CrossRiver*Rail*

11. Nature Conservation

Cross River Rail

CHAPTER 11
NATURE CONSERVATION

JULY 2011

Contents

11 Nature conservation

11.1 Introduction

This chapter addresses Part B, Section 3.4 of the Terms of Reference (ToR). The chapter describes the existing nature conservation values present within the study corridor and assesses the potential benefits and impacts on nature conservation aspects attributable to the Project. This allowed consideration of the linkages present and to place the biodiversity of the study corridor in context and to provide ecological input to the refinement of the final reference design.

The study corridor for the Project is located within highly urbanised city and suburban areas of Brisbane from Wooloowin in the north to Salisbury in the south. The majority of the areas within the study corridor which have some nature conservation value are those areas which have the potential to provide habitat and/or resources to native fauna and support native flora. These include areas located along Enoggera Creek/Breakfast Creek and its fringing mangrove forest, Victoria Park (including York's Hollow) at Spring Hill, Wickham Park, Roma Street Parkland and the City Botanic Gardens in Brisbane City, the Kangaroo Point cliffs along Count White Park at Kangaroo Point, Dutton Park (including the South Brisbane Cemetery) at Dutton Park and Lagonda Park at Annerley.

11.1.1 Legislative context

The legislation associated with the natural values located within the study corridor is outlined in **Appendix G1**. All works associated with the Project must comply with the legislation unless a specific exemption has been provided. **Table 11-1** summarises the relevant legislation applying to nature conservation and the Project response. The table also identifies relevant stakeholders and the likely development triggers for the legislation to apply. Further revision of this matrix will be required during the detailed design phase.

Table 11-1 Summary of relevant legislation for nature conservation

Legislation	Stakeholder	Development Trigger	Project Response
Federal			
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Department of Sustainability, Environment, Water, Population and Communities	Proximity to a matter of National Environmental Significance (NES) or Commonwealth land	Referral under the EPBC Act
State			
South East Queensland Regional Plan 2009–2031	Department of Local Government and Planning (DLGP)	Development is located within the South East Queensland region	Compliance with the relevant policies identified under the Natural Environment Desired Regional Outcome (DRO)
Sustainable Planning Act 2009 (SPA)	DLGP	Works in a watercourse or the removal of native vegetation	Development approvals if required
Nature Conservation Act 1992 (NC Act)	Department of Environment and Resource Management (DERM)	Taking, using, keeping or interfering with a protected fauna or flora	Permit which allows clearing and/or interference with protected species listed under the NC Act if required

Legislation	Stakeholder	Development Trigger	Project Response
Land Protection (Pest and Stock Route Management) Act 2002 (LP Act)	Department of Employment, Economic Development and Innovation (DEEDI)	Presence of declared pest species	All declared pest species identified within the construction area must be controlled
Vegetation Management Act 1999	DERM	Removal of vegetation identified as a Regional Ecosystem	Development Permit under the *Sustainable Planning Act 2009* if required.
Regrowth Vegetation Code	DERM	Removal of vegetation identified as high value regrowth vegetation in Rural Areas	Not Applicable
Fisheries Act 1994	DEEDI	The construction or raising of a waterway barrier	Development Permit under SPA if required.
		Destroying of vegetation, excavating or placing fill in watercourse, lake or spring	Compliance with DERM Guideline
Water Act 2000	DEEDI	Significant alterations and/or diversions to registered watercourses	Compliance with Self Assessable Code and where appropriate, water licence under the *Water Act 2000* and Development Permit under SPA
Environmental Protection Act 1994	DERM	Construction and Operational Activities	Compliance with General Environmental Duty Of Care
Plant Protection Act 1989	DEEDI	Disturbing land which is known to be a Red Imported Fire Ant (RIFA) area	Approval of RIFA Risk Management Plan
Koala State Planning Regulatory Provisions	DERM	Potential impact on mapped Koala habitat	Not Applicable
Local			
City Plan 2000	Brisbane City Council (BCC)	Interface with local government protected species and areas of environmental significance	Consultation with BCC
Natural Assets Local Law 2003	BCC	Clearing or interference with any protected vegetation as identified under the NALL	Consultation with BCC

11.1.2 Methodology

Terrestrial flora

The flora investigations were undertaken in two stages involving a desktop assessment of the study corridor followed by a field survey and assessment of the vegetation communities present within the study corridor (including targeted searches for endangered, vulnerable or rare (EVR) flora).

The desktop assessment included a review of the relevant databases, surveys and existing literature. The data sources used to describe the terrestrial flora and mapped vegetation communities of the study corridor included:

- the Queensland Herbarium's Regional Ecosystem mapping and High Value Regrowth mapping
- Queensland Herbarium HERBRECS Database
- DERM Wildlife Online (WildNet) Database

- DSEWPC EPBC Act Protected Matters database
- BCC's *Natural Assets Local Law 2003* (NALL) regarding information on locally protected vegetation
- BCC's Natural Assets Planning Scheme Policy (NAPSP)
- BCC's Regional Ecosystem mapping (this mapping was also used at it is at a higher resolution than the State Regional Ecosystem mapping and includes areas which are not recognised by the state mapping due to their area not being consistent with the State criteria)
- previous environmental and ecological studies undertaken as part of other large infrastructure projects within the area including the *Airport Link Environmental Impact Statement* (EIS) (SKM-CW JV 2006a), *Northern Link EIS* (SKM-CW JV 2008a), *North-South Bypass Tunnel EIS* (SKM-CW JV 2005), *Eastern Busway Concept Design and Impact Management Plan* (TMR 2008), *Green Bridge Link Impact Assessment Study* (BCC 2003) and the *City Valley Bypass Impact Assessment Study* (now known as the ICB) (Connell Wagner 1998).

Flora surveys were undertaken by experienced and qualified ecologists in April 2010 and March 2011 to support and verify the desktop assessment findings. Due to the urban nature of the study corridor the flora surveys were restricted to publically accessible vegetated areas which may have the ability to provide habitat value. These areas are shown in **Figure 11-1** to **Figure 11-5** and include:

- Northern section (Wooloowin to Bowen Hills):
  - Yowoggera Park, Albion
  - Windsor Park, Windsor
  - Flynn Oval/Mann Park, Windsor
  - RNA Showgrounds, Bowen Hills
- Central Section (Spring Hill to Dutton Park):
  - Victoria Park (including York's Hollow), Herston/Spring Hill
  - Wickham Park and Roma Street Parkland, Spring Hill/Brisbane CBD
  - City Botanic Gardens, Brisbane CBD
  - Count White Park, Kangaroo Point
  - Dutton Park and South Brisbane Cemetery, Dutton Park
  - Gair Park, Dutton Park
  - Fairview Park, Fairfield
- Southern Section (Dutton Park to Salisbury):
  - JF O'Grady Memorial Park, Fairfield
  - Green space located along Railway Road between Bledisloe and Sunbeam streets, Fairfield
  - Robinson Park, Fairfield
  - Southern extent of Fehlberg Park, Yeronga
  - Lagonda Park, Lagonda Street, Annerley
  - Rowlinson Park, Nelson Street, Yeronga
  - Brisbane Golf Club, Yeerongpilly
  - Green space (Melbourne Street) Rocky Water Holes Creek, Moorooka
  - Peter Scott Skate Park, Moorooka
  - Green space (Railway Terrace) Rocky Water Holes Creek, Moorooka
  - Kookaburra Park, Rocklea
  - Dollis Street Green space, Rocklea.

A comprehensive investigation was undertaken for each site using the Random Meander Technique as described by Cropper (1993). The Random Meander Technique involves investigating areas which appear likely to support significant species based on habitat potential and the judgement of the investigator.

