



Roads and Maritime Services/Sydney Airport Corporation Limited

Sydney Gateway Road Project

Environmental Impact Statement/ Preliminary Draft Major Development Plan

Chapter 22 Biodiversity



November 2019

Contents

22. Biodiversity	22.1
22.1 Assessment approach	22.1
22.2 Existing environment	22.4
22.3 Assessment of construction impacts	22.18
22.4 Assessment of operational impacts	22.23
22.5 Cumulative impacts	22.23
22.6 Management of impacts	22.24

Tables

Table 22.1 Landscape features	22.4
Table 22.2 Existing vegetation communities within the project site	22.5
Table 22.3 Fauna habitats	22.14
Table 22.4 Direct impacts on fauna	22.19
Table 22.5 Indirect impacts on biodiversity values	22.20
Table 22.6 Key threatening processes relevant to the project	22.21
Table 22.7 Potential operational impacts	22.23
Table 22.8 Biodiversity mitigation measures	22.25

Figures

Figure 22.1 Biodiversity study area	22.2
Figure 22.2 Vegetation communities – map 1	22.6
Figure 22.3 Vegetation communities – map 2	22.7
Figure 22.4 Vegetation communities – map 3	22.8
Figure 22.5 Vegetation communities – map 4	22.9
Figure 22.6 Vegetation communities – map 5	22.10
Figure 22.7 Representative patch of Swamp Oak floodplain forest	22.11
Figure 22.8 Representative patch of Mangrove forest	22.12
Figure 22.9 Representative patches of other habitats in the project site	22.16

Chapter 22

Biodiversity

This chapter provides a summary of the biodiversity assessment. It describes existing biodiversity, identifies potential impacts during construction and operation, and provides measures to mitigate and manage the impacts identified. Further information is provided in Technical Working Paper 14 (Biodiversity Development Assessment Report).

The SEARs relevant to biodiversity are listed below. There are no MDP requirements specifically relevant to biodiversity; however, there is a requirement under section 91(1) of the Airports Act to assess the potential environmental impacts associated with a development (section 91(1)(h)), and to specify how those impacts may be dealt with (section 91(1)(j)). Full copies of the SEARs and MDP requirements, and where they are addressed in this document, are provided in Appendices A and B respectively.

Reference	Requirement	Where addressed
Key issue SEARs		
8	Biodiversity	
8.1	The Proponent must assess biodiversity impacts in accordance with the <i>Biodiversity Conservation Act 2016</i> (BC Act), the Biodiversity Assessment Method (BAM) and be documented in a Biodiversity Assessment Report (BDAR) unless a BDAR waiver had been sought, where applicable.	The Biodiversity Development Assessment Report (BDAR) (Technical Working Paper 14) was prepared in accordance with the <i>Biodiversity Conservation Act 2016</i> and the Biodiversity Assessment Method.
8.2	The BDAR must include information in the form detailed in section 6.12 of the BC Act, clause 6.8 of the Biodiversity Conservation Regulation 2017, and the BAM.	Section 22.1.2
8.3	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 has been provided to the Department of Planning, Industry and Environment.
8.4	The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the <i>Biodiversity Assessment Method Order 2017</i> under section 6.10 of the BC Act	The BDAR was prepared by accredited assessors (refer to section 2.4 of Technical Working Paper 14).
8.5	The BDAR must include details of the measures proposed to address offset obligations.	The proposed measures are described in section 22.5.
8.6	The Proponent must assess any impacts on biodiversity values not covered by the BAM. This includes a threatened aquatic species assessment (Part 7A <i>Fisheries Management Act 1994</i> – FM Act) to address whether there are likely to be any significant impacts on listed threatened species, populations or ecological communities listed under the FM Act.	Potential impacts on aquatic biodiversity, matters of national environmental significance and cumulative impacts are described in sections 22.3 to 22.5.
8.7	The Proponent must identify whether the proposal, or any component of the proposal, would be classified as a Key Threatening Process (KTP) in accordance with the listings in the BC Act, FM Act and <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act).	Section 22.3.5

22. Biodiversity

22.1 Assessment approach

Biodiversity impact assessment for major infrastructure projects in NSW is carried out by skilled and experienced biologists and ecologists in accordance with relevant legislation, guidelines and policies, and using a standard assessment approach (the Biodiversity Assessment Method). This method broadly involves:

- Reviewing existing information on biodiversity, which consists of the plants (flora), animals (fauna) and habitats in the study area
- Field investigations to identify and map flora and fauna species and communities – with particular emphasis on identifying native species, areas of native vegetation, and threatened and endangered species and communities
- Reviewing the project design and construction plan to identify potential impacts on biodiversity
- Assessing the significance of impacts
- Identifying ways to avoid impacts, and measures to minimise and/or offset impacts that cannot be avoided.

To provide a consistent approach and methodology to assessing the potential impacts of the project on biodiversity, the Biodiversity Assessment Method was applied to the project as a whole, including those parts located on Sydney Airport land. The Biodiversity Assessment Method was also applied as there is no equivalent method for land subject to the requirements of the Airports Act. Offset requirements were then determined in accordance with the Biodiversity Assessment Method for land subject to the assessment under NSW legislation, and with reference to the EPBC Act offsets policy for matters of national environmental significance on Sydney Airport land.

An overview of the approach to the assessment is provided below, including the legislative and policy context and a summary of the assessment methodology.

22.1.1 Legislative and policy context

The assessment has been undertaken in accordance with the SEARs and MDP requirements (provided in Appendices A and B) and with reference to the following:

- Relevant legislation, including the EP&A Act, *Biodiversity Conservation Act 2016* (NSW) (the BC Act), *Biodiversity Conservation Regulation 2017* (NSW), *Fisheries Management Act 1994* (NSW) (the FM Act), *Biosecurity Act 2015* (NSW) (the Biosecurity Act), EPBC Act, and the Airports Act and associated regulations
- *Biodiversity Assessment Method* (OEH, 2017)
- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC, 2004b)
- *NSW Guide to Surveying Threatened Plants* (OEH, 2016a)
- *Survey guidelines for Australia's threatened frogs* (DEWHA, 2010)
- *Significant impact guidelines for the vulnerable green and golden bell frog (*Litoria aurea*)* (DEWHA, 2009)
- *Significant impact guidelines 1.1 – Matters of National Environmental Significance* (Department of the Environment, 2013)
- *Significant impact guidelines 1.2 – Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies* (DSEWPC, 2013)

- Sydney Airport Master Plan 2039 (SACL, 2019a)
- Sydney Airport Environment Strategy 2019-2024 (SACL, 2019b).

22.1.2 Methodology

Study area

The study area for the assessment includes the project site and adjoining areas, generally located within 500 metres of the project site as shown in Figure 22.1. The database searches were based on a search area within a radius of between five and 10 kilometres from the project site.

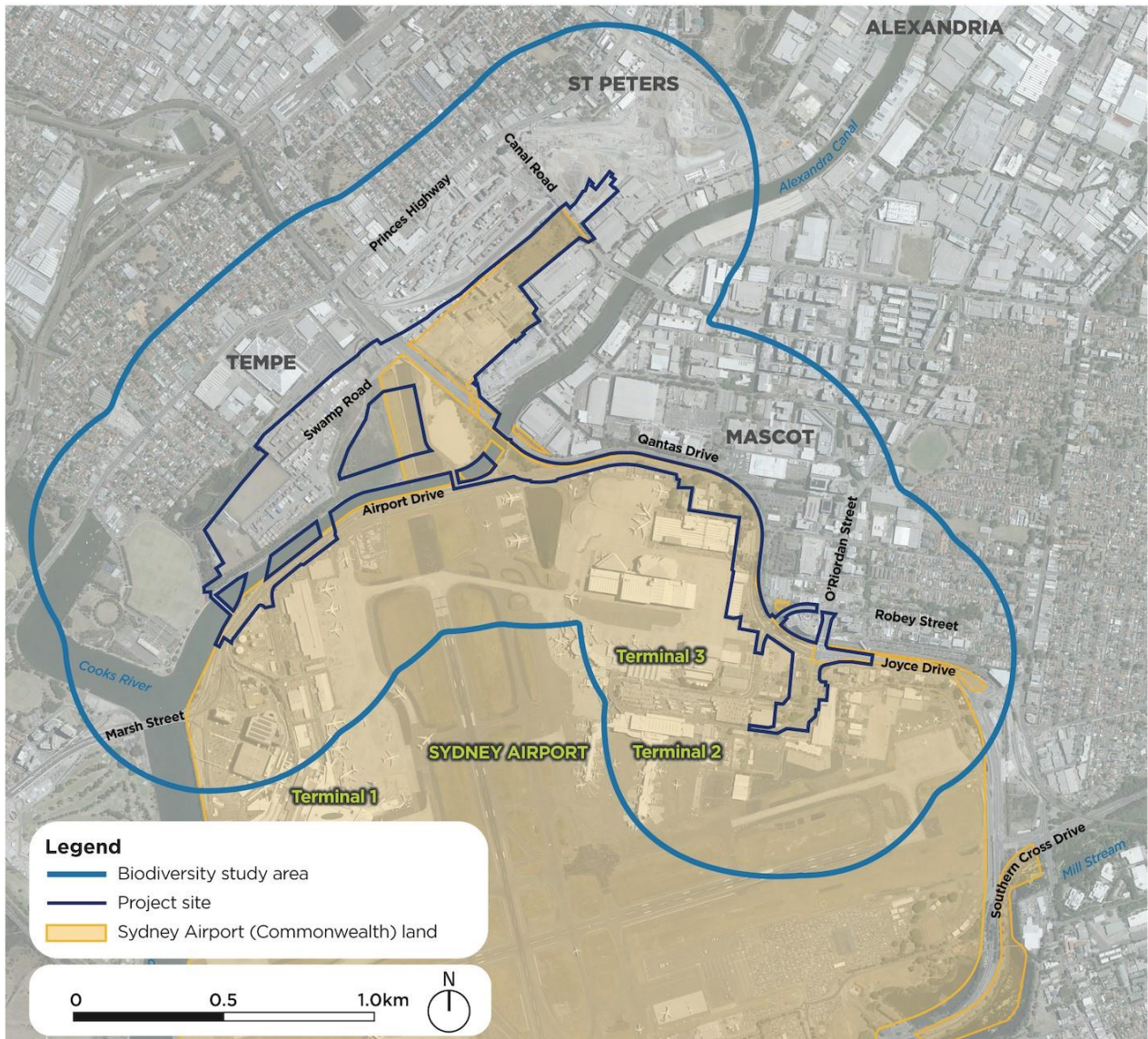


Figure 22.1 Biodiversity study area

Key tasks

The assessment involved:

