101	Moderate	56	3024 89	625555 2.4	269	1	1	5	3	0	1	30.0	0.3	100.3	0.3	0.0	0.1	0	0	77.0	10.0	1	1	1	1	0	1	0.5
3	850	0	101	Moderate	56	3026 53	625559 9.8	185	1	1	4	3	0	1	25.0	0.3	90.3	0.7	0.0	0.1	1	1	82.0	22.0	1	1	1	1	0	1	10.3
4	1071	0.00	101	Drain	56	3028 05	625611 3.1	137	1	0	2	0	0	0	0.5	0.0	95.0	0.0	0.0	0.0	0	0	0.0	0.0	0	0	0	0	0	1	0.3
5	850	0	101	Moderate	56	3026 38	625628 7.2	130	2	1	2	1	0	1	35.0	0.1	61.0	0.1	0.0	0.1	0	0	76.0	24.0	1	1	1	1	0	1	7.1
6	850	0	101	Moderate	56	3025 26	625633 4.1	194	1	0	7	4	0	1	20.0	0.0	90.9	0.4	0.0	0.1	0	0	87.0	2.0	1	1	1	1	0	1	0.5
7	849	0.06	101	Poor	56	3026 65	625612 2.2	181	2	0	0	0	0	0	35.0	0.0	0.0	0.0	0.0	0.0	0	0	24.0	0.0	0	1	1	1	0	0	80.8
8	849	0.06	101	Poor	56	3026 19	625626 8.8	290	1	0	0	2	0	0	20.0	0.0	0.0	0.2	0.0	0.0	0	0	25.0	5.0	0	0	1	1	0	0	90.5
9	850	0.05	101	Revegetati on	56	3027 91	625625 5.4	66	3	0	1	2	0	0	65.0	0.0	0.1	5.2	0.0	0.0	0	0	71.0	0.0	1	1	1	1	0	1	26.1
10	850	0	101	Regenerat ion	56	3027 99	625636 8.4	63	1	0	3	3	0	0	20.0	0.0	40.5	0.5	0.0	0.0	0	0	36.0	1.0	1	0	0	0	0	1	0.2
11	849	0	101	Blackberry	56	3025 13	625638 6.6	71	1	0	0	0	0	0	20.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0.0	0	0	1	1	0	0	96.1

Appendix D. EPBC Act significance assessments

Assessment of significance have been completed for threatened species, populations and communities that were recorded in the development site during field surveys or were identified as having a moderate or higher potential to occur in the development site based on the presence of habitat. For threatened biodiversity listed under the EPBC Act, significance assessments have been completed in accordance with the EPBC Act Policy Statement 1.1 Significant Impact Guidelines (Department of Environment, 2013). Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment that is affected, and upon the intensity, duration, magnitude and geographic extent of the impacts (Department of Environment, 2013). Importantly, for a 'significant impact' to be 'likely', it is not necessary for a significant impact to have a greater than 50 per cent chance of happening; it is sufficient if a significant impact on the environment is a real or not a remote chance or possibility (Department of Environment, 2013). This advice has been considered while completing the assessments.

The EPBC Act listed species subject to this assessment include:

- Grey-headed Flying-fox
- Regent Honeyeater
- Swift Parrot

The Green and golden Bell Frog was not assessed as the species has not been confirmed on-site and a population is not expected to occur

When assessing Vulnerable species, the assessment centres around whether the population that would be impacted is an 'important population' or not. An 'important population' is a population that is necessary for a species' long-term survival and recovery (Department of Environment, 2013). This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

This definition of what constitutes an 'important population' has guided the assessments for Vulnerable species.

The direct impact of the development is summarised below in Table D-1. The vegetation that would be impacted only provides potential foraging habitat these species.

Table D-1: Summary of direct impact to EPBC Act listed threatened species habitat (native vegetation) within the development site

Species	Plant community type name	Area (ha) in development site
Grey-headed Flying-fox Regent Honeyeater Swift Parrot	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (849) Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (850)	0.38

Planted revegetation and weeds would also be impacted. No profusely fruiting (e.g. *Ficus* sp.) or flowering trees were identified, and these areas are unlikely to provide substantial foraging opportunities for the Grey-headed Flying-fox, Swift Parrot and Regent Honeyeater.

Grey-headed Flying-fox

The Grey-headed Flying-fox (*Pteropus poliocephalus*) is known to forage widely throughout the Sydney urban area and a nationally important camp is located along the Parramatta River in Parramatta Park around 12 kilometres east of the development site. This species is considered likely to occur throughout the development site when trees are flowering based on the presence of suitable foraging habitat. The Grey-headed Flying-fox exists as a single interconnected population in Australia. As such, it is considered an important population.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it would:

1) lead to a long-term decrease in the size of an important population of a species

There would be no direct impact to the Parramatta Park roost camp so no direct impacts to a known permanent roosting, breeding / maternity site would occur. Therefore, it is likely that the impacts of the development would be confined to loss of feeding habitat caused by direct clearing or damage to PCTs during the construction. However, this loss of foraging habitat would be negligible and unlikely to affect breeding success given the extent of similar habitat in the Sydney area and the wide-ranging nature of Grey-headed Flying-fox foraging movements. The development is considered unlikely to lead to a long-term decrease in the size of an important population of the Grey-headed Flying-fox.

2) reduce the area of occupancy of an important population

The area of occupancy of the Grey-headed Flying-fox is not known but the species exists as one interconnected population along the eastern Australian coastal belt from Rockhampton in central Queensland to Melbourne in Victoria. The area occupied by this species would remain the same after construction. No impact to area of occupancy is expected.

3) fragment an existing important population into two or more populations

The Grey-headed Flying-fox is particularly well adapted to accessing widely spaced habitat resources given its mobility and preference for seasonal fruits and blossom in differing parts of the landscape. The development would not fragment an important population of the Grey-headed Flying-fox. Individuals would still be able to disperse between roosts along the east Australian coast.

4) adversely affect habitat critical to the survival of a species

The draft recovery plan for the Grey-headed Flying-fox identifies critical habitat for this species as:

- Productive during winter and spring, when food bottlenecks have been identified
- Known to support populations of greater than 30,000 individuals, within an area of 50-kilometre radius of a camp site
- Productive during the final weeks of gestation, and during the weeks of birth, lactation and conception (Sept-May)
- Productive during the final stages of fruit development and ripening in commercial crops affected by Grey-headed Flying-foxes
- Known to be continuously occupied as a camp site.

Critical roosting habitat is present in the Parramatta Park camp. Two other intermittently used camps are close by; Wetherill Hill and Ropes Creek. However, there would be no direct impacts to these camps as the development is located at a sufficient distance and would not even result in disturbance to these camps. The foraging habitat to be impacted is a small area of poor and moderate condition woodland vegetation and does not constitute critical foraging habitat given the relative widespread nature of similar, and higher quality, vegetation in the locality and abundance of higher quality foraging habitat within the feeding range of regional populations. As such, the development is not expected to adversely affect foraging habitat critical to the survival of this species.

5) disrupt the breeding cycle of an important population

Critical roosting and breeding habitat is present in the Parramatta Park camp. However, there would be no direct impacts to the camp. There would be a negligible impact on foraging habitat that may be used during the breeding cycle of the species but a disruption to the breeding cycle of the Grey-headed Flying-fox is not likely.

6) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Grey-headed Flying-fox can cover large areas of its range seeking suitable flowering eucalypts and fruits for foraging. The species is likely to utilise vegetation at the development site for foraging when the trees are in flower. The impact to foraging habitat from the development would be negligible and the development is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of foraging habitat to the extent that the species is likely to decline.

7) result in invasive species that are harmful to a vulnerable species becoming established in the Vulnerable species' habitat

The development is unlikely to result in an invasive species harmful to the Grey-headed Flying-fox becoming established in the habitat. Weeds are already well established in the habitat. Invasive species would be managed under the Construction Environmental Management Plan using best practice methods.

8) introduce disease that may cause the species to decline, or

There are no known disease issues affecting this species in relation to the development. The development would be unlikely to increase the potential for significant disease vectors to affect local populations.

9) interfere substantially with the recovery of the species.