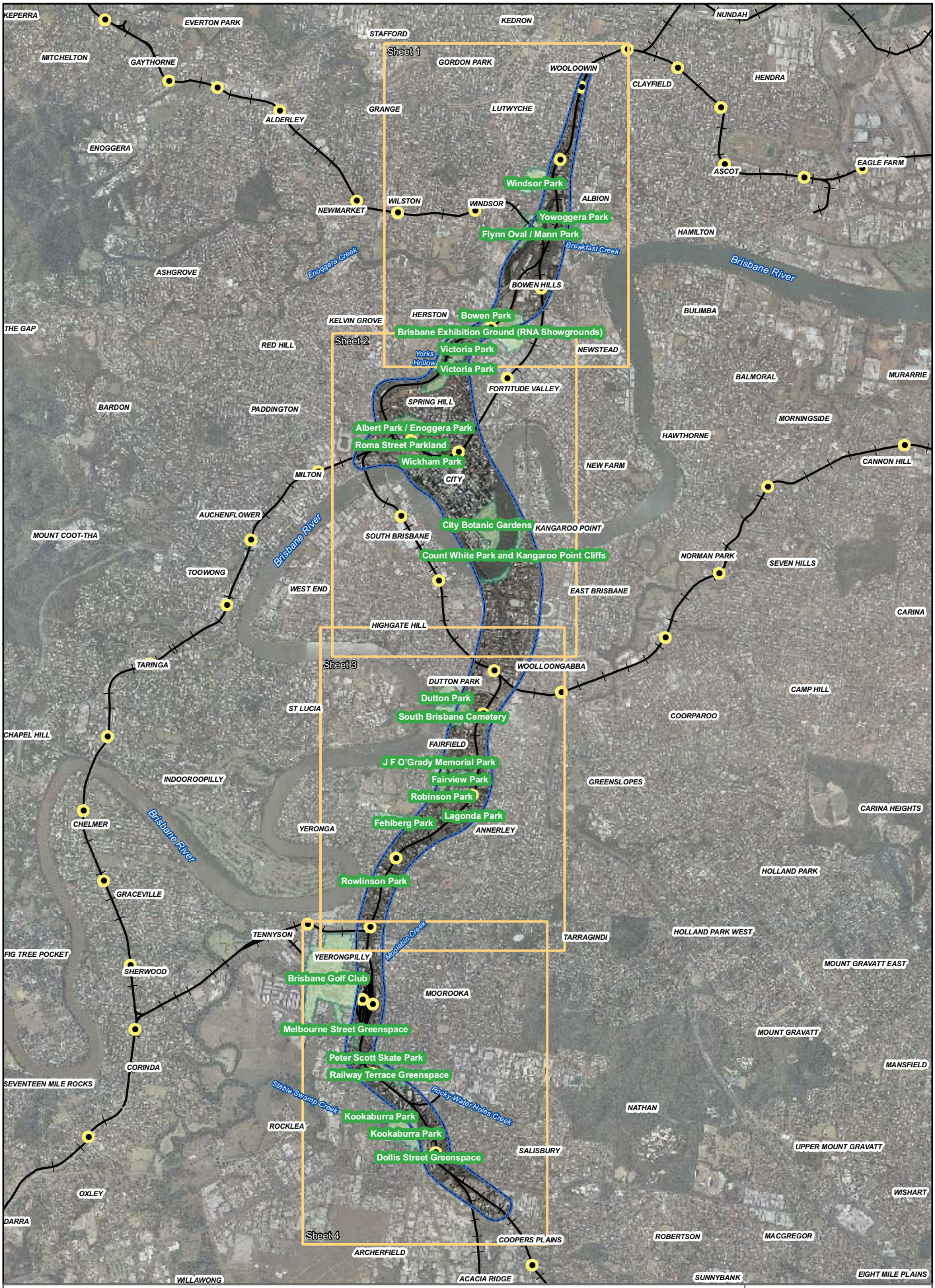
The Random Meander Technique was adopted as the majority of the areas investigated were small and fragmented in nature and predominantly consisted of highly modified landscapes supporting fragmented and disturbed vegetation communities. Most areas were therefore able to be assessed in full using this technique. It is noted that this technique is not consistent with the requirements of the Terms of Reference which requested that 'the minimum site size should be 10 m by 50 m. However it is considered that the technique proposed in the ToR would not provide accurate representation of the areas investigated, as survey areas of 10 m by 50 m are usually better suited to large green field sites where an estimate of the species present is required.

It is also recognised that the ToR state that the data should be recorded in a form compatible with the Queensland Herbarium CORVEG database along with species structure, assemblage, diversity and abundance. However this was not considered feasible as the majority of the sites investigated were artificially created parklands and/or highly disturbed communities which were small and fragmented in nature. The following investigations were undertaken at each site where applicable, recording species which were present within and surrounding each site, assessment of tree and canopy height where appropriate, measuring the Diameter at Breast Height (DBH) of large trees specimens, assessing habitat values of the areas by investigating the presence of hollows, nest boxes, structural complexity, along with relevant Photographs of the sites.

Additionally, any significant trees and other individual vegetation listed by BCC under the NAPSP within the study corridor but outside of the investigated sites were inspected to verify the species and/or composition.

The majority of species observed were identified using relevant field guides and taxonomic keys. Samples of specimens not readily identifiable were obtained during the survey and forwarded to the Queensland Herbarium for identification and/or verification. Field identified EVR flora species were also forwarded to the Queensland Herbarium for verification. Botanic and common names used in this chapter to describe flora were obtained from Stanley and Ross (1983, 1986 and 1989), Sharp and Simon (2002) and Leiper *et al.* (2008), Harden *et al.* (2006), and Foulis *et al.* (2004). Where there is no accepted common name only the botanical name is used.

The survey techniques are based on the *BCC Ecological Assessment Guidelines* (BCC undated). All ecological surveys for the Project were conducted in accordance with Aurecon's scientific purposes permit (WISP01649604) pursuant to the NC Act and animal ethics permit (0099) pursuant to the *Animal Care and Protection Act 2001*.



LEGEND

- Study Corridor
- Suburbs
- Sheets
- Surveyed Areas
- Station
- Track

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-1

Key Survey Areas

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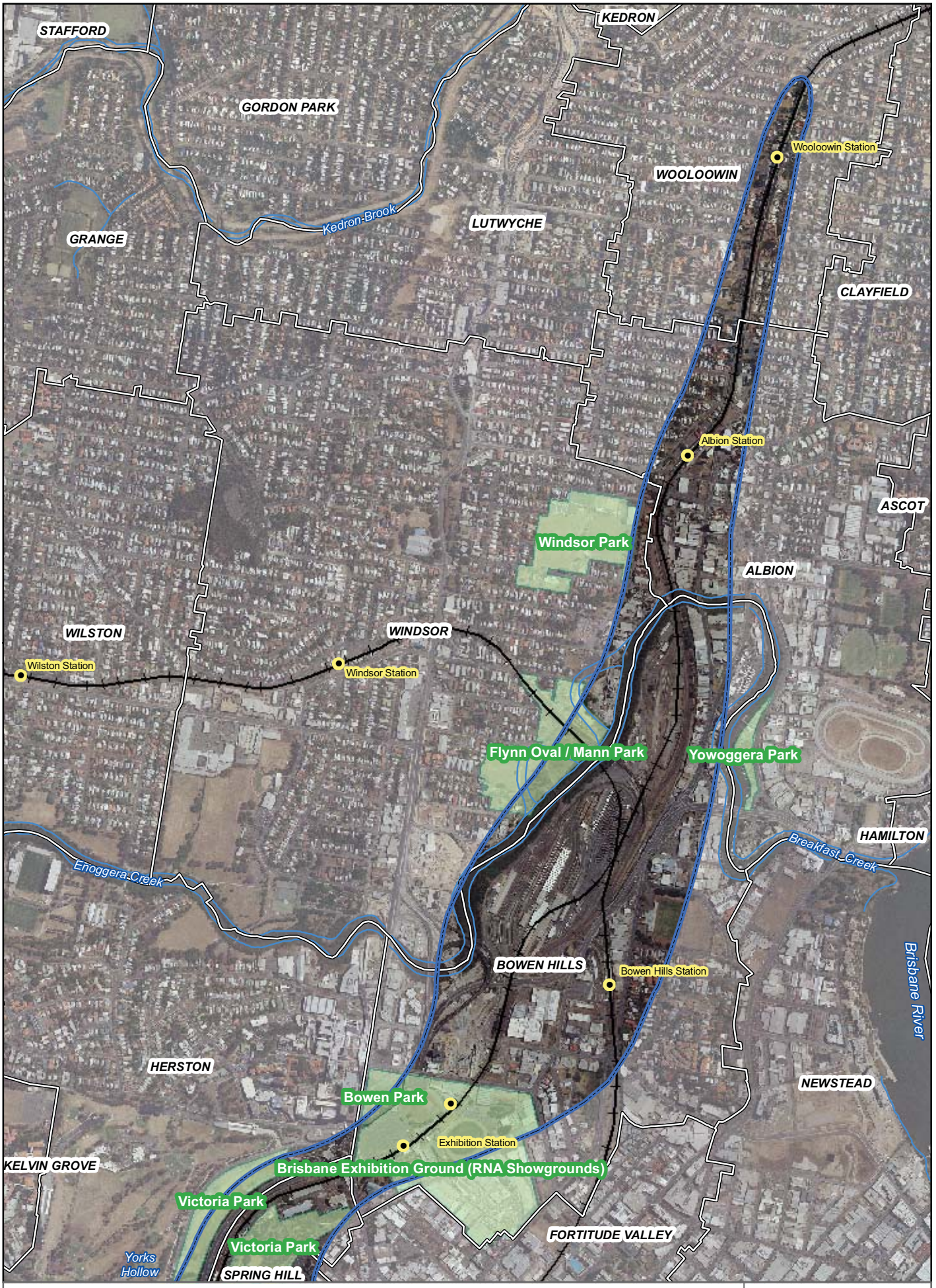