- Background research, including reviewing previous assessments relevant to the study area and database searches, to confirm the:
 - likely distribution of native vegetation and threatened ecological communities

- likely presence of threatened flora and fauna (listed under the BC Act, FM Act and/or the EPBC Act)
- potential presence of groundwater dependent ecosystems and coastal wetlands
- Assessing the potential for species credit species to occur in the project site and be impacted by the project
- Terrestrial flora field surveys to map native and non-native vegetation and identify whether threatened flora species or communities listed under the BC Act and/or EPBC Act are present. Flora surveys were undertaken over four days on 14 September, 15 November, and 5 and 17 December 2018, and involved a range of survey techniques in accordance with the Biodiversity Assessment Method
- Terrestrial fauna field surveys to describe fauna habitats present and identify whether threatened fauna species listed under the BC Act and/or EPBC Act or migratory fauna species listed under the EPBC Act are present or likely to occur. Fauna surveys were undertaken over nine days/evenings on 26 June, 12 and 14 September, 3, 10, 11, 18 and 30 October, and 29 November 2018. The surveys involved a range of techniques in accordance with the Biodiversity Assessment Method
- An aquatic habitat survey on 3 October at Alexandra Canal, Tempe Wetlands and downstream areas of the Cooks River
- Assessing the potential impacts on native vegetation and habitats, threatened species, groundwater dependent ecosystems, key threatening processes, matters of national environmental significance and the environment of Commonwealth land (where relevant)
- Identifying measures to mitigate and offset the impacts identified, including a biodiversity offset strategy
- Preparing a Biodiversity Development Assessment Report to describe the results of the assessment in accordance with section 6.12 of the BC Act, clause 6.8 of the Biodiversity Conservation Regulation 2017 and the Biodiversity Assessment Method.

A detailed description of the assessment methodology is provided in section 3 of Technical Working Paper 14 (Biodiversity Development Assessment Report).

Potential impacts of the project on amenity trees are considered in Chapter 21 (Landscape character and visual amenity).

Species credits

Species credits are a type of biodiversity credit required under the Biodiversity Assessment Method for an impact on certain threatened species. All threatened flora species listed under the BC Act are species credit species, while some threatened fauna species listed under the BC Act or their breeding habitat are either species or ecosystem credit species.

The Biodiversity Assessment Method calculator uses geographic, vegetation and habitat data to generate a list of threatened species with the potential to occur in an area. These species are referred to by the Biodiversity Assessment Method as 'candidate species credit species'. Targeted surveys are required to confirm or discount the presence of these species at a site. If present (or likely to occur), species credits must be calculated as part of any offset requirements under the BC Act.

22.1.3 Risks identified

An environmental risk assessment was undertaken as an input to the impact assessment (see Appendix G). This involved identifying potential environmental risks during construction and operation, and rating the potential risks according to likelihood, consequence and overall level of risk, in general accordance with *AS/NZS ISO 31000:2009 Risk management – Principles and guidelines*. Risks to biodiversity with an assessed overall rating of medium or above, identified by the environmental risk assessment, included:

- Indirect impacts on aquatic habitats downstream of the project site (including as a result of reduced water quality)
- Impacts on foraging habitat for threatened species, such as the Grey headed flying fox

- Introduction and/or spread of weeds.

The biodiversity assessment included consideration of these potential risks.

22.2 Existing environment

22.2.1 Landscape scale biodiversity features

Landscape features contribute to the overall biodiversity value of the study area and are used to inform appropriateness of offsets, where these are required. The key landscape features, as defined by the Biodiversity Assessment Method, and how these relate to the study area, are summarised in Table 22.1.

Table 22.1 Landscape features

Landscape feature	Project site
Interim Biogeographic Regionalisation for Australia bioregion and subregion	The study area is located within the Sydney Basin Bioregion and the Pittwater subregion.
NSW landscape regions (Mitchell landscapes)	The study area is located within the Mitchell landscapes of Sydney–Newcastle Barriers and Beaches landscape.
Rivers and streams	The project site crosses Alexandra Canal. Alexandra Canal is a constructed watercourse with artificial banks that flows into the Cooks River downstream of the project site. Further information on the canal is provided in Chapter 14 (Flooding).
Important and local wetlands on, adjacent and downstream of the project site	<p>Tempe Wetlands is a local wetland located adjacent to the project site. This wetland is an artificially constructed wetland surrounded by planted vegetation.</p> <p>Towra Point Estuarine Wetlands, listed as nationally important in the Directory of Important Wetlands in Australia, is located about 6.5 kilometres downstream of the project site.</p> <p>The Botany Wetlands, listed as nationally important in the Directory of Important Wetlands in Australia, is located about one kilometre to the south-east of the eastern end of the project site. Some areas of the Botany Wetlands, including Mill Pond and Engine Pond East and West, are located on Sydney Airport land. These areas are known as the Sydney Airport Wetlands. The Botany Wetlands (including the Sydney Airport Wetlands) are located outside the area of potential influence of the project and are not downstream of the project site.</p> <p>Parts of the southern end of Tempe Reserve alongside the Cooks River and Alexandra Canal (but outside the project site) are mapped as Coastal Wetlands under the <i>State Environmental Planning Policy (Coastal Management) 2018</i>. The proximity area for the wetland extends north along Alexandra Canal towards the footbridge, and adjoins the project site at this location.</p>
Habitat connectivity features	The main habitat corridor within the project site is associated with Alexandra Canal. There is a vegetated link between the canal and Tempe Wetlands.
Areas of geological significance and soil hazard features	There are no mapped areas of geological significance. Soil hazard features include areas of high probability acid sulfate soil risk associated with Alexandra Canal and low probability areas over the majority of the project site.
Areas of outstanding biodiversity value under the BC Act	No declared areas of outstanding biodiversity value are located in the study area.

22.2.2 Terrestrial flora

Vegetation communities

The majority of the study area has been heavily modified by past and ongoing disturbances associated with urban and infrastructure development and landfill activities. This has resulted in a high level of disturbance and degradation of vegetation. The majority of vegetation in the project site comprises exotic or planted native species on highly modified landforms. There are small isolated patches of remnant or regrowth native vegetation. Native vegetation and habitat within the project site is in generally poor condition, and is impacted by operational activities, edge effects, weed infestation and exotic pests.

Vegetation communities within the project site are summarised in Table 22.2 and are shown on Figure 22.2 to Figure 22.6. Only a small proportion of the vegetation present (0.91 hectares) comprises native vegetation, the majority of which is located on Sydney Airport land.

Table 22.2 Existing vegetation communities within the project site

Plant community type	Vegetation class / formation	Condition	Conservation status	Total area in project site (ha)	Area in Sydney Airport land (ha)
Native vegetation communities					
Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion (Plant community type 1232)	Forested Wetlands / Coastal Swamp Forests	Recorded as low condition, generally as regrowth	Does not meet the criteria for listing as a threatened ecological community under the BC Act or EPBC Act	0.87	0.68
Mangrove Forests in estuaries of the Sydney Basin Bioregion and South East Corner Bioregion (Plant community type 920)	Saline Wetlands / Mangrove Swamps	Recorded as poor condition, generally as regrowth	Not listed under the BC Act or EPBC Act, protected under the FM Act	0.04	0.04
<i>Total native vegetation</i>				<i>0.91</i>	<i>0.72</i>
Disturbed areas and non-native vegetation					
Highly disturbed areas with no or limited native vegetation	-	Scattered or clumped areas of trees to exotic scrub, grassland and weeds	Not applicable	18.29	9.69
Urban exotic / native landscape plantings	-	Cleared/non-native vegetation	Not applicable	4.85	2.44
<i>Total non-native vegetation</i>				<i>23.14</i>	<i>12.13</i>
Total vegetation				24.05	12.85