The Draft National Recovery Plan for the Grey-headed Flying-fox (*Pteropus poliocephalus*) outlines the following actions:

- Identify and protect foraging habitat critical to the survival of Grey-headed Flying-foxes across their range
- Enhance winter and spring foraging habitat for Grey-headed Flying-foxes
- Identify, protect and enhance roosting habitat critical to the survival of Grey-headed Flying-foxes
- Significantly reduce levels of deliberate Grey-headed Flying-fox destruction associated with commercial horticulture
- Provide information and advice to managers, community groups and members of the public that are involved with controversial flying-fox camps
- Produce and circulate educational resources to improve public attitudes toward Grey-headed Flying-foxes, promote the recovery program to the wider community and encourage participation in recovery actions
- Monitor population trends for the Grey-headed Flying-fox
- Assess the impacts on Grey-headed Flying-foxes of electrocution on powerlines and entanglement in netting and barbed wire, and implement strategies to reduce these impacts
- Oversee a program of research to improve knowledge of the demographics and population structure of the Grey-headed Flying-fox
- Maintain a National Recovery Team to oversee the implementation of the Grey-headed Flying-fox National Recovery Plan.

The recovery actions listed above are largely not applicable to the development. The development is not expected to interfere substantially with the recovery of the species.

Conclusion

The Grey-headed Flying-fox would suffer a negligible reduction in extent of suitable foraging habitat from the development site. No breeding camps or other important habitat would be directly impacted. This impact is unlikely to reduce the population size of the Grey-headed Flying-fox or decrease the reproductive success of this species. The development would not interfere with the recovery of the Grey-headed Flying-fox.

After consideration of the factors above, an overall conclusion has been made that the development is unlikely to result in a significant impact to the Grey-headed Flying-fox and a referral for biodiversity matters is not necessary.

Swift Parrot and Regent Honeyeater

The Swift Parrot (*Lathamus discolor*) and Regent Honeyeater (*Anthochaera phrygia*) are considered moderately likely to occur based on the presence of suitable foraging habitat, particularly winter flowering species *Eucalyptus tereticornis*. These species are known to sporadically occur within and move through the Sydney region, particularly the Swift Parrot while on mainland Australia during winter. Both species are considered likely to only occur intermittently and the likelihood of birds using the trees within the development site as a continual source of habitat is low. The development site and study area does not contain any mapped Important Areas for either of these species.

The Swift Parrot occurs as a single, migratory population. It is thought that the Regent Honeyeater also comprises a single Australian population.

An action is likely to have a significant impact on a Critically Endangered or Endangered species if there is a real chance or possibility that it would:

1) lead to a long-term decrease in the size of a population

The development site contains potential foraging habitat for the Swift Parrot and Regent Honeyeater in the form of scattered poor condition woodland and one moderate condition woodland patch. While the habitat at the development site is not optimal, the loss of potential feed trees would directly affect the opportunity for these species to feed in the area. However, the development site is not considered a critical area for the Swift Parrot or Regent Honeyeater.

These species may utilise trees at the development site for foraging intermittently when no other suitable inland (i.e. box ironbark woodlands) or coastal resources (i.e. Spotted Gum and Swamp Mahogany forests) are available or opportunistically while moving through the Sydney region. The development would remove a small amount of potential foraging habitat for these species, but the impact would be negligible considering that no high-quality natural foraging habitat would be impacted and the extent of resources in the adjacent environment that would remain (i.e. Eastern Creek riparian corridor and Prospect Reservoir woodland).

The Swift Parrot does not breed at the development site. The Regent Honeyeater does not breed in the Sydney urban area. There are only four known key breeding regions remaining for the Regent Honeyeater: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley, Hunter Valley and the Bundarra-Barraba region. The extent of habitat remaining at the development site would provide sufficient foraging resources to sustain future visitation, such that the development is unlikely to lead to a long-term decrease in the size of the Swift Parrot population or the Regent Honeyeater population.

2) reduce the area of occupancy of the species

As specialist nectarivores dependent on flowering eucalypts, Swift Parrot and Regent Honeyeaters are vulnerable to the loss of quantity and quality of key forage tree species. As a large-scale migrant, the Swift Parrot has the ability to cover vast areas of its winter range, seeking suitable flowering eucalypt habitat. Similarly, the Regent Honeyeater is known to travel large distances around south-eastern Australia in search of large flowering events. These species are an occasional visitor to the Sydney region and may utilise trees at the development site for foraging intermittently when no other suitable resources are available.

The development would contribute to the loss of a small amount of marginal potential foraging habitat which would result in a negligible reduction in foraging habitat available. However, it would not reduce the area of occupancy of the Swift Parrot which is estimated at 4,000 square kilometres or the Regent Honeyeater, which is estimated at 300 square kilometres.

3) fragment an existing population into two or more populations

Importantly, the development would not result in fragmentation of habitat for the Swift Parrot. These species are highly mobile and as a regular behaviour fly long distances over open areas to move between suitable foraging habitats. The development would not affect the movement of the Swift Parrot or Regent Honeyeater between habitat patches or fragment the populations.

4) adversely affect habitat critical to the survival of a species

Habitat critical to the survival of the Swift Parrot includes; those areas of priority habitat for which the Swift Parrot has a level of site fidelity or possess phenological characteristics likely to be of importance to the Swift Parrot. Key habitats for the Swift Parrot on the coast and coastal plains of New South Wales include large stands of Spotted Gum (*Corymbia maculata*), Swamp Mahogany (*Eucalyptus robusta*), Red Bloodwood (*Corymbia gummifera*) and Forest Red Gum (*Eucalyptus tereticornis*) forests.

Habitat critical to the survival of the Regent Honeyeater includes:

- Any breeding or foraging habitat in areas where the species is likely to occur (as defined by the distribution map provided in Figure 2 of the National Recovery Plan – this includes the Sydney Region); and
- Any newly discovered breeding or foraging locations.

The development site is dominated by *Eucalyptus tereticornis* (Forest Red Gum) constituting suitable foraging habitat for these species. The development site is within an area where the Regent Honeyeater is likely to occur, therefore the foraging habitat that would be impacted is considered to be critical to survival. The habitat at the development site is not primary habitat and unlikely to be of critical importance to the survival of these species as it consists of a small area of young trees in between two larger contiguous patches of woodland. The habitats are likely to only be visited on rare occasion by birds passing through on route to larger higher quality habitats on the coast and inland. The development is unlikely to adversely affect habitat critical to the survival of the Swift Parrot and Regent Honeyeater.

5) disrupt the breeding cycle of a population

The Swift Parrot is endemic to south-eastern Australia and breeds only in Tasmania. This species migrates to mainland Australia in autumn. As such, the development would not impact on breeding habitat for this species. Important winter foraging grounds would not be impacted so there would be negligible impact on the life cycle of the Swift Parrot.

There are only four known key breeding regions remaining for the Regent Honeyeater: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley, Hunter Valley and the Bundarra-Barraba region. It is likely that this species also breeds in other locations, breeding mostly corresponds with the flowering of key eucalypt and mistletoe species. Nests are usually placed in the canopy of mature trees with rough bark, e.g. ironbarks, sheoaks (*Casuarina*) and rough-barked Apple (*Angophora*). As such it is unlikely that the development site would constitute breeding habitat for this species. Additionally, the trees that would be impacted are mostly young and unlikely to experience a large flowering event that is going to support nearby breeding birds. As such, the development would not impact on breeding habitat for the Regent Honeyeater.

6) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As a large-scale migrant (Swift Parrot) and a 'rich-patch nomad' (Regent Honeyeater), these species can cover vast areas of their winter range, seeking suitable flowering eucalypt habitat. These species are an occasional visitor to the region and may utilise trees at the development site for foraging intermittently when no other suitable resources are available. The impact to foraging habitat from the development would be negligible and the development is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

7) result in invasive species that are harmful to a Critically Endangered or Endangered species becoming established in the Endangered or Critically Endangered species' habitat

The main invasive species harmful to the habitat for the Swift Parrot and Regent Honeyeater in NSW is weeds. Additionally, Noisy Miners and Bell Miners may make the habitat less suitable for these species due to competitive exclusion. The development may result in weed invasion and the removal of habitat may increase competition for food resources, but this impact is considered to be negligible given the context of the habitat in the immediate vicinity of the development site (i.e. Eastern Creek riparian corridor and Prospect Reservoir woodland) and the locality. Consequently, it is unlikely to result in any further invasive species becoming established in the habitat.

8) introduce disease that may cause the species to decline, or

Infection of native plants by *Phytophthora cinnamomi* has been identified as being spread by construction machinery. This water-borne mould infects the roots of plants and has the potential to cause dieback. It is the intention to use current best practice hygiene protocols as part of a Construction Environmental Management Plan to prevent the introduction or spread of pathogens. Management and mitigation measures would include guidance for preventing the introduction and/or spread of disease-causing agents such as bacteria and fungi.

9) interfere with the recovery of the species.