LEGEND

- Study Corridor
- Suburbs
- Surveyed Areas
- Watercourse
- Station
- Track

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-2

Key Survey Areas
Sheet 1 of 4 (Northern Section)

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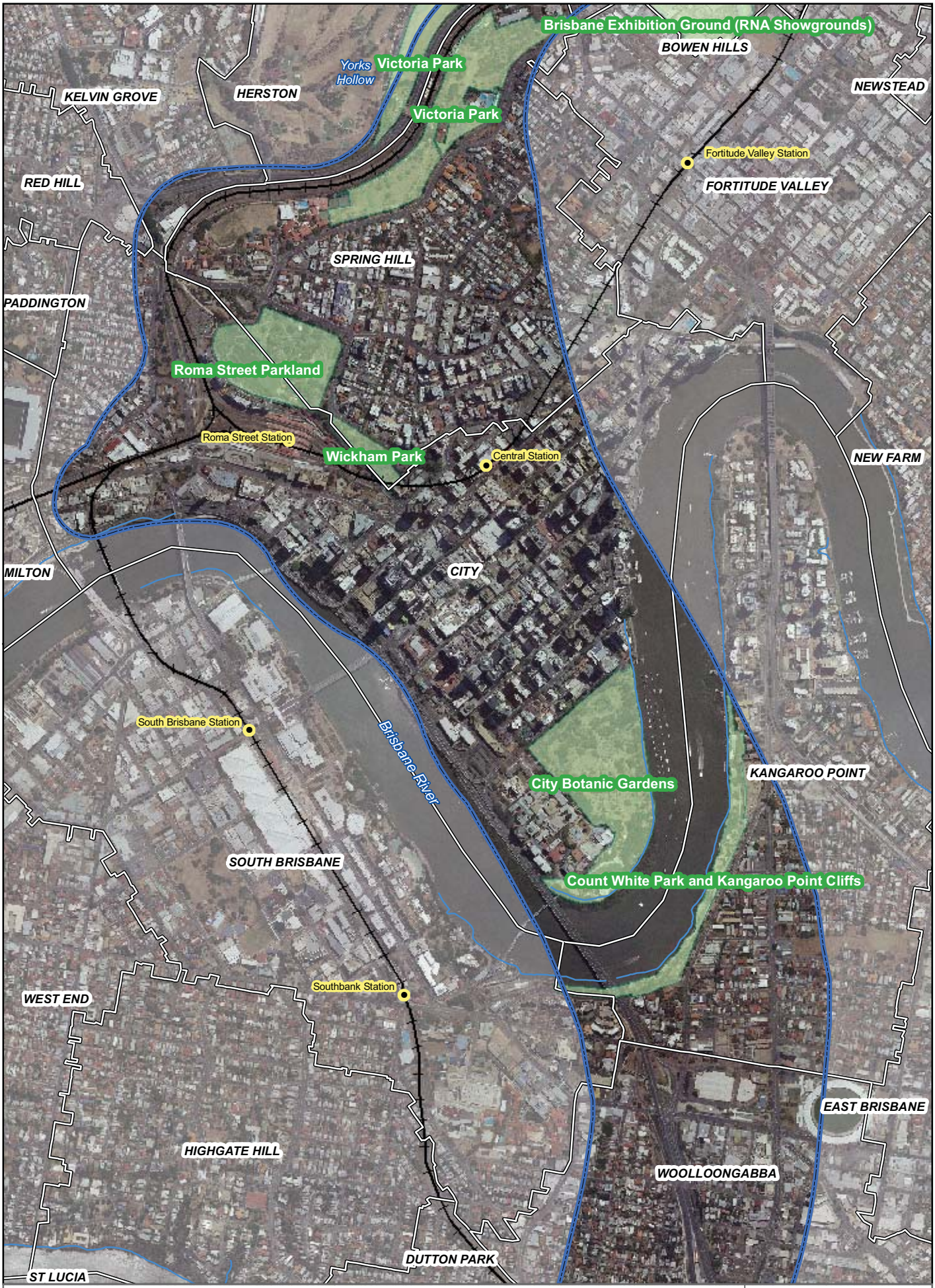

LEGEND

- Study Corridor
- Suburbs
- Surveyed Areas
- Watercourse
- Station
- Track

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-3

Key Survey Areas
Sheet 2 of 4 (Central Section)