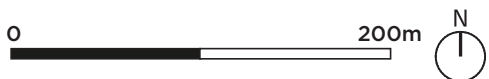
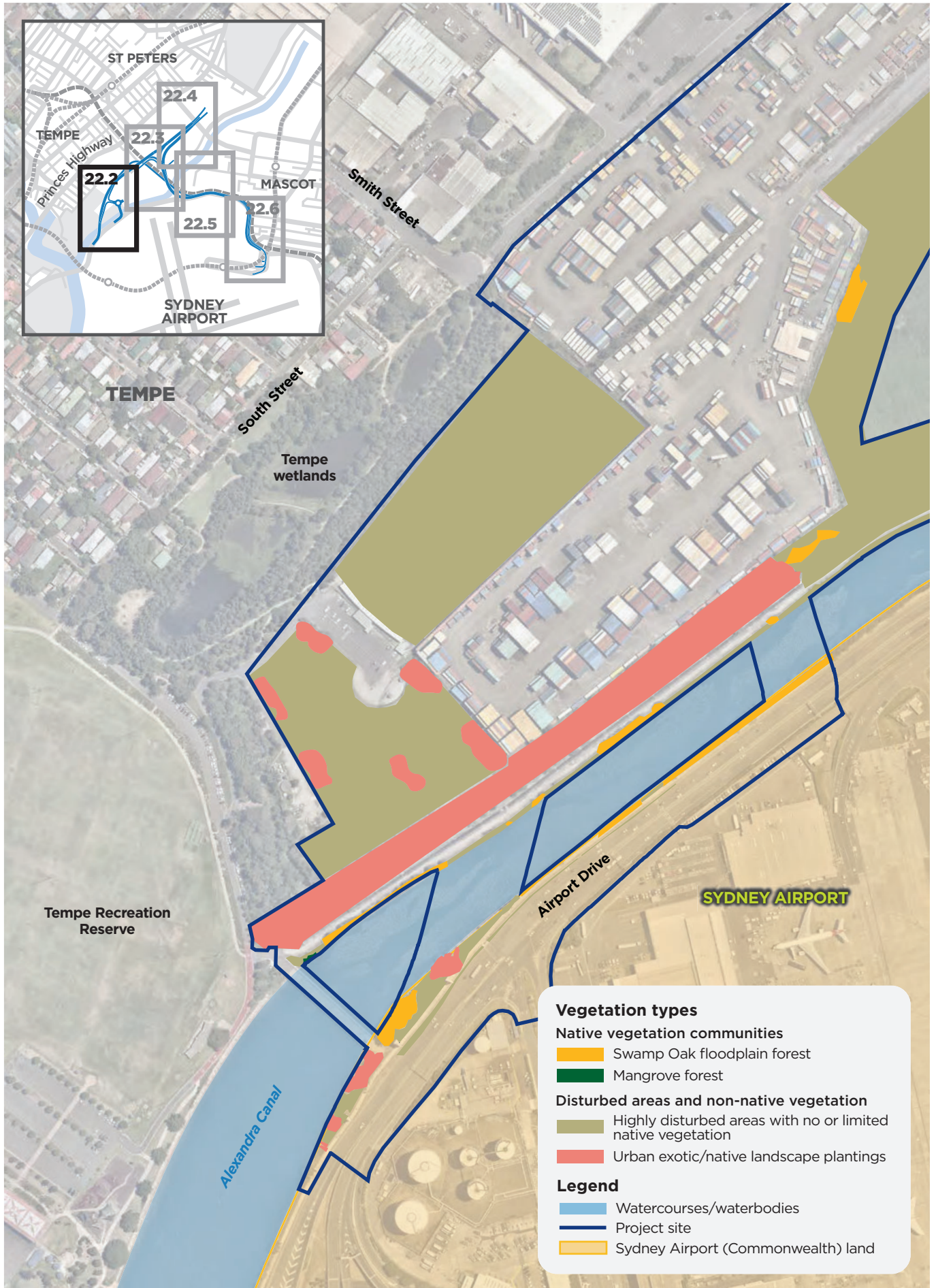


Figure 22.2 **Vegetation communities - map 1**

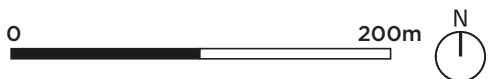
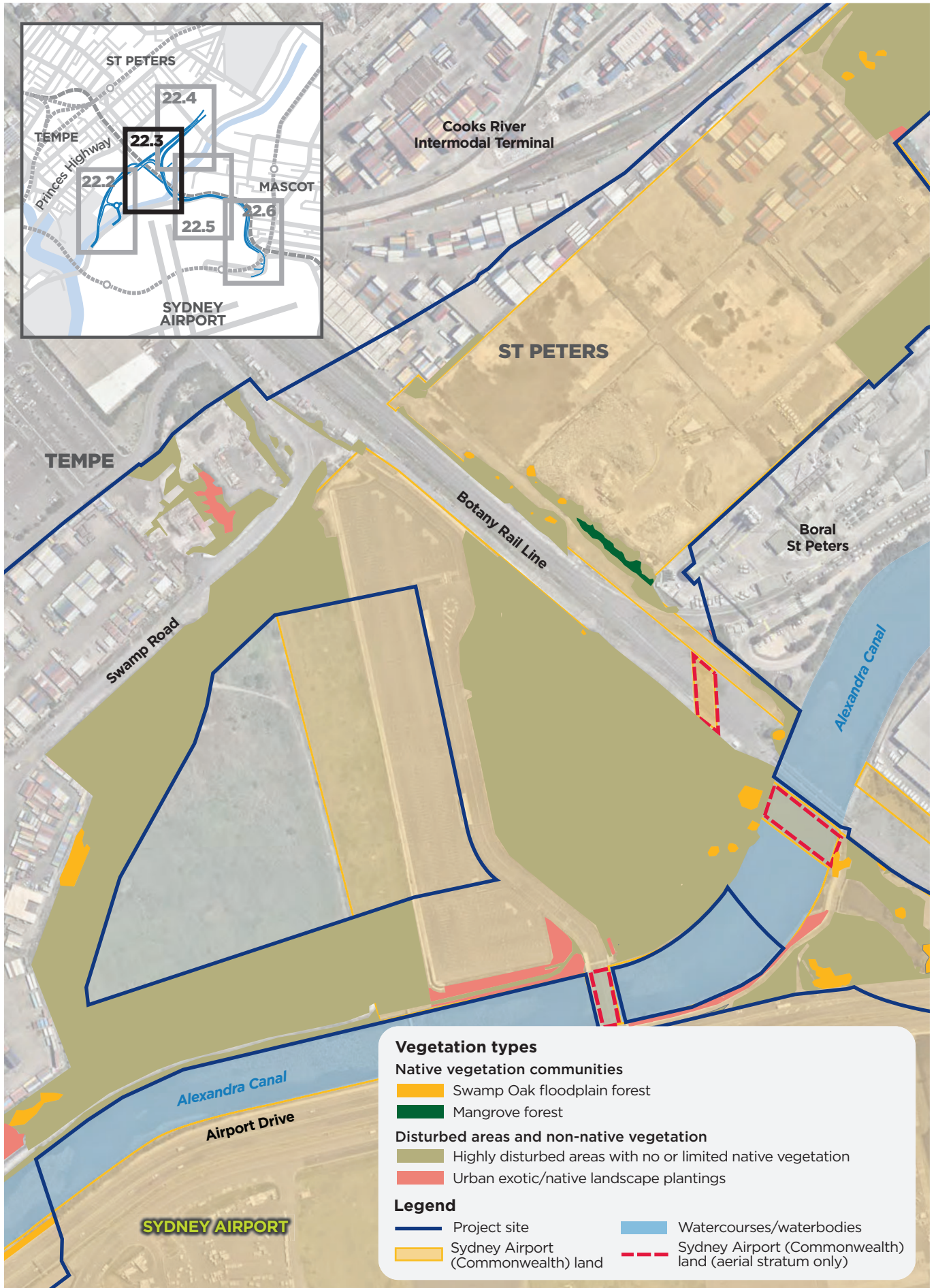