The *National Recovery Plan for the Swift Parrot* (Commonwealth of Australia 2011) identifies the following actions for recovery of this species:

- Identify the extent and quality of habitat
- Manage and protect Swift Parrot habitat at the landscape scale
- Monitor and manage the impact of collisions, competition and disease
- Monitor population and habitat.

The *National Recovery Plan for the Regent Honeyeater (Anthochaera phrygia)* (Commonwealth of Australia 2011) identifies four strategies for recovery of this species:

- Improve the extent and quality of regent honeyeater habitat.
- Bolster the wild population with captive-bred birds until the wild population becomes self-sustaining.
- Increase understanding of the size, structure, trajectory and viability of the wild population.
- Maintain and increase community awareness, understanding and involvement in the recovery program.

The recovery actions listed above to help recover the Swift Parrot and Regent Honeyeater are largely not applicable to the development. The removal of suitable foraging habitat conflicts with the first strategy of the Regent Honeyeater Recovery Plan, though this impact is not considered likely to interfere with the recovery of this species. The development would not interfere with the recovery of the Swift Parrot.

Conclusion

There would be a small reduction in extent of foraging habitat for the Swift Parrot and Regent Honeyeater at the development site. The development would not separate large blocks of habitat or restrict movement patterns of these species. There would be no impact to breeding habitat for either of these species. It is unlikely to reduce the size of the Swift Parrot population or the Regent Honeyeater population or decrease the reproductive success of these species. The development is unlikely to interfere with the recovery of the Swift Parrot or Regent Honeyeater. After consideration of the factors above, an overall conclusion has been made that the development is unlikely to result in a significant impact to the Swift Parrot or Regent Honeyeater and a referral is not required.

Appendix E. Biodiversity credit report

BAM Credit Summary Report

Proposal Details

Assessment Id	00020140/BAAS19068/20/00020141	Proposal Name	Sydney International Speedway	BAM data last updated *	21/10/2020
Assessor Name		Report Created	22/10/2020	BAM Data version *	31
Assessor Number		BAM Case Status	Open	Date Finalised	To be finalised
Assessment Revision	0	Assessment Type	Major Projects		

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	BC Act Listing status	EPBC Act listing status	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAI	Ecosystem credits
Cumberland shale hills woodland											
3 850_Poor		Cumberland Plain Woodland in the Sydney Basin Bioregion	15.2	15.2	0.24	Critically Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.50	TRUE	2

BAM Credit Summary Report

4 850_Reveg etation	Cumberland Plain Woodland in the Sydney Basin Bioregion	23.9	23.9	0.05	Critically Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.50	TRUE	1
Cumberland shale plains woodland										3
1 849_Moder ate	Cumberland Plain Woodland in the Sydney Basin Bioregion	18.7	18.7	0.01	Critically Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.50	TRUE	1
2 849_Poor	Cumberland Plain Woodland in the Sydney Basin Bioregion	11.3	11.3	0.06	Critically Endangered Ecological Community	Critically Endangered	High Sensitivity to Potential Gain	2.50	TRUE	0
Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion										1
5 1071_Drain	Not a TEC	44.4	44.4	0.01			High Sensitivity to Potential Gain	2.00		1
										1
										5

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Species credits
-------------------------	---	--------------------------------	--------------------------------------	--------------------------	----------------------------	--------------------------------	-------------------	--------------------

BAM Credit Summary Report

<i>Myotis macropus</i> / Southern Myotis (Fauna)						
849_Poor	11.3	11.3	0.02	Vulnerable	Not Listed	1
					2	False
						Subtotal
						1

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Appendix F. Protected Matters Search Tool Report



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 05/03/20 10:10:58

[Summary](#)

[Details](#)

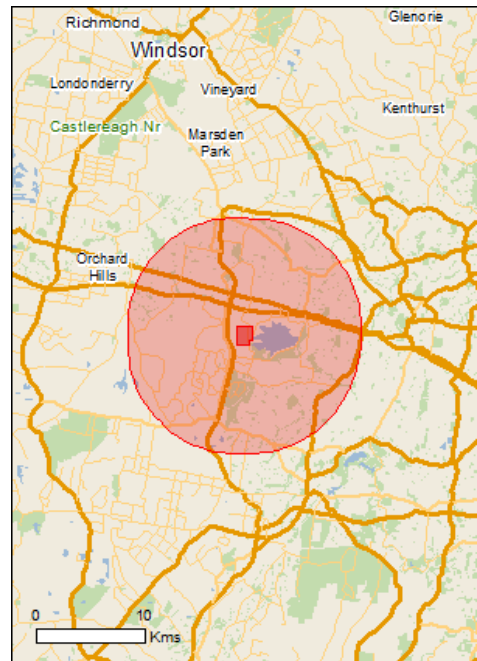
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

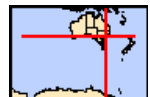
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	6
Listed Threatened Species:	44
Listed Migratory Species:	16

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	14
Commonwealth Heritage Places:	None
Listed Marine Species:	22
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	50
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities

[[Resource Information](#)]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	Community likely to occur within area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	Critically Endangered	Community may occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale	Critically Endangered	Community likely to occur within area

Listed Threatened Species

[[Resource Information](#)]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Fish		
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat may occur within area
Insects		
Synemon plana Golden Sun Moth [25234]	Critically Endangered	Species or species habitat likely to occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat likely to occur within area
Acacia pubescens Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat known to occur within area
Allocasuarina glareicola [21932]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Asterolasia elegans [56780]	Endangered	Species or species habitat may occur within area
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat may occur within area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat known to occur within area
Darwinia biflora [14619]	Vulnerable	Species or species habitat may occur within area
Genoplesium baueri Yellow Gnat-orchid [7528]	Endangered	Species or species habitat may occur within area
Grevillea parviflora subsp. parviflora Small-flower Grevillea [64910]	Vulnerable	Species or species habitat known to occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area
Micromyrtus minutiflora [11485]	Vulnerable	Species or species habitat likely to occur within area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat likely to occur within area
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat likely to occur within area
Persoonia nutans Nodding Geebung [18119]	Endangered	Species or species habitat known to occur within area
Pimelea curviflora var. curviflora [4182]	Vulnerable	Species or species habitat known to occur within area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat known to occur within area
Pomaderris brunnea Rufous Pomaderris [16845]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat may occur within area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat likely to occur within area
Pultenaea parviflora [19380]	Vulnerable	Species or species habitat known to occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Migratory Terrestrial Species

Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area

Migratory Wetlands Species

Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Australian Telecommunications Corporation
Commonwealth Land - Commonwealth Scientific & Industrial Research Organisation
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Deputy Director of War Service Homes
Commonwealth Land - Director of Defence Service Homes
Commonwealth Land - Director of War Service Homes
Commonwealth Land - Telstra Corporation Limited
Defence - BLACKTOWN TRAINING DEPOT
Defence - HMAS NIRIMBA

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Kemps Creek	NSW
Prospect	NSW

Invasive Species	[Resource Information]
<p>Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.</p>	

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species

Name	Status	Type of Presence
Streptopelia chinensis Spotted Turtle-Dove [780]		habitat likely to occur within area Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171] Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.812283 150.859574,-33.812212 150.859488,-33.812711 150.872706,-33.821981 150.872363,-33.821981 150.870303,-33.825119 150.870217,-33.825119 150.859746,-33.812283 150.859574

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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Appendix B – Addendum Aboriginal Cultural Heritage Assessment Report

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Sydney International Speedway

Addendum Aboriginal Cultural
Heritage Assessment

Blacktown Local Government Area

Report to Sydney Metro

November 2020



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Author:	Alyce Haast
Project manager:	Duncan Jones
Project number:	20005
Name of organisation:	Artefact Heritage
Document version:	Final

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CONTENTS

1.0	Introduction	1
1.1	Project overview.....	1
1.2	Environmental Impact Statement exhibition	2
1.3	Overview of the proposed amendments.....	3
1.4	Purpose and scope of this addendum.....	5
1.5	Authorship	5
1.6	Consultation	5
2.0	Assessment Methodology.....	6
2.1	Archaeological survey.....	6
2.1.1	Aboriginal site definition	6
2.1.2	Archaeological survey methodology	6
2.2	Significance assessment methodology.....	9
2.3	Impact assessment methodology	9
3.0	Proposed Amendments.....	10
3.1	Overview of amendments.....	10
3.1.1	Construction of the new ticket office and entry.....	10
3.1.2	Reconfiguration of carpark D	11
3.1.3	Revision of the site stormwater and drainage design	12
4.0	Archaeological Survey	14
4.1	Archaeological survey coverage.....	14
4.2	Description of survey units.....	15
4.2.1	Survey unit 1.....	15
4.2.2	Survey unit 2.....	16
4.2.3	Survey unit 3.....	17
5.0	Survey Results	18
5.1	Newly identified sites.....	18
5.2	Previously identified sites within the addendum survey area.....	18
5.2.1	Sydney International Speedway PAD 02 (SIS PAD 02) AHIMS ID 45-5-5352	18
6.0	Avoiding and Minimising Harm	20
6.1	Impact assessment.....	20
6.2	Ecologically Sustainable Development principles	22
6.2.1	The integration principle	22
6.2.2	The precautionary principle.....	22
6.2.3	The principle of intergenerational equity.....	22