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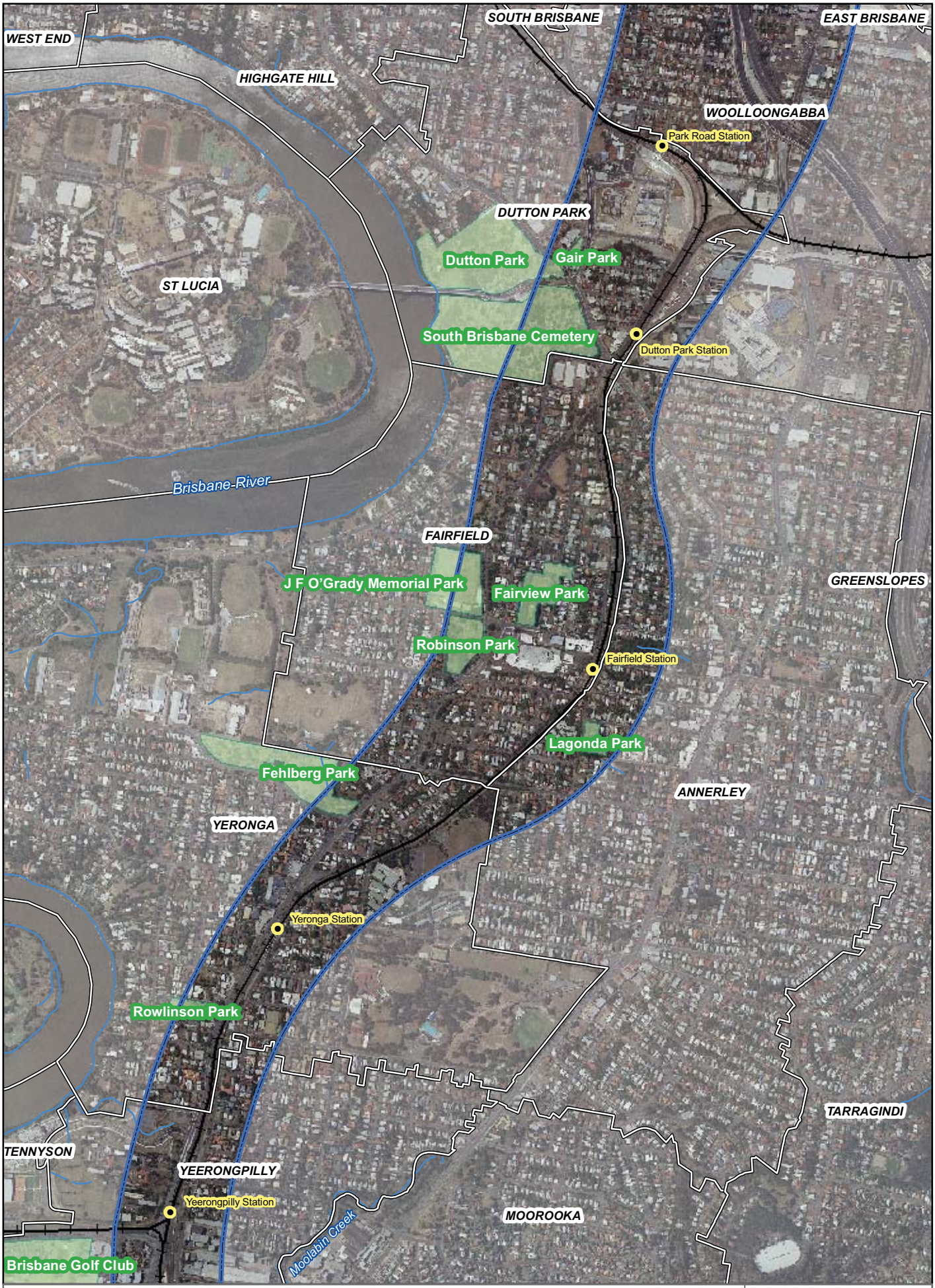

LEGEND

- Study Corridor
- Suburbs
- Surveyed Areas
- Watercourse
- Station
- Track

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-4

Key Survey Areas
Sheet 3 of 4 (Southern Section)

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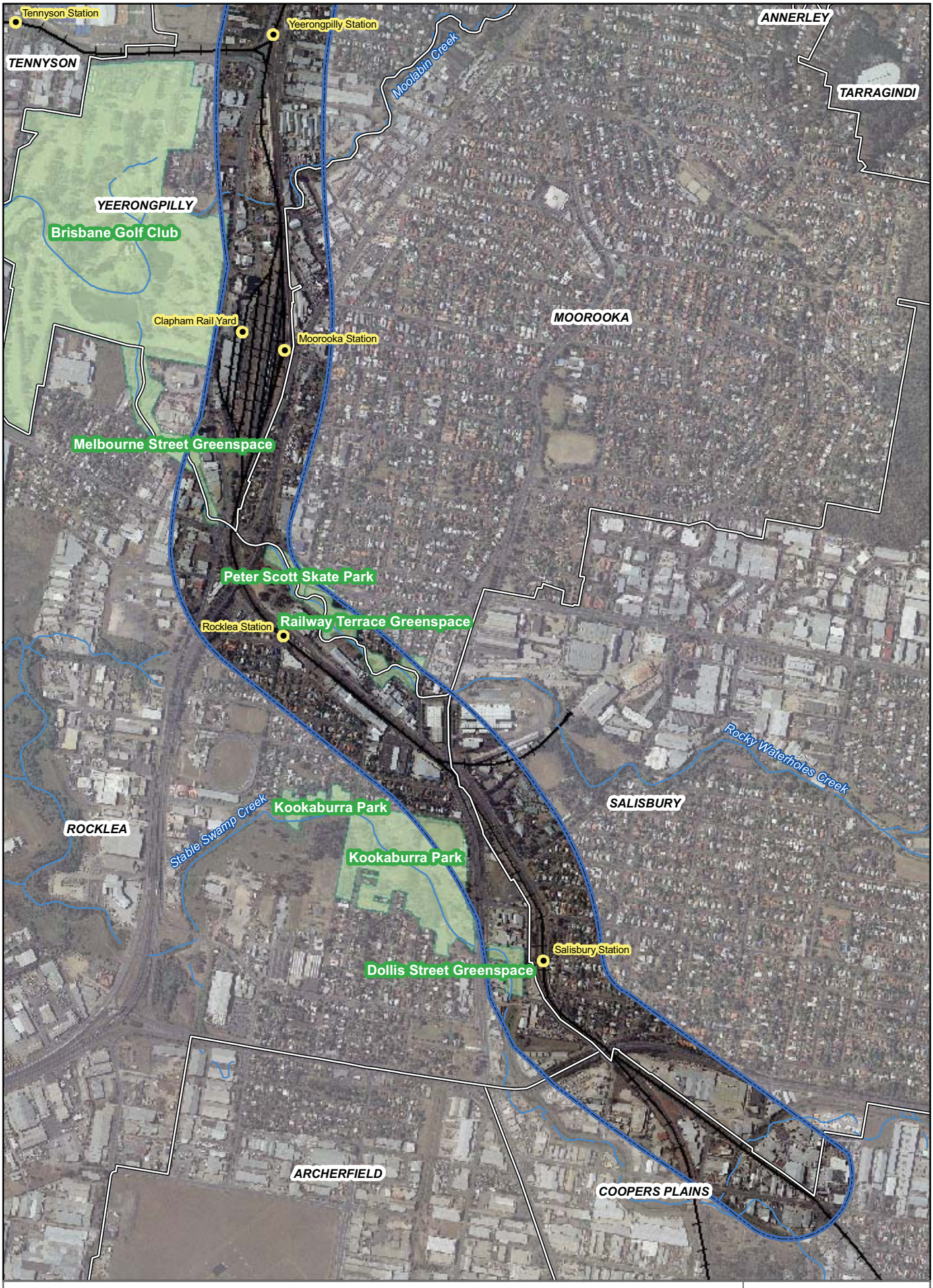

LEGEND

- Study Corridor
- Suburbs
- Surveyed Areas
- Watercourse
- Station
- Track

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-5

Key Survey Areas
Sheet 4 of 4 (Southern Section)

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Terrestrial fauna

The fauna investigations involved a desktop review of existing information and literature and appropriate level field surveys. Due to the urban nature of the study corridor the fauna and flora present are relatively well known, therefore in-depth fauna field survey techniques such as trapping and targeted observations were not undertaken. Additions to faunal registers from field investigations are unlikely as many records detailing the species compositions already exist in Queensland Museum databases, therefore reliance was placed on existing information as it was unlikely that new species would be identified. For this reason the fauna surveys were undertaken to verify the presence or absence of the fauna identified through the desktop assessments.

The information used for the desktop review to determine core habitat areas for EVR fauna species and to identify wildlife corridors at the State, regional and local scales included:

- DSEWPC EPBC Act Protected Matters database
- Queensland Museum Database Searches (amphibians, reptiles, birds, mammals, crustacean and fish records)
- DERM's Wildlife Online (WildNet) database
- DERM's Biodiversity Planning Assessment (BPA) for the South East Queensland Bioregion
- BCC's Natural Assets Planning Scheme Policy (NAPSP)
- previous environmental and ecological studies undertaken as part of other large infrastructure projects within the area including the *Airport Link Environmental Impact Statement* (EIS) (SKM-CW JV 2006a), *Northern Link EIS* (SKM-CW JV 2008a), *North-South Bypass Tunnel EIS* (SKM-CW JV 2005), *Eastern Busway Concept Design and Impact Management Plan* (TMR 2008), *Green Bridge Link Impact Assessment Study* (BCC 2003) and the *City Valley Bypass Impact Assessment Study* (now known as the ICB) (Connell Wagner 1998).