Figure 22.3 **Vegetation communities - map 2**

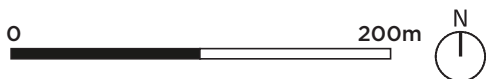
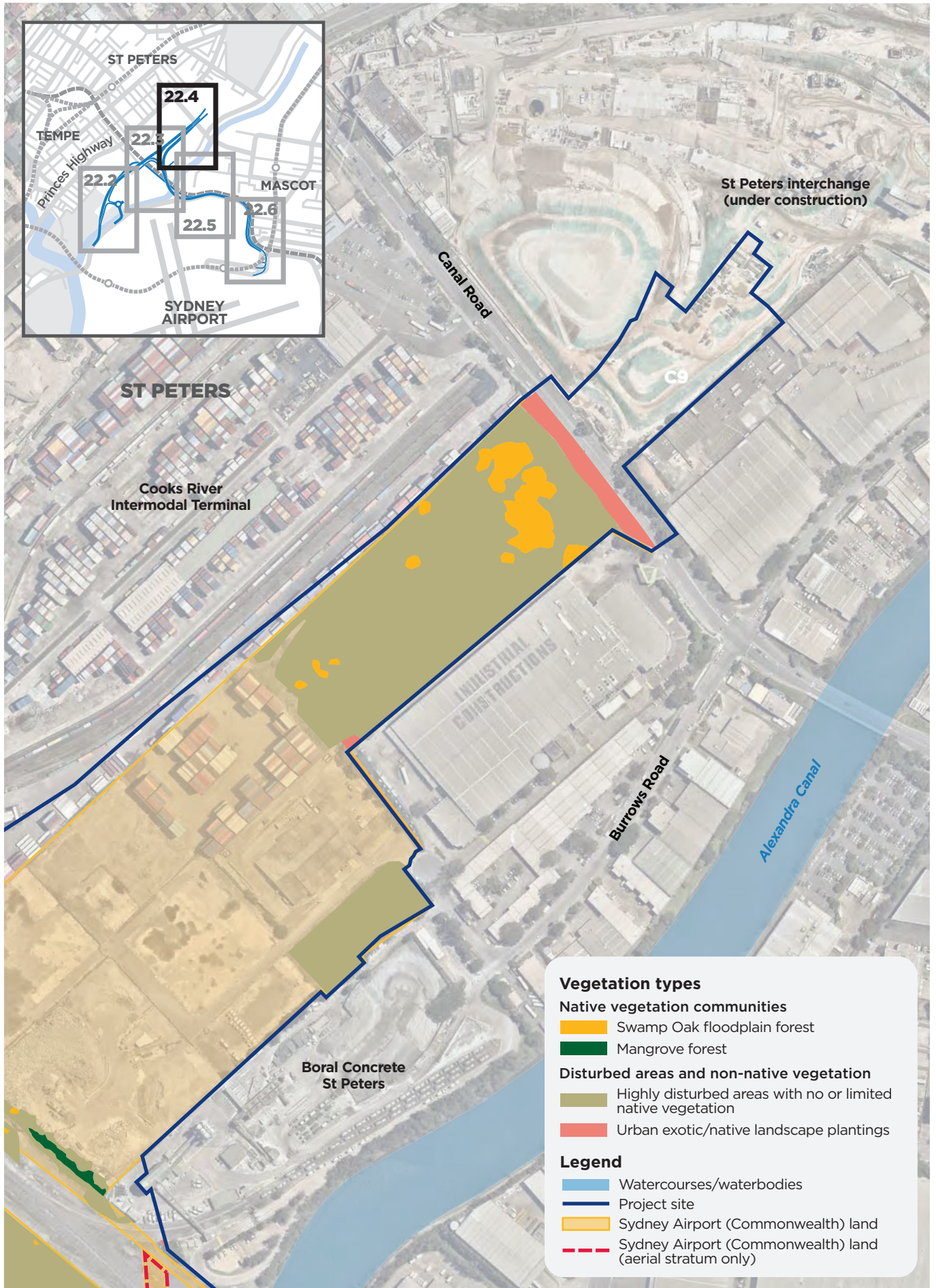


Figure 22.4 **Vegetation communities - map 3**

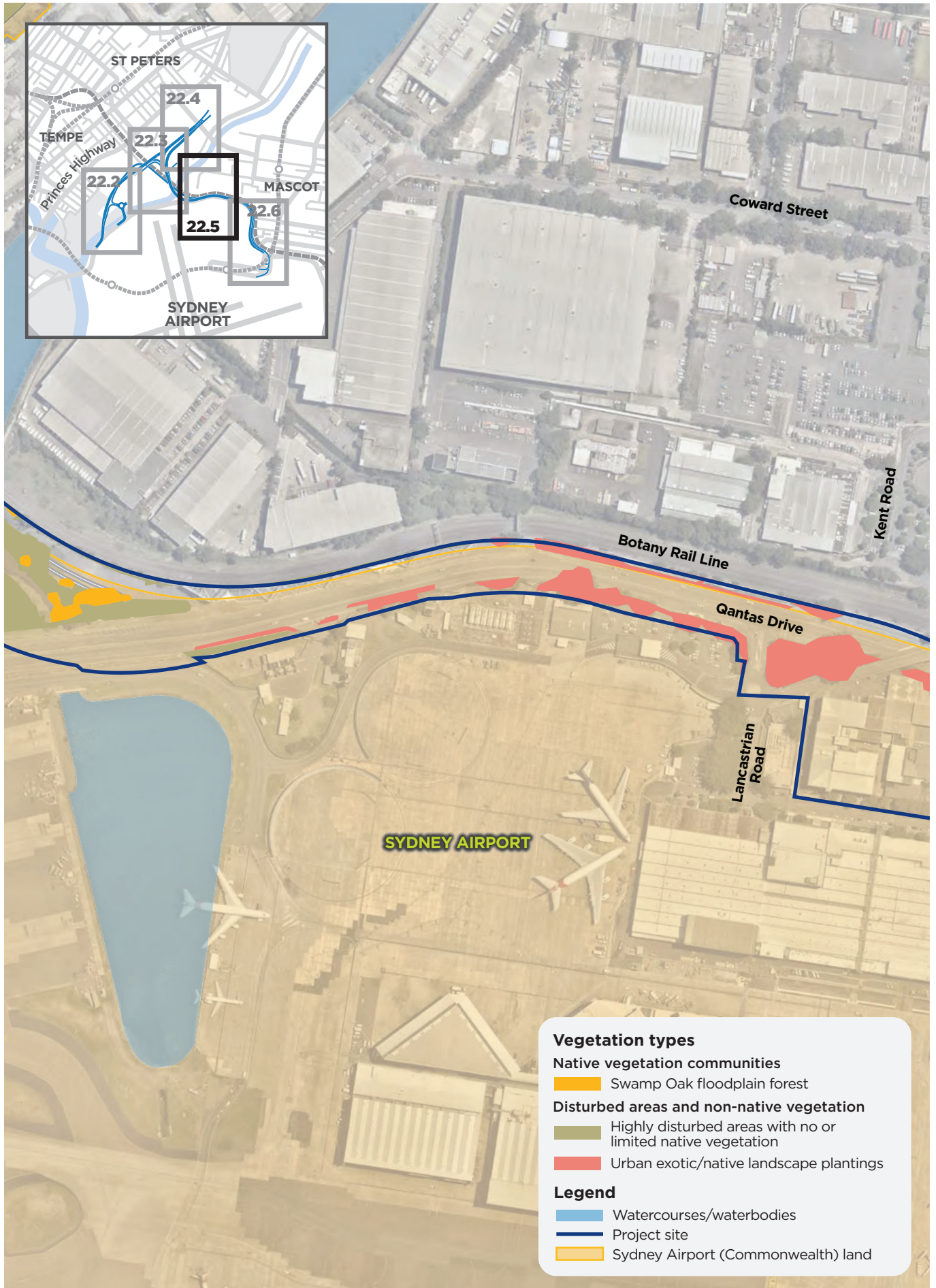


Figure 22.5 **Vegetation communities - map 4**

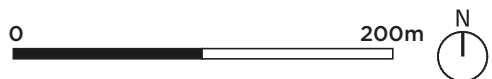
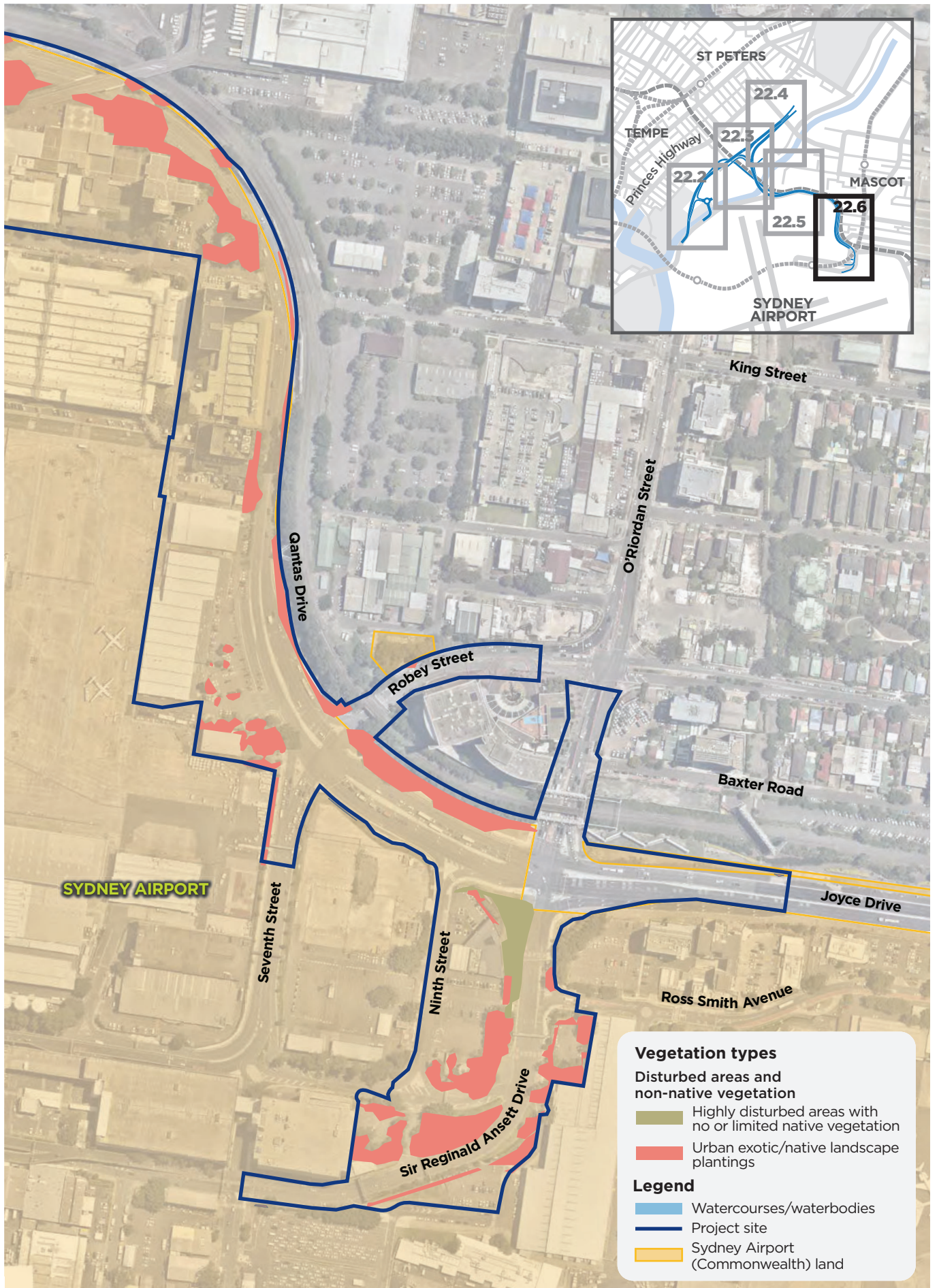


Figure 22.6 **Vegetation communities - map 5**

The Biodiversity Assessment Method requires the extent of native vegetation within the 'project area' (defined in this document, and referred to in this chapter, as the project site) to be mapped. Native vegetation in the project site has been classified into plant community types (PCTs) as shown in Figure 22.2 to Figure 22.6. The native vegetation communities in the project site are described below.