7.0 **Conclusions and recommendations23**

8.0 **References.....24**

FIGURES

Figure 1: Overview of the proposed amendments to the Sydney International Speedway.....	4
Figure 2: Addendum survey units.....	8
Figure 3 Overview of the existing and proposed Sydney Dragway ticket office and entry.....	11
Figure 4 Revised configuration of Carpark D (New Dragway Parking) compared to the footprint as assessed in the Environmental Impact Statement.....	12
Figure 5 indicative layout of the revised stormwater and drainage infrastructure	13
Figure 6: View of the modified slope landform to the east of bitumen access road.....	15
Figure 7: Existing bitumen access road and artificial slope landform in the north west of the survey unit	15
Figure 8: Low visibility across the existing modified slope landform.....	15
Figure 9: View of the modified slope landform to the east of the bitumen access road showing the area of exposure associated with recent construction	15
Figure 10: Modified slope within the north western portion of survey unit 2	16
Figure 11: Modified portions of drainage line in the western portion of the survey unit.....	16
Figure 12: Transition between artificial slope and intact flat landform associated with SIS PAD 02 ...	16
Figure 13: Intact portion of SIS PAD 02 located within the southern portion of survey unit 2.....	16
Figure 14:Edge of the artificial slope landform transitioning to grassed overflow carpark.....	17
Figure 15: Steeply sloped artificial landform within survey unit 3	17
Figure 16:Steeply sloped artificial landforms surrounding the existing bitumen access tracks	17
Figure 17: Portion of survey area overlapping SIS PAD 02	19
Figure 18: Redesign illustrating avoidance of impact to SIS PAD 02.....	21

TABLES

Table 1: Secretary’s Environmental Assessment Requirements 2

Table 2: Effective survey coverage 14

Table 3: Landform survey coverage 14

Table 4: Summary of impacts associated with project amendments. 20

1.0 INTRODUCTION

1.1 Project overview

The NSW Government has committed to relocating speedway racing to Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports, creating a true motorplex for the NSW motorsport racing community. The new speedway would provide the community and racing supporters a unique sporting facility that would cater for local, regional, national, and international racing events while continuing to support the growth of speedway racing in NSW.

The Western Sydney Parklands Trust, in association with the NSW Office of Sport, is leading a masterplanning process for Western Sydney Parklands' Precinct 5: Eastern Creek Motor Sports, with opportunities to share infrastructure and coordinate events across the three venues. This masterplan sets the context for the planning of the new Sydney International Speedway.

As part of delivering Sydney Metro West - the city's next big underground railway, the existing government land currently used for speedway racing is required for a future stabling and maintenance facility. The project is planned to be constructed and operational prior to the closure of the current speedway.

The project site is located on land owned and managed by Western Sydney Parklands Trust. Sydney Metro is proposing to build the project on behalf of and pursuant to arrangements with Western Sydney Parklands Trust.

Section 5.12(4) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) provides for the declaration of specified development on specified land as State significant infrastructure. A declaration has been made for the Sydney International Speedway as State significant infrastructure under Section 5.12(4) of the EP&A Act. Schedule 4 of the *State Environmental Planning Policy (State and Regional Development) 2011* has been amended to include Sydney International Speedway as State significant infrastructure. Artefact Heritage prepared a draft Aboriginal Cultural Heritage Assessment Report to support the Environmental Impact Statement for Sydney International Speedway. This addendum Aboriginal Cultural Heritage Assessment Report assesses amendments to the proposed design of the project which have been identified following the exhibition of the Environmental Impact Statement for the Sydney International Speedway.

This addendum report, in conjunction with the results of the Aboriginal Cultural Heritage Assessment for the project meets the requirements of the Secretary's Environmental Assessment Requirement for the project as detailed in Table 1:

Table 1: Secretary's Environmental Assessment Requirements

Secretary's Environmental Assessment Requirements	Where addressed
<p>The Proponent must identify and assess any direct and/or indirect impacts (including cumulative impacts) to the heritage significance of:</p> <ul style="list-style-type: none"> a) Aboriginal places, objects and cultural heritage values, as defined under the National Parks and Wildlife Act 1974 and in accordance with the principles and methods of assessment identified in the current guidelines; b) Aboriginal places of heritage significance, as defined in the Standard Instrument – Principal Local Environmental Plan; c) environmental heritage, as defined under the Heritage Act 1977; and d) items listed on the State, National and World Heritage lists; e) heritage items and conservation areas identified in environmental planning instruments application to the project area 	Technical Paper 5: Aboriginal Cultural Heritage Assessment
Where archaeological investigations of Aboriginal objects are proposed these must be conducted by a suitably qualified archaeologist, in accordance with section 1.6 of the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2010).	Section 1.5
Where impacts to Aboriginal objects and/or places are proposed, consultation must be undertaken with Aboriginal people in accordance with the current guidelines.	Section 1.6

1.2 Environmental Impact Statement exhibition

The Environmental Impact Statement for the Sydney International Speedway project was placed on public exhibition for review and comment for 28 days from 19 August 2020 to 16 September 2020. The draft Aboriginal Cultural Heritage Assessment Report was included in the Environmental Impact Statement as Technical Paper 5. Review and comment on the draft Aboriginal Cultural Heritage Assessment Report from registered Aboriginal parties was sought concurrently with public exhibition of the Environmental Impact Statement for 28 days between 21 August 2020 to 18 September 2020.

The *Sydney International Speedway Submissions Report*¹ has been prepared to respond to the issues raised by public authorities, key stakeholders and the community during exhibition of the Environmental Impact Statement. The Submissions Report identifies the issues raised during public exhibition and provides responses to these issues. The final Aboriginal Cultural Heritage Assessment Report, incorporating feedback received from registered Aboriginal parties, and this addendum Aboriginal Cultural Heritage Assessment has been provided as Appendix B of the Submissions Report.

¹ Sydney Metro 2020

1.3 Overview of the proposed amendments

As a result of continued design development and refinement, a number of proposed amendments to the project as exhibited in the Environmental Impact Statement have been identified:

- Relocation of Sydney Dragway ticket office and entryway to improve accessibility from the new Dragway parking areas (Carpark C and D)
- Refinements to the construction methodology, resulting in the need to import structural fill material to the main operational site
- Reconfiguration of the internal road and entry to Carpark A to minimise clearance of native, protected vegetation
- Reconfiguration of Carpark D to accommodate a revised vehicle and pedestrian entry and exit design, which minimises the amount of clearance of native, protected vegetation
- Revision of the site stormwater and drainage design to reduce the number of onsite detention tanks required. The revised design includes the installation of a discharge control pit and flow bypass pipe at the existing culvert under Ferrers Road between Carpark C and Carpark D, and a number of batter chutes that take advantage of existing terrain and minimises excavation requirements during construction
- Modified grandstand facility and inclusion of informal grassed area

An overview of the proposed amendments is shown on Figure 1.