Incidental fauna surveys were recorded during the vegetation surveys undertaken in April 2010 and March 2011. These included positive bird call identification, moving debris to check for fauna living underneath and direct sightings. Specific fauna searches were limited to spotlighting for nocturnal fauna during April and May 2010 in a number of selected locations in order to verify the general findings of the desktop data. These included:

- Victoria Park (including York's Hollow), Herston/Spring Hill (Central Section)
- Wickham Park and Roma Street Parkland, Spring Hill/Brisbane CBD (Central Section)
- City Botanic Gardens, Brisbane CBD (Central Section)
- Dutton Park and South Brisbane Cemetery, Dutton Park (Central Section)
- Lagonda Park, Lagonda Street, Annerley (Southern Section).

These areas were selected based on their potential habitat values, level of vegetation cover and the likelihood of nocturnal fauna being present. These areas were also the most likely to support any EVR species identified through the desktop searches.

Scientific and common names used to describe fauna were obtained from Pizzey and Knight (1997) and Simpson and Day (2004) for birds, Cogger (2000) and Wilson (2009) for reptiles, Robinson (2000) and Cogger (2000) for amphibians and Menkhorst and Knight (2004) and Strahan (1995) for mammals.

Aquatic flora and fauna

The majority of the aquatic flora and fauna were identified from the Queensland WildNet database, Queensland Museum Database searches, BCC literature, previous reports and from riparian assessments undertaken as part of this study. As a result of the urban nature of the study corridor, the aquatic fauna and flora present within the area are well documented. Consequently, additions to aquatic faunal or floral registers from field investigations are unlikely as many records detailing the species compositions already exist in Queensland herbaria and museum databases. Therefore reliance has been placed on existing information as it is unlikely that the information can be improved upon. Furthermore, due to the predominantly underground nature of the Project, most of the waterways located within the study corridor would not be disturbed. Therefore investigations into the aquatic substrate, stream type, tidal influence, fish spawning periods, offsets for fish habitats and alternatives to waterway crossing were not undertaken.

11.2 Description of existing environment

The area within the study corridor consists of a mosaic of intense urban development in and around the Brisbane CBD including areas from Wooloowin in the north to Salisbury in the south. The study corridor traverses areas of suburban and high density city development, parkland, and riparian vegetation associated with the two major waterways within the study corridor, the Brisbane River and Enoggera Creek/Breakfast Creek. Other smaller waterbodies located within the study corridor which are potentially affected by the Project include Moolabin Creek, Rocky Water Holes Creek and Stable Swamp Creek, all of which are tributaries to Oxley Creek in the southern section of the Project corridor. Other artificial surface waterway features within the study corridor include; the ornamental ponds located within the City Botanic Gardens, the lakes within the Roma Street Parkland and York's Hollow in Victoria Park, Spring Hill (refer to **Figure 11-1** for an overview of the study corridor and these features).

There is little direct connectivity between most of the habitats both within the study corridor and within the areas surrounding the study corridor. A notable exception is the Enoggera Creek/Breakfast Creek complex which is well connected by parklands from its mouth into the Brisbane River through to the large area of remnant vegetation associated with the Enoggera Army Barracks (also known as Gallipoli Barracks). However the larger areas of parklands and the riparian vegetation located within the study corridor do provide 'stepping stone' habitats for the more mobile and disturbance tolerant fauna species as well as habitats in their own right for some less mobile species and contribute to nutrients and food matter for ecosystems.

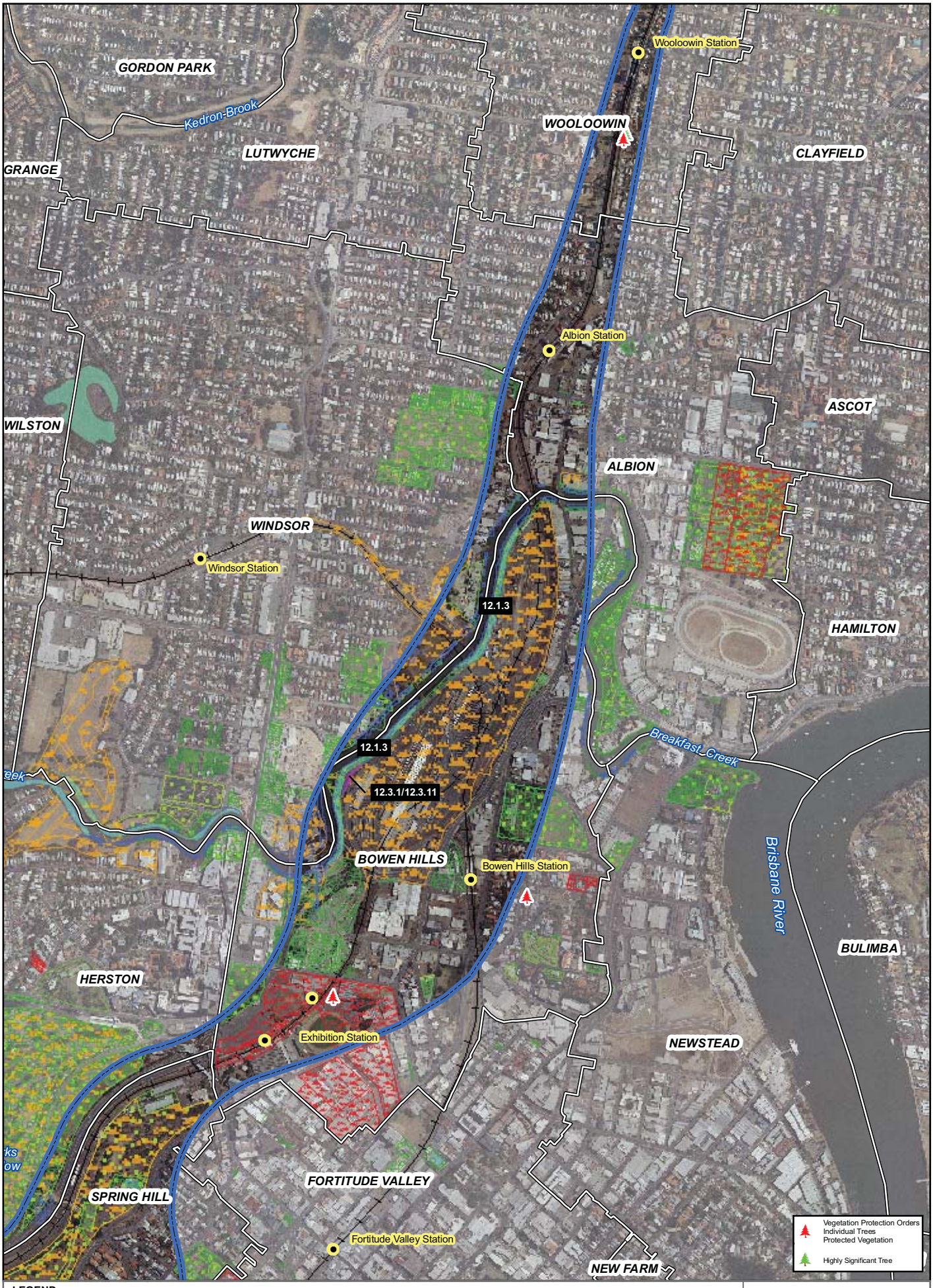
Land within Ipswich at Swanbank is proposed to be the spoil placement site for the Project. This site is an appropriate site for the placement of fill material from large construction projects. The placement of fill material from other regional infrastructure projects and areas has been occurring for over five years at this site. As this is an existing and registered waste facility site, no assessments were undertaken to determine its significance in terms of nature conservation values. The study corridor is located approximately 13 km from the Moreton Bay Ramsar site at its closest point. Additionally, no National Parks, Conservation Parks, Nature Refuges or Marine Parks listed under applicable legislation have been located within or directly adjacent to the study corridor.

11.2.1 Corridor-wide considerations

The overall nature conservation considerations for the study corridor have been divided into three sections as per the methodology sections to aid with clarity. These are:

- terrestrial flora
- terrestrial fauna
- aquatic flora and fauna.