Swamp Oak floodplain forest (PCT 1232)

This vegetation occurs as isolated patches of regrowth, generally in areas subject to historic filling. The upper layer of vegetation is dominated by Swamp Oak (*Casuarina glauca*). It is assumed that the fill used in these areas contained a Swamp Oak soil seed bank. The middle and ground vegetation layers are mostly absent of native species and dominated by exotic species.

Most patches of this community do not appear to be associated with active coastal floodplain processes or influence by saline groundwater. The small linear patches fringing Alexandra Canal appear as regrowth on fill material associated with construction of the bentonite wall at the former Tempe landfill.

A representative patch of Swamp Oak floodplain forest is shown by Figure 22.7.



Figure 22.7 Representative patch of Swamp Oak floodplain forest

Mangrove forest (PCT 920)

Mangrove forest vegetation in the project site is dominated by Grey Mangrove (*Avicennia marina* subsp. *australasica*) with some native groundcover species typical of saline areas. It is associated with low-lying tidal drainage channels draining to Alexandra Canal and occurs in two small patches:

- A narrow linear strip associated with a tidal section of a stormwater channel adjacent to the Botany Rail Line in Tempe
- A small patch on the western side of Alexandra Canal.

Exotic species were common in this vegetation, which is considered to be opportunistic regrowth.

A representative patch of mangrove forest is shown by Figure 22.8.



Figure 22.8 Representative patch of Mangrove forest

Threatened ecological communities

No threatened ecological communities listed under the BC Act or EPBC Act are located within the project site.

The mapped patches of Swamp Oak floodplain swamp forest were assessed to determine whether they represent a threatened ecological community. The vegetation was compared with the final determination criteria for the BC Act listing of the *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* threatened ecological community and the EPBC Act listing of the *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland* threatened ecological community. Based on a review of existing landform, altitudinal range, soils, geology and vegetation structure, the recorded patches of Swamp Oak floodplain swamp forest are not considered to meet the BC Act or EPBC Act listings for these threatened ecological communities.

Threatened flora species

Database search results

The results of database searches indicated that 37 threatened flora species or populations listed under the BC Act, and 28 threatened flora species listed under the EPBC Act, have been recorded, or are predicted to occur, in the study area. A full list of the species identified is provided in Appendix B of Technical Report 14. The likelihood of most species occurring in the project site was considered to be low given the lack of suitable habitat and/or local records. The assessment identified two candidate species credit species for targeted surveys – Biconvex Paperbark (*Melaleuca biconvexa*) and Narrow-leafed Wilsonia (*Wilsonia backhousei*).

Flora field survey results

The field survey identified a total of 163 flora species in the project site. These comprised 33 native and 130 introduced species.

Biconvex Paperbark and Narrow-leafed Wilsonia were not observed during the targeted field surveys. The potential for these species to occur is considered to be low given the lack of evidence during surveys, lack of local records, and/or poor quality of potential habitat present. As a result, these species do not need to be included in the biodiversity credit calculations for the project.

Two threatened flora species were recorded as landscape plantings within the project site, being Narrow-leaved Black Peppermint (*Eucalyptus nicholii*) and Wallangarra White Gum (*Eucalyptus scoparia*). The natural distribution of these species does not occur within the Sydney Basin Bioregion although they have been widely distributed by the horticultural industry as ornamental landscape plantings. The occurrence of these species within the project site do not meet the final determination listing attributes (NSW Scientific Committee, 2002) or species profile descriptions (OEH, 2019a) for geographical distribution, geology or vegetation formation. As a result, they are not assigned the conservation significance of a threatened species, and no species credits were calculated.

Groundwater dependent ecosystems

Groundwater dependent ecosystems rely on a supply of groundwater to support the species composition, structure and function of the ecosystem. The closest groundwater dependent ecosystems (identified in the *Groundwater Dependent Ecosystem Atlas* (Bureau of Meteorology, 2019) and the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources*) are

- The Botany Wetlands and Lachlan Swamps, located about two kilometres south-east of the project site
- Vegetation along Wolli Creek, located about one kilometre west of the project site.

No groundwater dependent ecosystems are located in the project site.

Weeds

Weeds are common throughout the study area, and include environmental weeds and weeds with formal control measures identified. The Biosecurity Act identifies priority weeds in NSW that have been assigned a biosecurity duty (such as prohibitions on sale and control measures). Under the *Australian Weeds Strategy 2017 to 2027* (Invasive Plants and Animals Committee, 2016), 32 introduced plants have been identified as Weeds of National Significance. These weeds are regarded as the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts.

Of the 130 introduced species recorded within the project site, 12 species are listed by the Biosecurity Act as priority weeds for the Greater Sydney region. Eight of these 12 species are also listed as Weeds of National Significance. These include Madeira Vine (*Anredera cordifolia*), Ground Asparagus (*Asparagus aethiopicus*), Climbing Asparagus Fern (*Asparagus plumosus*), Bitou Bush (*Chrysanthemoides monilifera*), Lantana (*Lantana camara*), Prickly Pear (*Opuntia* spp.), Blackberry (*Rubus fruticosus* spp. agg.) and Fireweed (*Senecio madagascariensis*).

22.2.3 Terrestrial fauna

Terrestrial fauna habitats

A low diversity of species was recorded during field surveys, with the better quality habitats at Tempe Wetlands (predominantly outside the project site) contributing significantly to the range of species recorded.

The fauna habitat types identified during field surveys, and the potential for threatened and migratory fauna species to be present in these habitats, are described in Table 22.3.

Threatened fauna species

Database search results

A total of 81 threatened fauna species listed under the BC Act, and 36 threatened fauna species listed under the EPBC Act, have been previously recorded or are predicted to occur in the study area. A full list of these species is provided in Appendix B of Technical Report 14.

The assessment identified four candidate species credit species for targeted surveys – the Green and Golden Bell Frog (*Litoria aurea*), Southern Myotis (*Myotis macropus*), Pied Oystercatcher (*Haematopus longirostris*) and Sooty Oystercatcher (*Haematopus fuliginosus*). Targeted surveys were also conducted for the Grey-headed Flying-fox (*Pteropus poliocephalus*) as this species is also listed under the EPBC Act.

Table 22.3 Fauna habitats

Habitat	Description	Key habitat characteristics	Threatened fauna species recorded or likely to occur	Migratory fauna species recorded or likely to occur
Mangrove forest	<p>These habitats, which are associated with low-lying tidal drainage channels draining to Alexandra Canal, and occur in two small patches:</p> <ul style="list-style-type: none"> ■ A narrow linear strip associated with a tidal section of a stormwater channel adjacent to the Botany rail line in Tempe ■ A small patch on the western side of Alexandra Canal. <p>A representative patch of mangrove forest is shown by Figure 22.8.</p>	Foraging habitat for common bird and reptile species.	No threatened species recorded. The Eastern Bentwing-bat is likely to forage in the area.	No migratory species recorded. Given the very narrow and localised nature of the vegetation, migratory waders are unlikely to occur except on rare occasions.
Swamp Oak Floodplain Forest	<p>Areas of this habitat do not appear to be associated with active coastal floodplain processes or influence by saline groundwater. The small linear patches fringing Alexandra Canal appear as regrowth on fill material associated with construction of the bentonite wall at the former Tempe landfill site.</p> <p>A representative patch of Swamp Oak floodplain forest is shown by Figure 22.7.</p>	Marginal habitat for common bird species, Ringtail Possum, and common lizards and frogs.	No threatened species recorded. The Eastern Bentwing-bat is likely to forage in the area.	No migratory species recorded. Migratory woodland species (such as the Rufous Fantail) could occasionally use this habitat. However, they are unlikely to depend on it other than as stepping stones across the urban landscape.
Highly disturbed areas (exotic grassland and weeds)	<p>These habitats are located along road reserves and on land adjacent to Alexandra Canal.</p> <p>A representative patch of this vegetation is shown by Figure 22.9.</p>	Few habitat resources for most native species, with some foraging resources for relatively mobile and native fauna, including small birds and reptiles.	No threatened species recorded. Microchiropteran bats (microbats) may forage in this habitat.	No migratory species recorded and none are likely to occur.