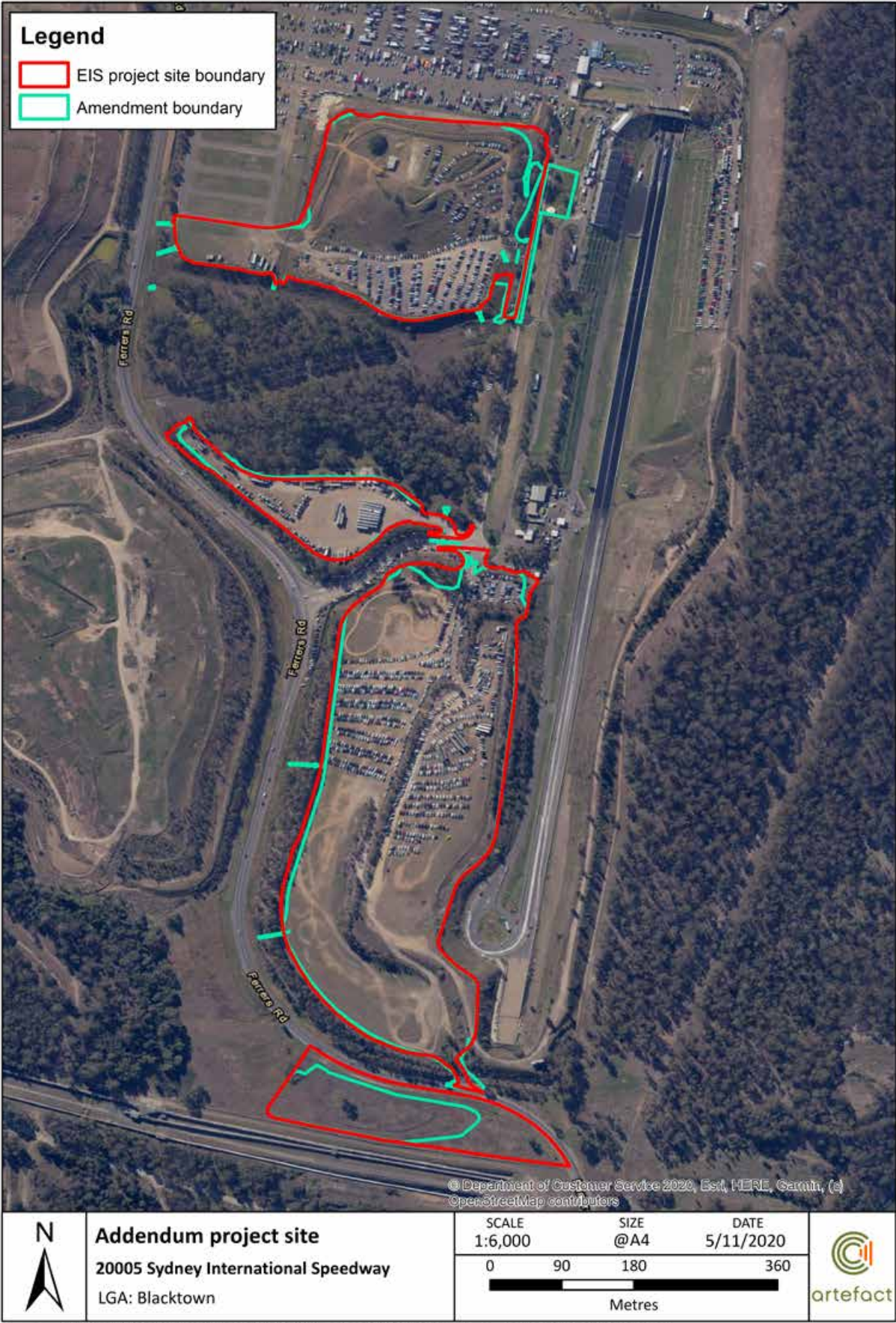


Figure 1: Overview of the proposed amendments to the Sydney International Speedway

1.4 Purpose and scope of this addendum

Artefact Heritage has been engaged to prepare an addendum Aboriginal Cultural Heritage Assessment Report for inclusion in the Sydney International Speedway Amendment Report. This addendum considers the impacts of the proposed amendments on Aboriginal cultural heritage and potential archaeological resources within the project site and includes:

- Assessment methodology
- Summary of proposed amendments
- Summary of additional Aboriginal community consultation
- Archaeological survey results for the addendum survey area
- Addendum impact assessment
- Conclusions and recommendations.

Background information including legislation, environmental background and archaeological background is not repeated within the addendum report, as this information is consistent with that provided in the exhibited draft Aboriginal Cultural Heritage Assessment Report.

1.5 Authorship

This report was prepared by Alyce Haast (Senior Heritage Consultant). Management input and review was provided by Duncan Jones (Principal) and by Sandra Wallace (Managing Director).

1.6 Consultation

Aboriginal stakeholder consultation for the proposal has been conducted in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010². Information regarding consultation for the project is described in Section 5 (Aboriginal Community Participation) of the exhibited Technical Paper 5 (draft Aboriginal Cultural Heritage Assessment Report).

As described below, the proposed amendments will not result in additional impacts on Aboriginal sites or areas of archaeological potential. As such, while registered Aboriginal parties have been provided the addendum Aboriginal Cultural Heritage Assessment Report for their information, it was not subject to a statutory review period.

² Department of Environment, Climate Change and Water 2010b

2.0 ASSESSMENT METHODOLOGY

2.1 Archaeological survey

2.1.1 Aboriginal site definition

An Aboriginal site is generally defined as an Aboriginal object or place. An Aboriginal object refers to any deposit, object or material evidence (not being a handicraft) relating to Aboriginal habitation of the area that comprises New South Wales³. Aboriginal objects may include stone tools, scarred trees or rock art. Some sites, or Aboriginal places can also be intangible and although they might not be visible, these places have cultural significance to Aboriginal people.

The Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales⁴ states in regard to the definition of a site and its boundary that one or more of the following criteria must be used when recording material traces of Aboriginal land use:

- The spatial extent of the visible objects, or direct evidence of their location
- Obvious physical boundaries where present, for example mound site and middens (if visibility is good), or a ceremonial ground
- Identification by the Aboriginal community on the basis of cultural information.

For the purposes of this addendum assessment, an Aboriginal site, or potential Aboriginal site, was defined by recording the spatial extent of visible traces or the direct evidence of their location within the amended project site.

2.1.2 Archaeological survey methodology

2.1.2.1 Site survey

A site inspection of areas of the amended project site which did not form part of the project site as included in the exhibited Environmental Impact Statement, was carried out by Alyce Haast and Steve Randall (Deerubbin LALC) on 7 September 2020.

The survey units for the addendum survey are shown in Figure 2. A discussion of survey units and the results of the survey are provided in Section 4.2 and Section 5.0 respectively.

2.1.2.2 Aims of archaeological survey

The aims of the archaeological survey were to:

- Cover a representative sample of areas of the amended project site which were not previously included within the exhibited project site
- Reinspect any previously registered Aboriginal sites which may be impacted by the amended project
- Record any new Aboriginal sites observed during the survey of the amended project site
- Identify areas of Potential Archaeological Deposit (PAD) within the amended project site that may be present in areas that have had no or minimal disturbance

³ Department of Environment, Climate Change and Water 2010a: 37

⁴ Office of Environment and Heritage 2011

- Engage with Deerubbin LALC regarding the proposed works and the archaeological potential of the addendum project site.

2.1.2.3 Recorded Aboriginal sites and areas of archaeological potential

As no new Aboriginal sites were identified during the addendum survey, the summary of identified sites is limited to comment on portions of previously identified sites which extend into the addendum survey area.



Figure 2: Addendum survey units

2.2 Significance assessment methodology

As no new Aboriginal objects or areas of archaeological potential were identified during the addendum survey, no site specific significance assessment was completed as part of this addendum.

Significance assessments completed for previously recorded sites are identified within the exhibited draft Aboriginal Cultural Heritage Assessment Report.

2.3 Impact assessment methodology

The definition of harm to an object or place under the National Parks and Wildlife Act includes any act or omission that 'destroys, defaces or damages the object or place or in relation to an object – moves the object from land on which it had been situated.' (s5 National Parks and Wildlife Act).

Direct harm may occur as a result of activities which disturb the ground surface including site preparation activities, earthworks and ground excavation, and the installation of services and infrastructure.

Indirect harm for Aboriginal heritage refers to impacts that may affect sites or features located immediately beyond or within the area of the proposed works. Indirect harm may include impacts from vibration, increased visitation or increased erosion, including ancillary project activities (construction and/or operation) that are not located within the project site.

Registered Aboriginal sites which are within the vicinity of the project site are comprised of artefact sites or areas of PAD. Any buried Aboriginal objects would not be subject to impacts as a result of vibration. There are no Aboriginal places in the vicinity of the project site which may be subject to indirect impacts.

The addendum assessment considered the potential impact of the proposed amendment on previously identified sites and areas of PAD. This is further discussed in Section 6.0

3.0 PROPOSED AMENDMENTS

3.1 Overview of amendments

The proposed amendments to the design of the Sydney International Speedway project relevant to this addendum Aboriginal Cultural Heritage Assessment Report include:

- Relocation of Sydney Dragway ticket office and entryway to improve accessibility from the new Dragway parking areas (Carpark C and D)
- Reconfiguration of Carpark D to accommodate a revised vehicle and pedestrian entry and exit design, which minimises the amount of clearance of native, protected vegetation
- Revision of the site stormwater and drainage design to reduce the number of onsite detention tanks required. The revised design includes the installation of a discharge control pit and flow bypass pipe at the existing culvert under Ferrers Road between Carpark C and Carpark D, and a number of batter chutes that take advantage of existing terrain and minimises excavation requirements during construction

The abovementioned amendments to the project would result in additional areas of ground disturbance which were not considered as part of the draft Aboriginal Cultural Heritage Assessment Report included as part of the Environmental Impact Statement.