Natural conservation constraints for the study corridor are shown on **Figure 11-6** to **Figure 11-9**.



LEGEND

- Study Corridor
- Suburbs
- Station
- Track

- High Value Regrowth Vegetation

Regional Ecosystem

- Endangered - Sub-dominant
- Endangered - Dominant
- Of Concern - Sub-dominant
- Of Concern - Dominant
- Not Of Concern
- Plantation forest

- Wetland Vegetation - Protected Vegetation
- Significant Landscape Trees - Protected Vegetation
- Significant Native Vegetation - Protected Vegetation
- Valued Urban Vegetation - Protected Vegetation
- Vegetation Protection Orders - Protected Vegetation
- Council Controlled Vegetation - Protected Vegetation
- Park

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-6

Natural Conservation Constraints
Sheet 1 of 4 (Northern Section)

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LEGEND

- Study Corridor
- Suburbs
- Station
- Track

- High Value Regrowth Vegetation

Regional Ecosystem

- Endangered - Sub-dominant
- Endangered - Dominant
- Of Concern - Sub-dominant
- Of Concern - Dominant
- Not Of Concern
- Plantation forest

- Wetland Vegetation - Protected Vegetation
- Significant Landscape Trees - Protected Vegetation
- Significant Native Vegetation - Protected Vegetation
- Valued Urban Vegetation - Protected Vegetation
- Vegetation Protection Orders - Protected Vegetation
- Council Controlled Vegetation - Protected Vegetation
- Park

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-7

Natural Conservation Constraints
Sheet 2 of 4 (Central Section)

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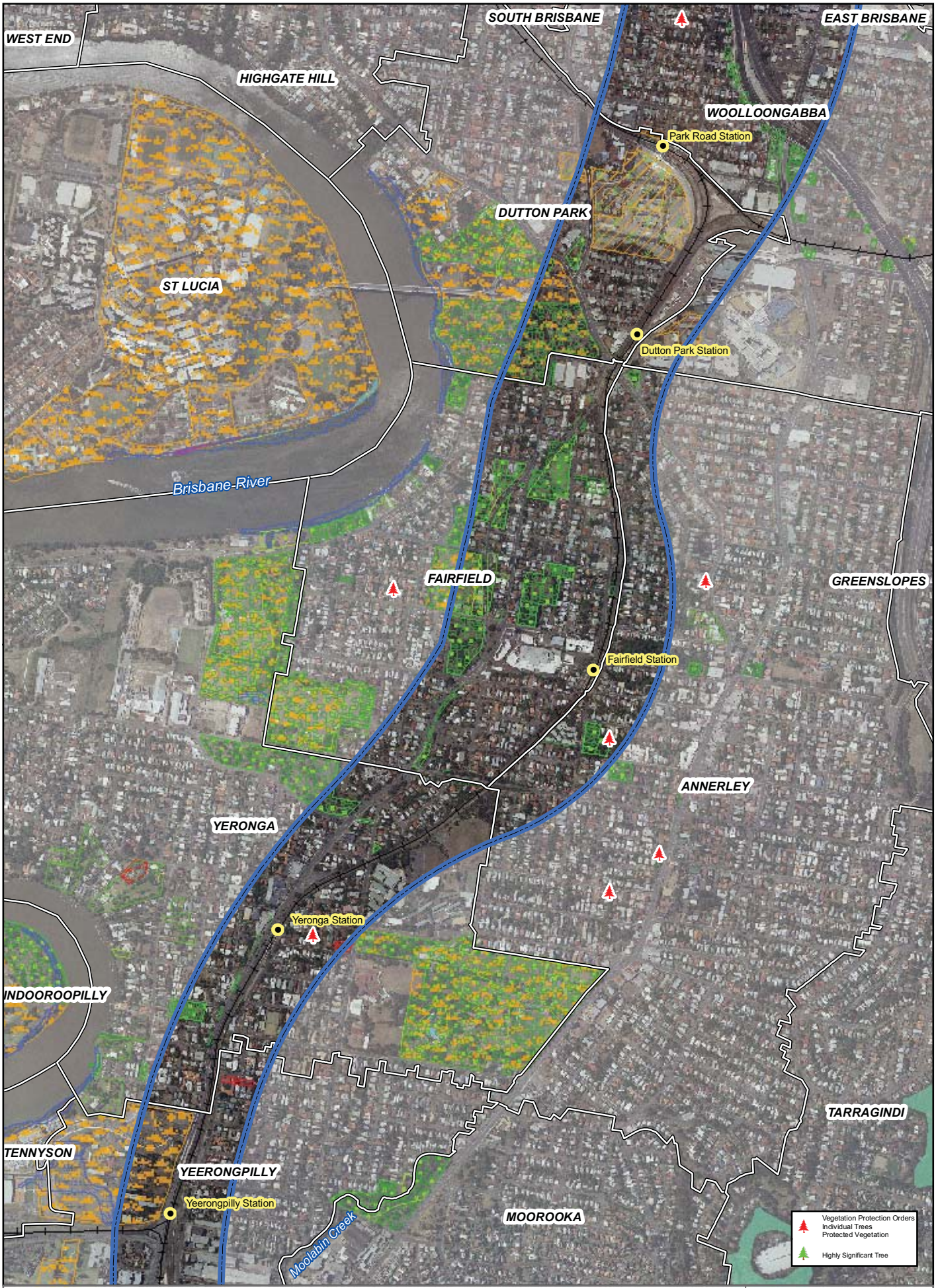

LEGEND

- Study Corridor
- Suburbs
- Station
- Track
- High Value Regrowth Vegetation

Regional Ecosystem

- Endangered - Sub-dominant
- Endangered - Dominant
- Of Concern - Sub-dominant
- Of Concern - Dominant
- Not Of Concern
- Plantation forest
- Wetland Vegetation - Protected Vegetation
- Significant Landscape Trees - Protected Vegetation
- Significant Native Vegetation - Protected Vegetation
- Valued Urban Vegetation - Protected Vegetation
- Vegetation Protection Orders - Protected Vegetation
- Council Controlled Vegetation - Protected Vegetation
- Park

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-8

Natural Conservation Constraints
Sheet 3 of 4 (Southern Section)

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LEGEND

- Study Corridor
- Suburbs
- Station
- Track
- High Value Regrowth Vegetation

Regional Ecosystem

- Endangered - Sub-dominant
- Endangered - Dominant
- Of Concern - Sub-dominant
- Of Concern - Dominant
- Not Of Concern
- Plantation forest
- Wetland Vegetation - Protected Vegetation
- Significant Landscape Trees - Protected Vegetation
- Significant Native Vegetation - Protected Vegetation
- Valued Urban Vegetation - Protected Vegetation
- Vegetation Protection Orders - Protected Vegetation
- Council Controlled Vegetation - Protected Vegetation
- Park

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-9

Natural Conservation Constraints
Sheet 4 of 4 (Southern Section)

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

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Terrestrial flora

There are three small patches of State Regional Ecosystems mapped within the study corridor along Enoggera Creek/Breakfast Creek next to the Mayne Rail Yard at Bowen Hills (northern section). Two of these areas are mapped as 'Least Concern' Regional Ecosystem 12.1.3 and one area is mapped as 'Endangered/Of Concern' Regional Ecosystem 12.1.3/12.3.11 (refer to **Figure 11-6**).

However, Accad *et al.* (2008) indicate that the Queensland Herbarium RE mapping is at "1:100 000" scale, which delineates a minimum area for remnant vegetation of 5 ha and 75 m width limit for linear features". Each of the three areas within the study corridor are smaller than 1.5 ha. Due to the proximity of Enoggera Creek/Breakfast Creek and the connection with the mangroves which line this section of the Creek these patches may provide some habitat value to a number of species or form part of a wildlife corridor.

As the reference design alignment avoids these areas, they would not be impacted upon as a result of this project. **Table 11-2** shows the total area of each mapped State Regional Ecosystem area within the corridor.