Habitat	Description	Key habitat characteristics	Threatened fauna species recorded or likely to occur	Migratory fauna species recorded or likely to occur
Urban exotic and planted native species	<p>These habitats are located on the former Tempe landfill site and the adjacent Tempe Recreation Reserve. They are dominated by a dense mid storey vegetation layer of variable complexity, including species such as Green Wattle, Parramatta Wattle, Native Blackthorn, Swamp Oak and Eucalyptus sp.</p> <p>Planted trees, including eucalypts and figs, are located along the sides of roads and at car parks.</p> <p>A representative patch of this vegetation is shown by Figure 22.9.</p>	<p>Foraging and breeding habitat for a range of common species typical of urban parks and gardens.</p> <p>No hollow-bearing trees were observed.</p>	<p>The Grey-headed Flying-fox may forage in planted eucalypts when they are flowering or fruiting.</p> <p>Microbats may occasionally forage in this habitat.</p>	<p>No migratory species recorded.</p> <p>Migratory woodland species (such as the Rufous Fantail) could occasionally use this habitat but are unlikely to depend on it.</p>
Planted vegetation at Tempe Wetlands	<p>Tempe Wetlands is an artificial wetland that acts as a detention basin for stormwater drainage from the surrounding area. It does not receive water from a natural watercourse. A range of planted native species are located around the three ponds in the wetlands, including Swamp Oak, eucalypts and acacias.</p> <p>A representative patch of this vegetation is shown by Figure 22.9.</p>	<p>Tempe Wetlands and surrounding plantings provide important habitats for a range of common and threatened fauna.</p> <p>No hollow-bearing trees were observed.</p>	<p>The Grey-headed Flying-fox was recorded foraging in planted eucalypts.</p> <p>The Eastern Bentwing-bat was recorded. The Eastern Freetail Bat may also forage in these habitats.</p> <p>No evidence of the Green and Golden Bell Frog was observed during targeted surveys.</p>	<p>No migratory species recorded.</p> <p>Migratory woodland species (such as the Rufous Fantail) could occasionally use this habitat but are unlikely to depend on it.</p>
Mud flats at Alexandra Canal	<p>Narrow bands of mud flats occur along the edges of Alexandra Canal in the project site.</p> <p>A representative patch of this vegetation is shown by Figure 22.9.</p>	<p>Foraging habitat for wading birds and other common bird species.</p>	<p>No threatened species recorded</p>	<p>No migratory species recorded.</p> <p>Migratory waders could occasionally use this habitat. However, these areas do not comprise important habitat for waders.</p>
Bridges and culverts	<p>The project site contains a pedestrian footbridge, rail bridge and culverts that open to Alexandra Canal.</p>	<p>Crevices and pipes in the underside of the bridge or in culverts are potential roost habitat for microbats.</p>	<p>No evidence of roosting bats was observed.</p>	<p>None</p>



Exotic grasslands and weeds



Urban exotic and planted native species



Planted vegetation at Tempe Wetlands



Mud flats at Alexandra Canal

Figure 22.9 Representative patches of other habitats in the project site

Species credit species

Targeted surveys in appropriate conditions did not find any evidence of the four species credit species identified. Given the lack of evidence of these species, and/or poor quality of potential habitat present, the project is unlikely to impact habitat for these species. As a result, these species do not need to be included in the biodiversity credit calculations for the project.

Fauna field survey results

The field survey identified a total of 60 fauna species in the project site, including 45 bird species, seven mammal species, four reptile species and four frog species. Two threatened species were identified for which species credits are not required to be calculated:

- Eastern Bentwing-bat, listed as vulnerable under the BC Act
- Grey-headed Flying-fox, listed as vulnerable under both the BC Act and EPBC Act.

Some highly mobile species, such as the Eastern Freetail Bat, may occasionally occur within the project site. The Green and Golden Bell Frog was not recorded in the project site and is considered unlikely to be present.

22.2.4 Aquatic biodiversity

Aquatic habitats

The aquatic field survey targeted two aquatic habitats in the project site – Tempe Wetlands and Alexandra Canal. The downstream areas of Cooks River were also surveyed as they have the potential to be indirectly impacted by the project.

Alexandra Canal

Alexandra Canal is mapped as key fish habitat, despite its highly disturbed and artificial form. Narrow mud flats within the canal provide limited habitat for oysters, mangroves and Swamp Oak. Sparse woody debris and submerged habitat structures provide some refuge for common fish species, which were observed or are considered likely to be present. As described in section 22.2.2, two small patches of mangrove forest were identified near the canal.

Tempe Wetlands

Tempe Wetlands is an artificial wetland with no flow from a natural system. Water enters from a stormwater drain and the wetlands drain to Alexandra Canal.

A number of emergent aquatic plants were observed. Native fish are unlikely to occur in the wetlands given the lack of connectivity with Alexandra Canal and the Cooks River.

Cooks River

Near its confluence with Alexandra Canal the Cooks River is a highly modified habitat. The banks are typically concrete or stone blocks, with small areas of mud flats adjacent to these at low tide. Riparian vegetation is limited to occasional mangroves and planted trees.

Threatened aquatic species

Tempe Wetlands and Alexandra Canal do not provide habitat for any known threatened species. No threatened aquatic or migratory species were recorded during field surveys.

Parts of the southern end of Tempe Recreation Reserve adjacent to the Cooks River and Alexandra Canal (outside the project site) are mapped as coastal wetlands under *State Environmental Planning Policy (Coastal Management) 2018*.

22.2.5 Matters of national environmental significance

Threatened ecological vegetation communities

The protected matters search identified 11 threatened ecological communities, listed under the EPBC Act, as potentially occurring within the locality. One of these (*Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland*) was considered to have the potential to occur within the project site.

As described in section 22.2.2, none of the areas mapped as Swamp Oak floodplain swamp forest in the project site meet the EPBC Act listing criteria for a threatened ecological community.

Threatened flora and fauna species

The protected matters search identified 28 threatened flora species and 36 threatened fauna species listed under the EPBC Act as potentially occurring within the locality. The results of the field surveys and likelihood of occurrence assessments concluded that these species have a low likelihood of occurrence in the project site.

The Grey-headed Flying-fox was the only threatened species listed under EPBC Act identified during field surveys.

Migratory species

The protected matters search identified 41 migratory species (not including pelagic and marine species) listed under the EPBC Act as potentially occurring within the locality. There are no records of migratory species in the project site. The results of the field surveys and likelihood of occurrence assessments concluded that these species have a low likelihood of occurrence in the project site.

Wetlands of international importance

The Towra Point Nature Reserve, which is listed as a wetland of international importance under the Ramsar convention, is located about 6.5 kilometres from the project site, on the southern side of Botany Bay.

22.2.6 Biodiversity values on Sydney Airport (Commonwealth) land

The biodiversity values of Sydney Airport land within the project site are summarised below.

Terrestrial flora

Small areas of native vegetation are located on Sydney Airport land within the project site:

- Swamp Oak floodplain forest (0.68 hectares)
- Mangrove forest (0.04 hectares).

Small pockets of planted trees (predominantly eucalypts and figs) and shrubs are also located along roadsides and in carparks within Sydney Airport land. Other vegetation is summarised in Table 22.2.

No threatened flora species or communities listed under the BC Act or EPBC Act were recorded.

Terrestrial fauna

The small patches of native vegetation, planted trees and exotic vegetation provide habitat for common and widespread native fauna species typical of highly modified urban environments.

The Grey-headed Flying-fox would forage in planted eucalypts and fig trees when trees are flowering or fruiting. However, there is no roosting habitat for this species within the project site or adjoining areas. Microbats are also likely to occasionally forage over patches of vegetation.

Aquatic biodiversity

An artificial pond is located adjacent to Qantas Drive. This is covered by netting to prevent birds from using it. It does not provide habitat for threatened or migratory waders. Despite its disturbed and modified nature, it is mapped as key fish habitat and does contain some fish. However, the pond is unlikely to provide important habitat for native fish and it does not contain suitable habitat for any threatened aquatic species listed under the FM Act or EPBC Act.

22.3 Assessment of construction impacts

Potential impacts on biodiversity during construction include:

- Direct impacts as a result of vegetation clearing
- Indirect impacts on flora and fauna located outside the project site as a result of activities within the project site.

A summary of the results of the impact assessment is provided in the following sections.

22.3.1 Terrestrial flora

The project would mainly impact existing cleared and hardstand areas with no biodiversity values. During construction, about 24 hectares of vegetation would be removed, which includes 0.91 hectares of native vegetation.

No threatened ecological communities or species would be impacted.

22.3.2 Terrestrial fauna

The potential for direct impacts on fauna and their habitats are summarised in Table 22.4.