3.1.1 Relocation of the Sydney Dragway ticket office and entryway

The new layout and configuration of the Sydney Dragway parking means that the existing ticket office and entry, located at the southern end of the dragstrip and towards the Sydney International Speedway main operational site is in a location which is not easily accessible from the parking areas. As a result, the Sydney Dragway ticket office and entryway structure is proposed to be relocated to the east of Carpark D and the north-south link road. The proposed amendment consists of:

- A new pedestrian access from Carpark C, footpaths and concrete ramps
- A new ticket office and turnstiles
- A new formal entryway into the Sydney Dragway site
- Supporting infrastructure, including landscaping, signage and pedestrian infrastructure.

Construction of the relocated ticket office and entry would include:

- Excavation work for the pedestrian footpath, ticket office and turnstiles as required
- Footing and slab installation for the ticket office and turnstiles
- Construction of ticket office building
- Installation of pedestrian walkways and entryway
- Utilities connections to ticket office
- Landscaping and finishing works.

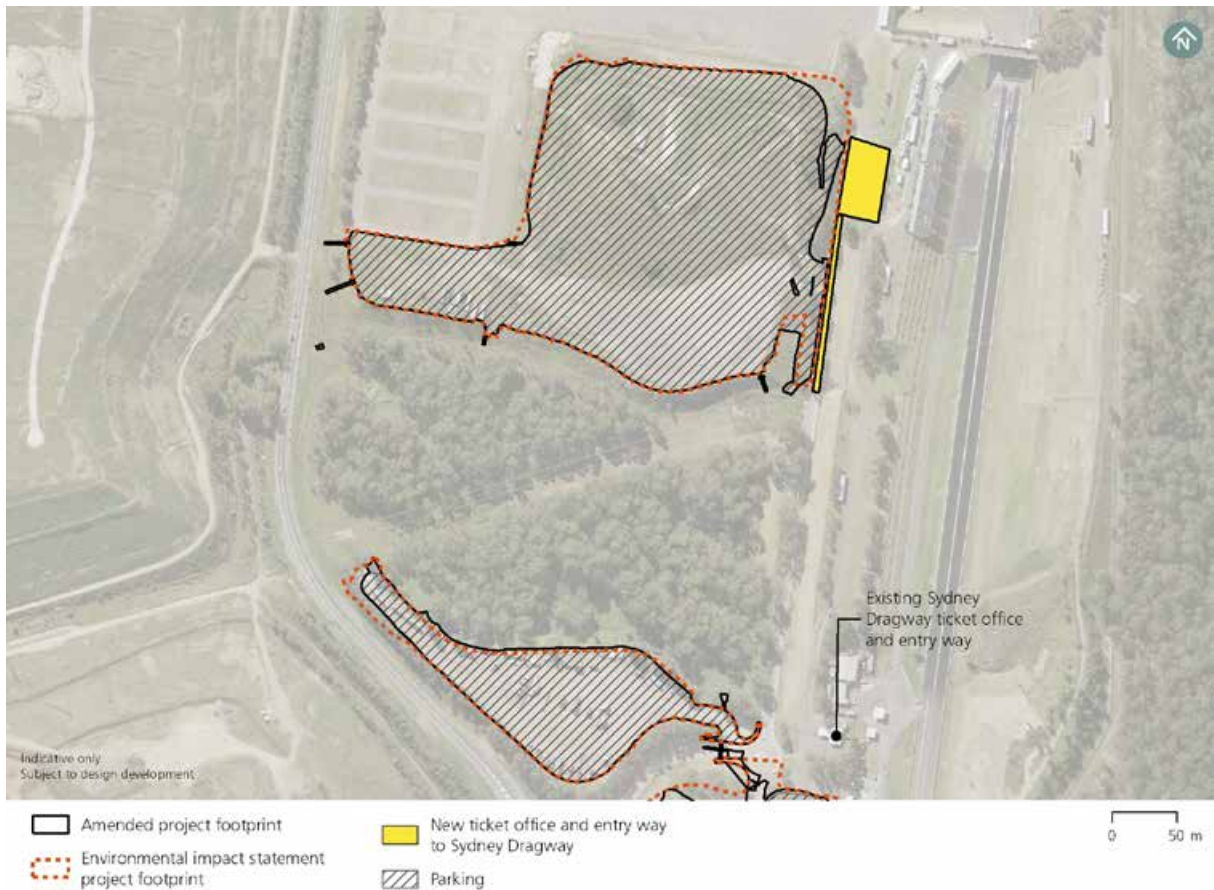


Figure 3 Overview of the existing and proposed Sydney Dragway ticket office and entry

3.1.2 Reconfiguration of Carpark D

The project as included in the exhibited Environmental Impact Statement includes the establishment of Carpark D, forming a new area of dedicated Sydney Dragway parking to replace existing parking areas that would form part of the Sydney International Speedway project site. Carpark D is described in Section 5.3.1 and shown on Figure 5-2 of the Environmental Impact Statement.

As part of this proposed amendment, the layout of Carpark D has been amended to accommodate a revised vehicle and pedestrian entry and exit design along the eastern boundary of the carpark. The revised design would result in a reduction in the project footprint at this location when compared to the footprint described and assessed in the exhibited Environmental Impact Statement.

Carpark D would still provide around 1760 carparking spaces, as included in the Environmental Impact Statement.

A comparison of the footprint of Carpark D as assessed in the Environmental Impact Statement and the amended design is shown on Figure 4.

The construction methodology for this proposed amendment would be generally consistent with that proposed for Carpark D in the Environmental Impact Statement, within the amended project footprint.



Figure 4 Revised configuration of Carpark D (New Dragway Parking) compared to the footprint as assessed in the Environmental Impact Statement

3.1.3 Revision of the site stormwater and drainage design

The project includes the construction and operation of stormwater and drainage infrastructure to support the operation of the Sydney International Speedway.

The exhibited Environmental Impact Statement described the stormwater management as a pit and pipe system that would be installed across the project site to collect and transport stormwater runoff into stormwater drains. Water would then flow to on-site detention tanks located across the project site before being treated (as required). Stormwater runoff would ultimately be discharged from the project site into existing culverts which flow underneath Ferrers Road, and discharge into local waterways.

Some of the onsite detention tanks on the main operational site would also function as rainwater harvesting tanks, to collect and store runoff from the grandstand roof for non potable uses within the project site.

As part of this proposed amendment, the stormwater management and drainage design has been revised to reduce the number of onsite detention tanks within the project site. Instead, the pit and pipe drainage system would direct runoff through a series of drains and to a number of batter chutes along the boundaries of the project site.

Runoff from Carparks A, C and D would be captured within the project site in drainage channels and discharged offsite through batter chutes located along the northern boundary of Carpark C and the southern boundary of Carpark D. Water discharged offsite would flow into existing offsite vegetated swales and natural drainage channels to a 2.5 metre high discharge control pit, fitted with a low flow

bypass pipe which would be installed upstream of the existing headwall of the culvert which flows under Ferrers Road between Carpark C and D. The discharge control pit and flow bypass pipe has been designed to prevent stormwater flows from being discharged into local waterways at flows greater than existing and to comply with Blacktown City Council's Permissible Site Discharge requirements.

Runoff captured within the racetrack, grandstand facility and competitor car parking areas would be directed to onsite detention tanks, consistent with the design included in the Environmental Impact Statement. The 1200 cubic metre onsite detention tank located in the racetrack would function as a rainwater harvesting tank, and has been sized to be able to hold stormwater in this area from a one per cent AEP event (100 year ARI storm). Batter chutes have been included as part of the revised site stormwater and drainage design in this area of the project site to discharge runoff if the on site detention tanks reach capacity.

All runoff discharged offsite would comply with the Permissible Site Discharge requirements provided in Blacktown City Council's *Engineering Guide for Development* (2005) of no more than 147 litres per second per hectare for 'All other Hawkesbury River Sub-catchments'.

The revised drainage design has been prepared using the required pollutant reduction targets requirements of Blacktown *Development Control Plan 2015* as a guide

The indicative locations of the batter chutes and the discharge control pit and flow bypass pipe are shown Figure 5.