Table 11-2 Total area of each mapped State Regional Ecosystem area

Area number	Regional Ecosystem number and status	Regional Ecosystem description	Size
1	12.1.3 ('Least Concern')	Mangrove shrubland to low closed forest on marine clay plains and estuaries	11 764.2 m^2 (1.18ha)
2	12.1.3 ('Least Concern')	Mangrove shrubland to low closed forest on marine clay plains and estuaries	14 353.81 m^2 (1.44ha)
3	12.3.1/12.3.11 ('Endangered/Of Concern')	Gallery rainforest (notophyll vine forest) on alluvial plains/*Eucalyptus tereticornis*, *E. siderophloia*, *Corymbia intermedia* open forest on alluvial plains near coast	2 884.13 m^2 (0.29ha)

Note:
State Regional Ecosystem is from DERM's regional ecosystem description database (DERM 2009f).

In addition to the State Regional Ecosystem mapping, BCC has also mapped a number of smaller scale locally recognised Regional Ecosystems. These locally recognised Regional Ecosystems are scattered throughout the study corridor. However most of these are not mapped as remnant vegetation or significant vegetation. The only areas within the corridor which are of significance are two areas of 'Not of Concern' Local Regional Ecosystem (12.1.3).

One of these areas is located along the western side of the Mayne Rail Yard and overlaps with the 'Endangered/Of Concern' State Regional Ecosystem in **Table 11-2**. The other area of 'Not of Concern' Local Regional Ecosystem (12.1.3) is along the edge of the Brisbane River in the City Botanic Gardens and around to the Pacific Motorway. There are also a number of locally mapped unclassified remnant Regional Ecosystems present within the corridor. These are located in the southern section of the study corridor. The first of these is located within the backyard of a residential block in Fairfield which is located to the east of Fairfield Gardens in the central section of the study corridor. The second unclassified area is located within Lagonda Park (southern section) and includes the gully system which runs through the park (refer **Photograph 11-1**). There are also some small scattered patches of unclassified Local Regional Ecosystem along Rocky Water Holes Creek in Moorooka (southern section) (refer **Photograph 11-2**). These areas are all mapped in **Appendix G2.**


Photograph 11-1 (A & B) **Lagonda Park, Lagonda Street, Annerley**


Photograph 11-2 (A & B) **Green space 19 (Railway Terrace) Rocky Water Holes Creek, Moorooka**

There are also a number of locally recognised wetlands within the study corridor (refer to **Appendix G2**). These are located along the edges of Enoggera Creek/Breakfast Creek in Windsor and Bowen Hills in the northern section, however these patches are scattered and are not continuous along the length of the waterway. York's Hollow in Victoria Park, Spring Hill (**Photograph 11-3**), is also mapped as a local wetland along with the area in the City Botanic Gardens which is mapped as a Local Regional Ecosystem (central section). There are also some small wetlands around Rocky Water Holes Creek and Stable Swamp Creek in the southern section which are mapped and recognised at the local scale by BCC.


Photograph 11-3 (A & B) **York's Hollow in Victoria Park, Spring Hill**

None of these State or Local Regional Ecosystem areas or wetlands will be directly impacted by the Project.

Desktop database searches indicate a large number of flora species previously recorded, or mapped as occurring, within the study corridor. Of these 20 were threatened species which may occur within the study corridor, based on the presence of suitable habitat. Eleven of these species are listed under the EPBC Act and 16 under the NC Act, with many of these being listed under both Acts. **Table 11-3** outlines the EVR terrestrial flora species identified from database searches and their potential to occur within the study corridor. The likelihood of an identified species, listed in **Table 11-3**, being encountered within the study corridor is described in the last column of the table. Species which are 'not likely' to occur within the study corridor based on the lack of suitable habitat and/or recorded sightings of the species within the study corridor have not been included in the table. For the full list of potential significant terrestrial flora species identified from database searches refer to **Appendix G3**.

In addition to the Commonwealth and State EVR species, there are also two flora species which may occur within the corridor which are recognised as being locally significant by BCC. These are also included in **Table 11-3**.

Table 11-3 Likely presence of significant terrestrial flora species identified from database searches

Scientific name	Common name	Status	Source	Likely presence
Gossia gonoclada^	Angle-stemmed Myrtle	EN (Qld) EN (Aust)	1 & 2	**Possible** – Not located during survey of area but noted to occur within the Oxley Creek Catchment area and has been actively reintroduced into the area by the *A. gonoclada* Recovery Team as part of the *Recovery plan for the angle-stemmed myrtle A. gonoclada 2001-2005.*
Eucalyptus curtisii	Plunket Mallee	R (Qld) Restricted distribution (BCC)	2	**Present** – Located during surveys of area but specimens are likely to have been planted as the natural distribution of this species is 60 km south of Brisbane on poor sandstone ridges.
Persicaria elatior	Tall Knotweed	VU (Qld)	2	**Possible** – Not located during survey of area. This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance (DEC 2005).
Picris conyzoides	-	VU (Qld)	2 & 3	**Possible** – Not located during survey of area. Occurs in open eucalypt forest on heavy soils, often on disturbed sites (Leiper *et al.* 2008).
Macadamia integrifolia	Smooth-shelled Macadamia Nut	VU (Qld) VU (Aust) Restricted distribution (BCC)	1	**Present** – Located during survey of area but likely to be a cultivated specimen intentionally planted within a park. Not likely to be a wild specimen as this species is naturally associated with subtropical rainforest areas between Grafton, NSW and Maryborough, QLD which does not occur within the study corridor (TSSC 2008).

Notes:
***Status** - CE: Critically Endangered, EN: Endangered, VU: Vulnerable, R: Rare, Restricted distribution (BCC): is recorded as having a restricted distribution within Brisbane City under the BCC Natural Assets Planning Scheme Policy, Aust = Status under the Commonwealth EPBC Act, Qld = Status under the Queensland NC (Wildlife) Regulation.*
***Source** - 1: EPBC Protected Matters report; 2: Qld Herbarium HERBRECS database, 3: DERM Wildnet database.*
^ Gossia gonoclada has been identified through database searches as potentially occurring within the study corridor. If this species is located during future activities within the study corridor, the objectives and management practices of the Commonwealth 'Recovery plan for the angle-stemmed myrtle (Gossia gonoclada) 2001-2005' should be complied with.

Site surveys were undertaken to establish the presence of protected and EVR species within the study corridor and areas which may support these species. Overall, due to the highly urbanised nature of the study corridor, the majority of the species identified were common and widespread species.

As noted in **Table 11-3** a number of specimens of Plunkett mallee (*Eucalyptus curtisii*), listed as Rare under the NC Act were located in three locations within the study corridor, namely Dutton Park (central section), the green space located along Railway Road between Bledisloe and Sunbeam streets, Fairfield (southern section) and Fehlberg Park (southern section). However these are not considered to constitute wild populations as their habitat and distribution range does not occur within the study corridor. A single specimen of Macadamia nut (*Macadamia integrifolia*) was also located in the northern section at Flynn Oval/Mann Park, but again it is highly likely that this has been planted. Refer **Photographs 11-4** to **11-6** for images of Dutton Park, Fehlberg Park and Flynn Oval/Mann Park.


Photograph 11-4 (A & B) **Dutton Park and South Brisbane Cemetery, Dutton Park (central section)**


Photograph 11-5 (A & B) **Fehlberg Park, Yeronga (southern section)**


Photograph 11-6 (A & B) **Flynn Oval/Mann Park, Windsor (northern section)**

A description of the sites visited is provided in **Table 11-4** and a comprehensive list of flora species recorded during current surveys is included in **Appendix G4**. However it should be noted that for the Wickham Park, Roma Street Parkland and City Botanic Gardens sites, the list is indicative only due to the high floristic diversity occurring in these areas. Most of the species in these areas are introduced ornamental species.