Table 22.4 Direct impacts on fauna

Impact	Description
Removal of habitat resources	<p>The following habitat resources would be removed:</p> <ul style="list-style-type: none"> ■ 4.85 hectares of potential foraging habitat for the Grey-headed Flying-fox ■ About 5.7 hectares of potential foraging habitat for the Eastern Bentwing-bat and other threatened fauna species ■ About 18.3 hectares of highly disturbed areas that may provide foraging habitat for the Eastern Bentwing-bat ■ About 0.04 hectares of mangroves that provide limited habitat for common fauna. <p>This vegetation provides limited habitat resources for native fauna due to its highly modified nature and the surrounding urban environment. It includes foraging and shelter resources for common native fauna typical of urban environments.</p> <p>A small number of food trees for the Grey-headed Flying-fox, and foraging habitat for microbats, would be removed. This impact would not be significant in the context of available foraging habitat in the study area.</p>
Removal of hollow-bearing trees	No large hollow-bearing trees suitable for nesting by threatened owls were recorded.
Injury and mortality	Construction has the potential to result in injury or mortality of some individuals of less mobile fauna species and other small terrestrial fauna that may be sheltering in vegetation. The potential injury or mortality of individuals is highly unlikely to affect an ecologically significant proportion of any local populations. More mobile native fauna, such as native birds, bats, terrestrial and arboreal mammals, are likely to be able to evade injury during construction.
Fragmentation and isolation of habitat.	Native vegetation within the project site is fragmented by existing urban development, roads and the rail corridor. The project would be unlikely to create an additional barrier to the movement of pollinator and seed dispersal fauna, such as insects and birds.
Impacts on key fish habitat and marine vegetation	There would be no loss of key fish habitat. A very small area of mangroves and highly disturbed mud flats would be removed. There would be no impacts on aquatic connectivity or fish passage along Alexandra Canal. The gaps in riparian vegetation would increase; however, this is unlikely to prevent the movement of any fauna along this corridor.
Impact on wetland habitat	There would be no direct impacts on any wetland habitats.
Impacts on threatened fauna species	The project would have minimal impacts on threatened fauna species. The main potential impacts relate to the loss of habitat resources, described above.

22.3.3 Aquatic ecology

The project would directly impact the mangrove forest community in the project site (shown on Figure 22.3), requiring removal of about 0.04 hectares of mangrove forest. The project would not directly impact any habitat for threatened aquatic species listed under the EPBC Act or FM Act.

The project includes construction of new bridges across Alexandra Canal, which is mapped as key fish habitat. The project has been designed to minimise potential impacts on the canal and the bridges do not include piers within the canal. As a result, fish passage would not be blocked. Additional measures would be implemented during construction to minimise the potential for water quality impacts. Further information is provided in Chapter 16 (Surface water quality).

The project would not directly impact Tempe Wetlands.

22.3.4 Indirect impacts

The potential for indirect impacts on terrestrial and aquatic biodiversity values are summarised in Table 22.5.

Table 22.5 Indirect impacts on biodiversity values

Impact	Description
Weed invasion and edge effects	<p>'Edge effects' include increased noise and light, erosion and sedimentation, introduction of weeds, and associated degradation of vegetation at the interface of intact vegetation and cleared areas.</p> <p>The small native vegetation patches in the project site are already severely affected by edge effects and associated impacts such as weed infestation. The project would create few additional edge effects and is unlikely to significantly increase existing edge effects.</p>
Pests and pathogens	<p>Construction activities, particularly the movement of construction vehicles, have the potential to introduce pests and pathogens to a site, or transfer them to other sites. These could include plant pathogens (such as Phytophthora and Myrtle Rust) and frog pathogens (Chytrid fungus).</p> <p>The potential for impacts associated with these pathogens is low, given the existing levels of disturbance and access within the project site, and the lack of intact native vegetation in the vicinity of the project site.</p>
Light, noise and vibration	<p>Light, noise and vibration can impact breeding, foraging and roosting activities where fauna are located close to construction activities, particularly in environments that are not already subject to these effects. Fauna that occupy habitats within the project site and adjacent areas would be accustomed to existing lights and high noise and vibration levels originating from aircraft, road traffic, trains and the urban environment. While there would be localised increases during construction, these are unlikely to result in a significant impact.</p>
Sedimentation, erosion and pollution	<p>Uncontrolled erosion can spread weeds, reduce habitat values and stifle plant growth. Sediment laden runoff entering watercourses can affect water quality and adversely affect aquatic life. This is a particular risk during construction within and near Alexandra Canal.</p> <p>The project has been designed to minimise this particular risk, by not including piers within the canal and limiting the activities that would take place on the banks of the canal. Additional measures would be implemented during construction to minimise the potential for water quality impacts. Further information is provided in Chapter 16.</p>
Aquatic disturbance and pollution	<p>Construction has the potential to mobilise contaminated sediments. The introduction of pollutants into the surrounding environment has the potential to impact on water quality and affect aquatic biodiversity values within and downstream of the project site, including habitat for fish, wading birds and other species that use downstream habitats.</p> <p>Measures would be implemented during construction to minimise the potential for mobilisation of contaminated sediments and associated surface and groundwater quality impacts.</p> <p>Further information on the potential for contamination, groundwater and surface water impacts is provided in Chapters 13, 15 and 16 respectively.</p>

22.3.5 Impacts on key threatening processes

The BC Act, FM Act and EPBC Act list a series of key threatening processes. These are defined as an action, activity, project or potential threat that:

- Adversely affects two or more threatened species, populations, or ecological communities
- Could cause species, populations or ecological communities that are not currently threatened to become threatened.

The key threatening processes relevant to the project are considered in Table 22.6. The project itself does not constitute a key threatening process and is unlikely to exacerbate those processes.

Table 22.6 Key threatening processes relevant to the project

Key threatening process	Listing	Assessment
Clearing of native vegetation	BC Act EPBC Act	The project would involve removing less than one hectare of native vegetation. This minor reduction is highly unlikely to affect the viability of remnant vegetation in the project site or study area, or reduce the extent of habitat below a minimum size required for any fauna species.
Loss of hollow-bearing trees	BC Act	No mature trees with obvious large hollows would be removed.
Removal of dead wood and dead trees	BC Act	The project site contains very little fallen timber or dead trees. The small amounts that do occur may be removed or disturbed during construction.
The degradation of native riparian vegetation along NSW water courses	FM Act	Small areas of highly modified native vegetation and planted trees located along the edges of Alexandra Canal would be removed.
Human-caused climate change	BC Act, EPBC Act and FM Act	During construction, machinery and the production and transport of materials would emit carbon dioxide into the atmosphere, which is known to increase greenhouse gases responsible for climate change.

22.3.6 Impacts on matters of national environmental significance

The Grey-headed Flying-fox is the only identified matter of national environmental significance with the potential to be impacted by the project. An assessment of the potential impacts on this species was undertaken in accordance with the *Significant impact guidelines 1.1 – Matters of National Environmental Significance*.

The assessment concluded that the project would not have a significant impact on this species given the small area of planted vegetation that would be removed, and that there would be no direct impacts on any breeding camps. Further information is provided in Appendix G of Technical Working Paper 14 (Biodiversity Development Assessment Report).

22.3.7 Summary of impacts on Sydney Airport (Commonwealth) land

The project would mainly impact existing cleared and hardstand areas on Sydney Airport land. During construction, about 12.9 hectares of vegetation would be removed from within the project site on Sydney Airport land. This includes about 0.7 hectares of native vegetation. No threatened ecological communities or flora species would be impacted.

The vegetation that would be removed provides limited habitat resources for native fauna due to its highly modified nature and the surrounding urban environment. Fauna habitat resources that would be removed include foraging and shelter resources for common native fauna typical of urban environments.

The potential direct and indirect impacts on biodiversity values are consistent with those described in section 22.3. An assessment of the significance of potential impacts on the biodiversity values of Sydney

Airport land was undertaken in accordance with the *Significant impact guidelines 1.2* (DSEWPC, 2013). The assessment concluded that the project would not have a significant impact on biodiversity, as a result of the highly modified nature of the existing environment, the limited existing biodiversity values, and the small magnitude and extent of the potential impacts.

The Grey-headed Flying Fox may occasionally forage in planted trees on Sydney Airport land. However, these trees do not represent critical habitat, and the project would not have a significant impact on the species.

Sydney Airport land within the project site does not contain any threatened ecological communities or threatened flora listed under the EPBC Act, or any important habitat for threatened or migratory shorebirds. The project would not significantly impact any matters of national environmental significance (including threatened species or ecological communities). Further information is provided in Appendix G of Technical Working Paper 14 (Biodiversity Development Assessment Report).

Consistency with the Sydney Airport Master Plan

The *Sydney Airport Master Plan 2039* (SACL, 2019a) (the Master Plan) identifies biodiversity and conservation management as a key environmental issue. The main area of natural biodiversity value on Sydney Airport land is the Sydney Airport Wetlands, which are part of the Botany Wetlands. The marine environment of Botany Bay is also identified as an area of environmental sensitivity.

By implementing the Master Plan and associated *Sydney Airport Environment Strategy 2019-2024* (SACL, 2019b) (the Environment Strategy) Sydney Airport Corporation plans to manage and reduce potential impacts on the ecology and biodiversity of Sydney Airport and its surrounds by implementing (amongst other things):

- Ecological impact assessments for all major developments, in particular where potential impacts may occur to the Sydney Airport Wetlands, Botany Bay, listed flora and fauna species and communities
- Management and mitigation measures for developments to limit ecological and biodiversity impacts.

The five year plan for biodiversity in the Environment Strategy includes a range of actions, of which the following are of most relevance to the project:

- Ensure that, where appropriate, potential biodiversity impacts are assessed as part of the assessment of development proposals and, if necessary, managed
- Develop an airport wide vegetation strategy which incorporates biodiversity offsets.

The project is consistent with these measures. In particular, the project has been designed to avoid adverse consequences on the biodiversity values of Sydney Airport land. A rigorous impact assessment process has been undertaken to ensure biodiversity impacts are appropriately assessed and impacts minimised where practicable.