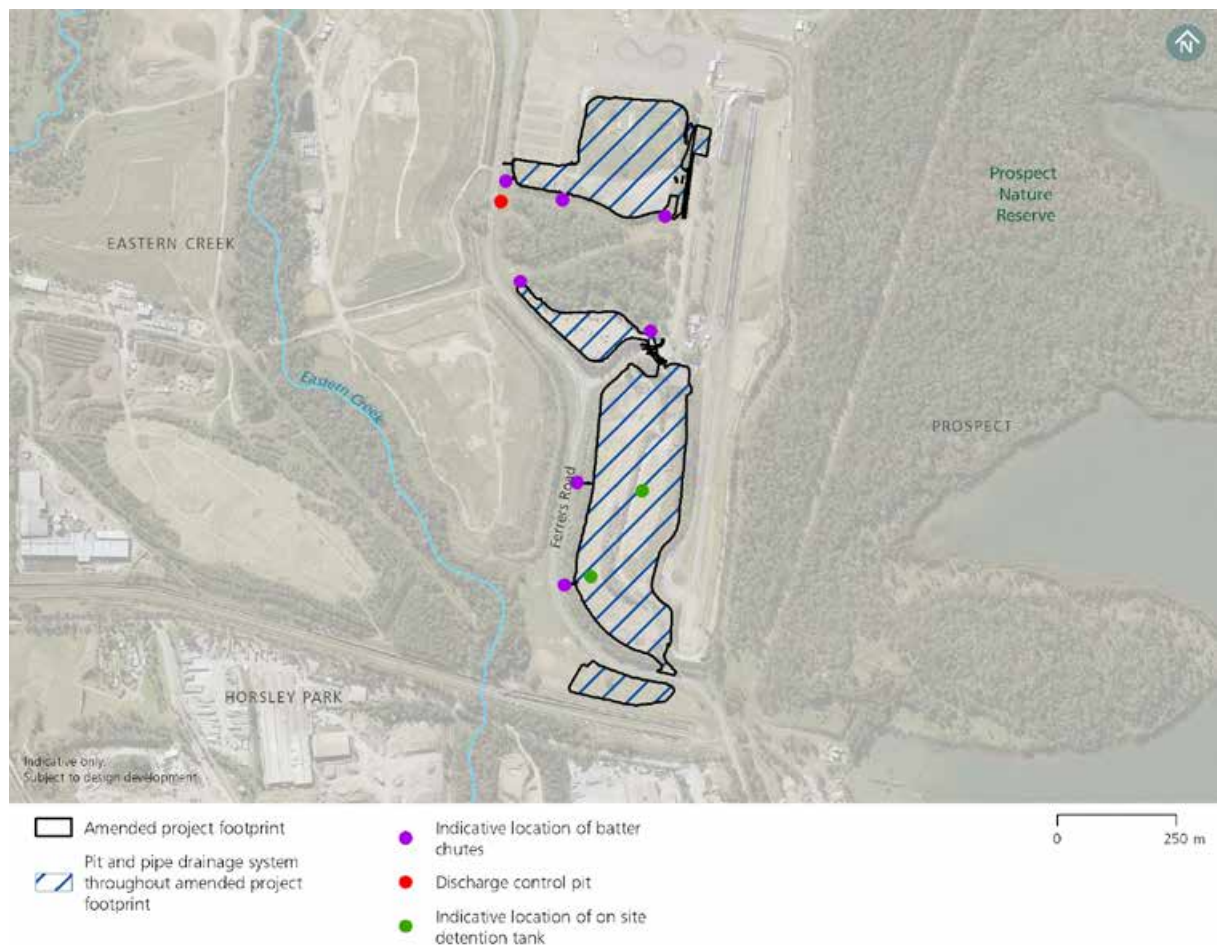


Figure 5 Indicative layout of the revised stormwater and drainage infrastructure

4.0 ARCHAEOLOGICAL SURVEY

4.1 Archaeological survey coverage

During the addendum site survey, the addendum project site was divided into discrete survey units, based on landform in each location, in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales.

The majority of the addendum survey units were located within heavily vegetated artificial earth batters surrounding existing carparks and facilities within the addendum project site. As a result, visibility across the majority of each survey unit was poor.

A summary of the survey coverage of all survey units, according to the methodology outlined in the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales, is provided in Table 2 and Table 3. The locations of the survey units are illustrated in Figure 2.

Table 2: Effective survey coverage

Survey unit	Landform	Survey unit area (sq. m)	Visibility (%)	Exposure (%)	Effective coverage area (sq. m)	Effective coverage (%)
Survey Unit 1	Modified slope, Modified flat	3071	10	10	30.7	1
Survey Unit 2	Modified slope, Flat	6337	10	10	63.3	1
Survey Unit 3	Modified slope, Flat	2981	10	10	29.8	1

Table 3: Landform survey coverage

Landform	Landform Area (sq. m)	Area effectively surveyed (sq. m)	% of landform effectively surveyed	Number of sites identified
Modified slope	10023	100.23	1	0
Modified flat	1121	11.21	1	0
Flat	1245	12.45	1	0

4.2 Description of survey units

4.2.1 Survey unit 1

Survey unit 1 was located in the north east of the addendum survey area. The survey unit consisted of a bitumen access road with artificial embankments. Visibility across the survey unit was generally low with dense grasses obscuring the ground surface across the majority of the survey unit. A small area of exposure of underlying sandy fill base associated with recent earthworks was noted in the eastern portion of the survey unit. The survey unit was assessed to have been subject to high levels of disturbance during former earthworks.

No Aboriginal objects or areas of archaeological potential were identified within Survey unit 1.



Figure 6: View of the modified slope landform to the east of bitumen access road



Figure 7: Existing bitumen access road and artificial slope landform in the north west of the survey unit



Figure 8: Low visibility across the existing modified slope landform



Figure 9: View of the modified slope landform to the east of the bitumen access road showing the area of exposure associated with recent construction

4.2.2 Survey unit 2

The majority of survey unit 2 was comprised of several discrete areas of artificial embankment surrounding an intact area of Cumberland Plain woodland located between Carpark C and Carpark D. The embankment was identified as a heavily modified landform. Small portions of the survey unit extended into the area of intact woodland. Localised areas of disturbance to the intact woodland were noted in the northern and western portion of the survey unit including the presence of existing drainage infrastructure in the western portion of the survey unit.

Small portions in the south of the survey unit extended into the portion of intact woodland identified as SIS PAD 02 (AHIMS ID 45-5-5352) in the exhibited draft Aboriginal Cultural Heritage Assessment Report. This portion of the survey unit was located within a flat landform which was assessed to be intact during the addendum site survey.

Visibility across the entire survey unit was low with dense grasses obscuring the ground surface across the majority of the survey unit.

No new Aboriginal objects or areas of potential were identified within the survey unit. Portions of SIS PAD 02 (AHIMS ID 45-5-5352) were located within the survey unit.



Figure 10: Modified slope within the north western portion of survey unit 2



Figure 11: Modified portions of drainage line in the western portion of the survey unit



Figure 12: Transition between artificial slope and intact flat landform associated with SIS PAD 02



Figure 13: Intact portion of SIS PAD 02 located within the southern portion of survey unit 2

4.2.3 Survey unit 3

Survey unit 3 consisted of three discrete areas within an artificial embankment supporting an artificial raised terrace. The embankment appeared to be a completely artificial landform with ground exposures showing evidence of sand and gravel fill inclusions. The embankment was covered in sparse regrowth eucalypt forest and dense grasses obscuring ground visibility across the majority of the survey unit.

No Aboriginal objects or areas of archaeological potential were identified within Survey unit 3.



Figure 14: Edge of the artificial slope landform transitioning to grassed overflow carpark



Figure 15: Steeply sloped artificial landform within survey unit 3



Figure 16: Steeply sloped artificial landforms surrounding the existing bitumen access tracks

5.0 SURVEY RESULTS

5.1 Newly identified sites

No new Aboriginal sites or areas of archaeological potential were identified during the addendum survey.

5.2 Previously identified sites within the addendum survey area

5.2.1 Sydney International Speedway PAD 02 (SIS PAD 02) AHIMS ID 45-5-5352

Centroid: [Removed for public display]

Site length: 200 metres (north to south)

Site width: 345 metres (east to west)

SIS PAD 02 was identified during preparation of the exhibited draft Aboriginal Cultural Heritage Assessment Report as an area of PAD. The PAD was identified as being located within an area of Cumberland Plain woodland which has been preserved while extensive earthwork and construction activities have taken place around it. The PAD was located across a largely level landform with a gentle slope in the southern portion of the PAD. An ephemeral drainage channel was identified as being located southeast to northwest through the central portion of the PAD. Regrowth eucalypt were identified across the PAD extent.