The project will not impact on sensitive areas at Sydney Airport, including Sydney Airport Wetlands or the Botany Bay marine environment, and is not in conflict with any of the identified biodiversity actions identified in the Environment Strategy.

Current biodiversity management practices at Sydney Airport predominantly relate to managing the Sydney Airport Wetlands and do not directly apply to the project, as the wetlands are located well outside the project site. The project may impact fig trees on Sydney Airport land (eg along Qantas Drive), however these are not located in the South East Sector where fig trees are being managed. Nevertheless, to ensure consistency with this management action within the project site, amenity trees (including fig trees) removed to construct the project would be replaced in accordance with the tree management strategy for the project (see section 21.6.1). Such trees may include fig trees and other food trees that provide foraging resources for the threatened Grey-headed Flying-fox, where there would be no increase in the risk of wildlife strike (see Chapter 11 (Airport operations)).

22.4 Assessment of operational impacts

The potential for biodiversity impacts during operation are summarised in Table 22.7.

Table 22.7 Potential operational impacts

Impact	Description
Light, noise, and vibration	The project would introduce additional light, noise and vibration associated with street lighting and the movement of vehicles. Fauna in the project site would be accustomed to existing light, noise and vibration associated with the operation of Sydney Airport and the surrounding road and rail network. In this context, the project is likely to comprise only a minor increase in these potential impacts. The project is unlikely to increase the extent, duration, or magnitude of these impacts, to the extent that there would be a significant impact on biodiversity values.
Vehicle strike	Few terrestrial fauna species occur in the project site that are at risk of vehicle strike, and those that occur are already subject to this risk. The project is unlikely to significantly increase the risk of vehicle collisions with fauna.
Erosion and sedimentation and discharge of pollutants	Any potential increase in contaminants or changes in water quality would have the potential to result in indirect impacts on adjoining or downstream habitats. For example, the discharge of stormwater into Alexandra Canal as a result of new or upgraded outlets has the potential to mobilise sediments, including contaminated sediments. The project has been designed to minimise the potential for these impacts. Potential contamination, soil and water quality impacts are considered in Chapters 13, 15 and 16. Appropriate mitigation measures would be implemented to effectively manage any potentially adverse impacts. As a result, no significant operational impacts on biodiversity are predicted.

22.5 Cumulative impacts

The main potential for cumulative biodiversity impacts relates to the combined impacts of the project with the proposed Botany Rail Duplication project. The project site for the Botany Rail Duplication contains small areas of remnant and regrowth native vegetation, including small patches of two endangered ecological communities listed under the BC Act (0.46 hectares of *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* and 0.1 hectares of *Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*).

Construction of the Botany Rail Duplication would involve removing 0.72 hectares of native vegetation. Together, both projects would result in the removal of a total of 1.63 hectares of native vegetation.

Other road projects in the study area, including the New M5 and M4–M5 Link, have resulted in the removal of mainly planted vegetation and associated fauna habitats. Cumulatively, these projects would result in a minimal loss of biodiversity values. The main potential cumulative impact would be the further loss of habitat from an already modified environment with limited natural biodiversity values.

22.6 Management of impacts

22.6.1 Approach

Approach to mitigation and management

The overall approach to managing impacts on biodiversity is, in order of importance, to:

- Avoid impacts through the planning and design process
- Mitigate impacts using a range of mitigation measures
- Offset any residual impact that could not be avoided or mitigated as required by relevant legislation.

The majority of the project site is located on land that has been significantly modified by clearing and development. Impacts on biodiversity are substantially less than would be associated with an undisturbed greenfield site. Project infrastructure has been sited to maximise the use of existing cleared areas and avoid areas of native vegetation as far as practicable. The design would continue to be refined to minimise direct impacts on native vegetation as far as practicable.

The project would mainly impact existing cleared and hardstand areas with no biodiversity values. During construction, about 0.9 hectares of native vegetation would be removed, which includes about 0.7 hectares located on Sydney Airport land.

Measures are provided in section 22.6.2 to mitigate impacts that cannot be avoided. The potential for impacts during construction would be managed in accordance with a project-specific Biodiversity Management Plan, which would be implemented as part of the CEMP. The plan would detail processes and responsibilities to minimise potential impacts on biodiversity during construction. It would be prepared in accordance with relevant legislation, guidelines and standards, including the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (Roads and Traffic Authority, 2011). Further information on the CEMP, including the Biodiversity Management Plan, is provided in Chapter 27 (Approach to environmental management and mitigation).

Measures to minimise potential impacts associated with noise, air quality, contamination and soils, flooding and water quality would assist in minimising potential indirect impacts to biodiversity. These mitigation measures are provided in Chapters 10 and 12 to 16.

The residual impacts of the project are described in section 22.6.3.

Expected effectiveness

Roads and Maritime has experience in managing potential biodiversity impacts for road developments of a similar scale to the project. This includes experience on projects with much higher levels of potential impacts, including those in locations that are more ecologically diverse and sensitive.

The proposed mitigation measures, including preparation of the Construction Biodiversity Management Plan, are based on best management practice and specialist experience. The management plan would be prepared in accordance with the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects*. These guidelines were developed in consultation with the relevant NSW government agencies, biodiversity specialists and Roads and Maritime staff, and have been successfully applied to a number of projects. The guidelines also outline specific and tailored requirements for monitoring and reporting to record the success of the biodiversity management measures.

As such, the measures are considered to be effective in managing potential impacts to biodiversity.

22.6.2 List of mitigation measures

Measures that will be implemented to address potential impacts on biodiversity are listed in Table 22.8. All measures apply to the project as a whole (ie to those elements of the project that are located on Sydney Airport land and those located on land subject to the EP&A Act).

Table 22.8 Biodiversity mitigation measures

Impact/issue	Ref	Mitigation measure	Timing
Avoiding impacts on biodiversity	BD1	Detailed design will avoid or minimise the need to remove and/or disturb native vegetation and fauna habitat, including impacts on mapped areas of mangrove forest and Tempe Wetlands.	Detailed design
	BD2	Vegetation clearing will be limited to the minimum necessary to construct the project. Micro-siting of infrastructure will be undertaken during detailed design to further minimise or avoid impacts on native vegetation where practicable. Exclusion areas will be established and maintained around any native vegetation adjoining the project site in close proximity to work locations to be retained.	Detailed design
Managing the potential for biodiversity impacts during construction	BD3	A Construction Biodiversity Management Plan will be prepared prior to construction and implemented as part of the CEMP. It will include measures to manage biodiversity and minimise the potential for impacts during construction. The plan will be prepared in accordance with relevant legislation, guidelines and standards.	Pre-construction, construction

22.6.3 Managing residual impacts

Residual impacts are impacts of the project that may remain after implementation of:

- Design measures to avoid and minimise impacts (see sections 6.4 and 6.5)
- Construction planning and management approaches to avoid and minimise impacts (see sections 6.4 and 6.5)
- Specific measures to mitigate and manage identified potential impacts (see section 22.6.2).

The project would result in some unavoidable residual impacts, including:

- Removal or modification of 0.91 hectares of native vegetation and associated habitat resources
- Removal or modification of five hectares of urban exotic/native landscape plantings and associated habitat resources
- Removal of 0.04 hectares of mangrove forest
- Impacts from noise, light, traffic and altered environmental conditions.

These impacts are minor in extent and magnitude, and would not result in a significant reduction in biodiversity values within the study area.

The offset obligations under NSW and Commonwealth legislation are discussed below.

Biodiversity offset obligations under the BC Act

Obligations to offset the biodiversity impacts of the project on land subject to assessment under NSW legislation were determined using the Biodiversity Assessment Method calculator. A biodiversity offset for impacts on native vegetation and/or threatened species habitat is not required if the vegetation integrity score of the impacted plant community type is less than 17.

The project would remove 0.19 hectares of Swamp Oak floodplain swamp forest (PCT 1232) with a vegetation integrity score of 10.2 on land subject to NSW legislation. A biodiversity offset is not required for

this impact, as the vegetation is under the thresholds for the assessment. In this regard, impacts to PCT 1232 have been determined to have an ecosystem credit obligation of zero.

Offsets are not required for impacts on non-native vegetation. No credits were calculated for miscellaneous ecosystems that would be impacted by the project, including the highly disturbed areas with no or limited vegetation and urban exotic/landscape plantings. As described in section 22.2.2 and 22.2.3, no species credit species were recorded in the project site and none are considered likely to be affected by the project. As a result, no offsets are required.

Offsetting impacts on protected marine vegetation and key fish habitat

The *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013) provide for 'no net loss' of habitat. The project would not remove any fish habitat, including protected marine vegetation (eg mangroves) on land subject to the NSW legislation within the project site. As such, there are no offset obligations under the FM Act.

Biodiversity offset obligations under the EPBC Act – offset for significant impacts

Under the *Environmental Offsets Policy* (DSEWPC, 2012) biodiversity offsets are required to compensate for significant residual impacts on matters of national environmental significance. As no significant impacts were identified, no biodiversity offsets are required in relation to matters of national environmental significance.

Offsetting impacts for land clearing on Sydney Airport land

The Airport Building Controller, in consultation with the Sydney Airport Environment Officer, can impose conditions on building activity approvals, including a requirement to provide offsets for the removal of trees and vegetation. Roads and Maritime would consult with the Sydney Airport Environment Officer to identify any offset requirements for vegetation removal on Sydney Airport land.