The addendum survey including inspection of small areas within the southern extent of the PAD. These areas of PAD were comprised of a gently sloped landform located immediately north of the artificial embankment associated with Carpark C. Survey of these areas confirmed that these portions of the survey unit were comprised of an intact landform in close proximity to the previously identified ephemeral drainage channel.



Figure 17: Portion of survey area overlapping SIS PAD 02

6.0 AVOIDING AND MINIMISING HARM

6.1 Impact assessment

The proposed amendments are located within heavily modified landforms which do not contain Aboriginal sites or areas of archaeological potential. There would be no harm to known Aboriginal objects or areas of archaeological potential as a result of the amended project site.

The initial amendment design included the placement of two batter chutes along the northern boundary of Carpark C. Survey completed for the addendum confirmed that the location of these two batter chutes would result in impact to SIS PAD 02. Following confirmation of potential impact, the proposed design was modified to include a drainage path along the edge of the carpark in a previously modified landform. This modified design has ensured that SIS PAD 02 was not impacted as part of the amended design.

A summary of sites located within the addendum study area and the assessed impact to the site is provided in Table 4.

Table 4: Summary of impacts associated with project amendments.

Site	Site type	Significance	Type of harm	Degree of harm	Consequence of harm	Consistent impact? (yes/ no)
SIS PAD 02 (AHIMS ID 45- 5-5352)	PAD	Unknown	None	None	No loss of value	Yes

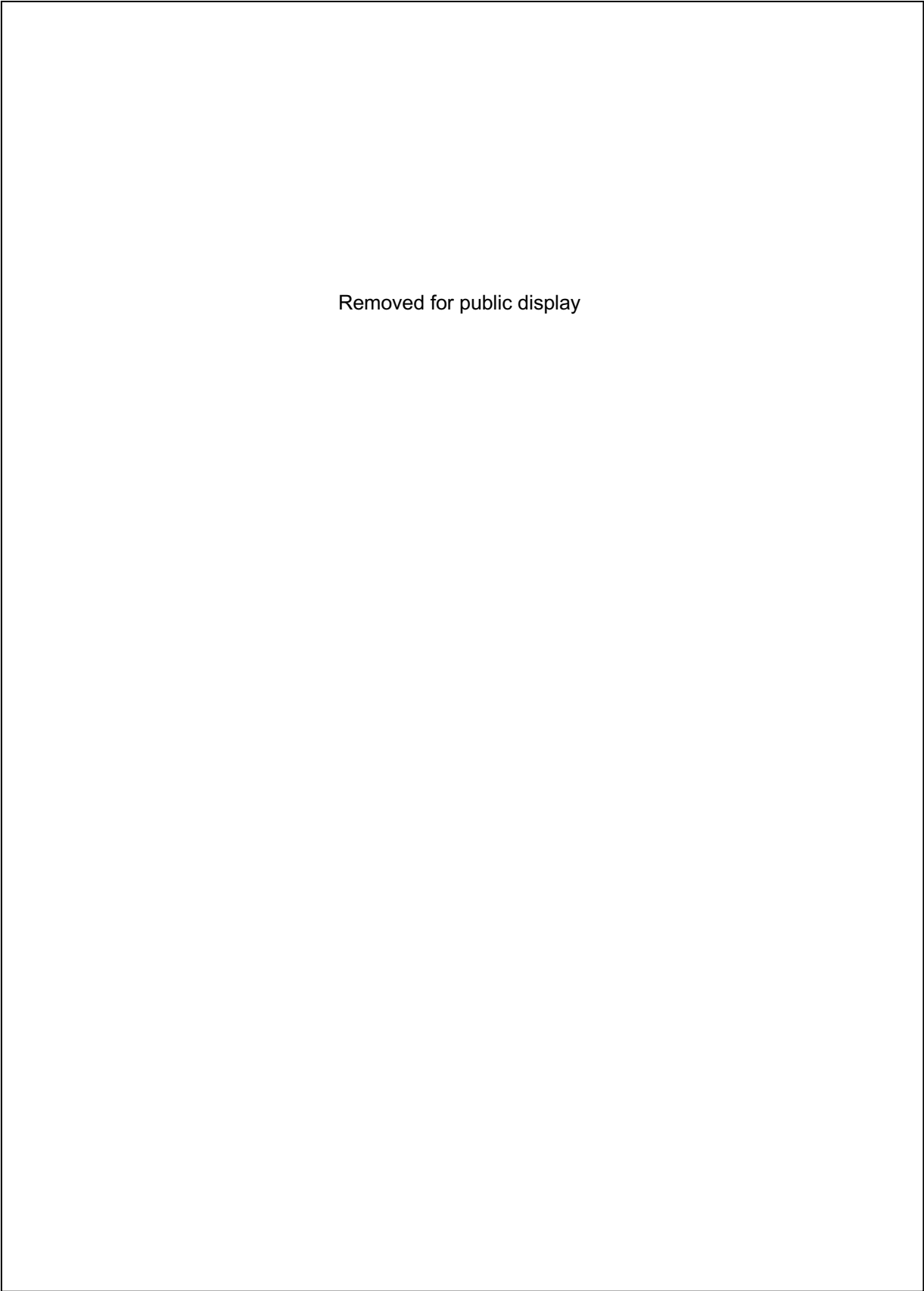


Figure 18: Redesign illustrating avoidance of impact to SIS PAD 02

6.2 Ecologically Sustainable Development principles

In accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales*⁵, the principles of ecologically sustainable development have been considered in preparation of this addendum Aboriginal Cultural Heritage Assessment Report, including options to avoid impacts to Aboriginal cultural heritage, assessment of unavoidable impacts, identification of mitigation and management measures, and taking account of Aboriginal community views. The principles of ecologically sustainable development are detailed in the NSW *Protection of the Environment Administration Act 1991*. Principles of ecologically sustainable development relevant to the assessment of the project as it relates to Aboriginal cultural heritage are considered below.

The below discussion has been provided to expand the discussion of ecologically sustainable development principles discussed in the project ACHAR⁶ for the revised scope of works outlined in this addendum Aboriginal Cultural Heritage Assessment Report.

6.2.1 The integration principle

Decision making processes should effectively integrate both long term and short term economic, environmental, social and equitable considerations (the 'integration principle'). The preparation of this Addendum Aboriginal Cultural Heritage Assessment Report demonstrates regard for the integration principle by considering Aboriginal heritage values and impacts from the amended project. This in combination with the Aboriginal Cultural Heritage Assessment Report⁷ completed to support the Environmental Impact Statement demonstrate a continued consideration of Aboriginal heritage values throughout the detailed design phase.

6.2.2 The precautionary principle

If there are threats of serious or irreversible environmental damage, lack of full scientific confidence should not be used as a reason for postponing measures to prevent environmental degradation (the 'precautionary principle').

During the development of the amended project, the design of the proposed amendments, in particular the revised site stormwater and drainage design has changed to ensure that identified Aboriginal sites, in particular SIS PAD 02, would not be impacted by the proposed amendments.

6.2.3 The principle of intergenerational equity

The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations (the 'principle of intergenerational equity').

While the wider Eastern Creek region has been identified as containing moderate cultural and spiritual values, the areas of amended project footprint considered in this Addendum Aboriginal Cultural Heritage Assessment Report have been assessed as having minimal contribution to the broader cultural values associated with Eastern Creek. Subsequently impacts to the project site are considered to result in minimal impacts to the overall cultural values of Eastern Creek. Further, the proposed amendments would not impact identified Aboriginal sites which would be conserved for future generations.

⁵ Office of Environment and Heritage 2011

⁶ Artefact Heritage, 2020. p. 63.

⁷ Artefact 2020

7.0 CONCLUSIONS AND RECOMMENDATIONS

This addendum assessment has identified that impacts to identified Aboriginal sites within the project site are consistent with the exhibited draft Aboriginal Cultural Heritage Assessment Report⁸ and Environmental Impact Statement. As such, no additional management and mitigation measures are required over and above those recommended in the exhibited draft Aboriginal Cultural Heritage Assessment Report.

As impacts to Aboriginal sites within the project site are consistent with the draft Aboriginal Cultural Heritage Assessment Report, review of the draft Addendum Aboriginal Cultural Heritage Assessment Report by the registered Aboriginal Parties is not required.

Any changes to the project site or design may require additional archaeological investigation and consultation with Aboriginal parties in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales and Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010.

⁸ Artefact 2020

8.0 REFERENCES

Artefact 2020, Sydney International Speedway: Technical paper 5: Aboriginal Cultural Heritage Assessment Report

Department of Environment Climate Change & Water 2010a, Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales

Department of Environment Climate Change & Water 2010b, Aboriginal cultural heritage consultation requirements for proponents



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