These parks have been established for horticultural and recreational purposes and consequently are dominated by introduced species. The original species and habitat have been cleared, with few remnant trees or areas of remnant vegetation remaining.

All of the sites investigated during the survey work have been assessed and provided with a relative value compared to the other sites within the study corridor based on their habitat potential. This habitat potential is based on a combination of factors including vegetation structure, potential and actual habitat values and connection to other areas which have habitat potential. In addition to these factors, community efforts were also taken into consideration as areas which are actively being improved by bush care groups are likely to provide more value to native wildlife than other areas both now and in the future.

The areas within the corridor which have the highest habitat potential are:

- the Regional Ecosystem areas along Enoggera Creek/Breakfast Creek (northern section) (refer **Figure 11-6**)
- the northern end of Victoria Park and York's Hollow in Spring Hill (central section) (refer **Photograph 11-3**)
- Wickham Park and Roma Street Parkland in the CBD (central section) (refer **Photograph 11-3**)
- City Botanic Gardens in the CBD (central section) (refer **Photograph 11-8**)
- the Kangaroo Point cliffs along Count White Park at Kangaroo Point (central section) (refer **Photograph 11-9**)
- Dutton Park and South Brisbane Cemetery in Dutton Park (central section) (refer **Photograph 11-4**)
- Lagonda Park in Annerley (southern section) (refer **Photograph 11-1**).

All of the areas investigated during the site survey along with their overall habitat potential are illustrated on **Figures 11-10** to **Figure 11-13**.

Table 11-4 Field observations for investigated sites

Vegetation description	Fauna	Habitat description
Northern Section		
Yowoggera Park, Albion		
Primarily amenity landscaping, mown grass and shade trees. Two species of mangroves fringe the creek bank – Grey Mangrove (*Avicennia marina* var *australasica*) and River Mangrove (*Aegiceras corniculatum*). There is also a strip of unmown grass and herbaceous plants the majority of which are introduced species along the top of the creek bank.	Only a limited number of disturbance tolerant, common and widespread bird species were observed during current surveys including *Threskiornis molucca* (Australian white ibis), *Sphecotheres vieilloti* (Australasian figbird), and *Gerygone levigaster* (Mangrove gerygone).	Yowoggera Park has limited habitat value due to its limited area, linear shape, surrounding land use and simplified vegetation structure. However it forms part of the linkage of parkland along Enoggera Creek/Breakfast Creek, providing a "green" buffer from the surrounding urban development.
Windsor Park, Windsor		
There is a stand of shade trees, mostly Swamp Cypress adjacent to McDonald Road. The ground storey is mown grass and the Park does not support any understorey vegetation. Mainly used as sporting fields, with small isolated stands of shade trees, comprising exotic species.	Only a limited number of disturbance tolerant, common and widespread bird species were observed during surveys and are likely to use this site.	There is little habitat value at Windsor Park due to the limited extent of tree cover and very simplified vegetation structure.
Flynn Oval/Mann Park, Windsor		
Scattered trees planted in mown parkland with denser plantings and weed growth adjacent to the fence that separates the park from the adjacent railway land. A single Macadamia Nut tree, a species which is listed as Vulnerable under the NC Act and the EPBC Act appears to have been planted in the park. Along the banks of Enoggera Creek/Breakfast Creek is a strip of Grey Mangrove and River Mangrove forest and Swamp Oak (*Casuarina glauca*) with small patches of Saltwater Couch (*Sporobolus virginicus*) and Seablight (*Suada australis*).	Only a limited number of disturbance tolerant, common and widespread bird species were observed during surveys and are likely to use this site.	There is little habitat value at Flynn Oval/Mann Park due to the limited extent of tree cover and simplified vegetation structure over most of the site. However the Park forms part of the linkage of parkland along Enoggera Creek/Breakfast Creek.
RNA Showgrounds, Bowen Hills		
The vegetation includes a number of large, mature Weeping Figs (*Ficus* sp.) and amenity landscaping around some of the buildings. Bowen Park is also present within the RNA Showgrounds (located at the corner of Bowen Bridge Road and O'Connell Terrace). The park supports a number of native and exotic shade tree species.	Only a limited number of disturbance tolerant, common and widespread bird species were observed during surveys and are likely to use this site.	The limited extent of vegetation, the structural simplicity of the vegetation and its isolation from other areas of habitat make the habitat value of this site relatively low.

Vegetation description	Fauna	Habitat description
Central Section		
Victoria Park (including York's Hollow), Herston/Spring Hill		
There are significant areas of mown grass with scattered large shade trees on the slope below Gregory Terrace. At the bottom of the slope and right along the boundary fence adjacent to the railway line is a dense screen of planted trees and shrubs. Towards the south-east corner of the site is an area of open eucalypt forest which, according to a plaque at the site, was planted in 1959. The waterways in and around what was called York's Hollow were expanded and replanted as part of the works associated with the construction of the Inner City Bypass (ICB). There are extensive areas of amenity and habitat landscape plantings including aquatic macrophytes, herbaceous plants shrubs and trees. The amenity planting extends across the land bridge that connects the two sides of the park across the bypass and the railway lines. The species used in the plantings in Victoria Park are predominantly native with a small number of introduced plant species.	A relatively species diverse area with 15 native bird species, two species of native mammal, two species of native frog and one native reptile recorded during the current survey. All species are relatively common and widespread. The Grey-headed Flying-fox (*Pteropus poliocephalus*), listed as Vulnerable under the NC Act and the EPBC Act is likely to feed within the site from time to time when suitable species such as eucalyptus, melaleucas and banksias, are in fruit or flower.	The presence of mature trees, planted forest, landscaped water bodies and some areas of complex vegetation structure gives Victoria Park a comparatively high habitat value. It has reasonably low human usage and due to its topography is relatively unaffected by traffic noise, sheltering this area for less disturbance tolerant species. In addition to the complex vegetation present, there are also a number of fauna boxes present in the northern section of the park. However some of these are currently broken and are not useable by fauna.
Wickham Park and Roma Street Parkland, Spring Hill/Brisbane CBD		
Contains a highly diverse range of tropical and subtropical flora species from Australia and around the world, mown grass and aquatic macrophytes associated with the various artificial waterways and water bodies within the park. Within Emma Miller Place, which is part of Wickham Park and Roma Street Parkland, there is a large fig which is located in close proximity to the Roma Street Transit Centre.	A relatively diverse area with 12 species of native bird and four species of native mammal, including Grey-headed Flying-fox, recorded during the current survey. During nocturnal searches the Grey-headed Flying-foxes were noted feeding within the parklands; however no roosts were identified within Wickham Park or the Roma Street Parkland.	The habitat values are relatively high in Wickham Park and Roma Street Parkland. This is due to the size of the parks, complexity of the vegetation structure and diversity of flora species. The waterways and waterbodies also provide additional habitat values for fauna. Due to the topography of the parks, the area is relatively unaffected by traffic noise. It is likely that as the vegetation matures, the fauna diversity In Wickham Park and Roma Street Parkland would increase.

Vegetation description	Fauna	Habitat description
City Botanic Gardens, Brisbane CBD		
This City Botanic Gardens contains a highly diverse range of planted flora species from around Australia and the world, mown grass and aquatic macrophytes associated with the ponds within the park. Along the edges of the Brisbane River are mangrove forests containing Grey Mangrove and River Mangrove. Specimens of Ponytail Palm (*Wodyetia bifurcata*) have also been planted in the Gardens. The species is listed as Vulnerable under the NC Act and EPBC Act. This species is endemic to northeast Queensland and occurs nowhere else, therefore it can be assumed that these specimens are planted and not a natural occurrence.	Not as diverse as the Victoria Park or Wickham and Roma Street Parkland. Most bird species recorded are disturbance tolerant, common and widespread. The Grey-headed Flying-fox is likely to feed within the site from time to time when suitable flora species are in fruit or flower. An unidentified freshwater turtle was observed in the pond during spotlighting surveys.	This site has some patches of relatively complex vegetation though these are limited in extent. Flora diversity is also high. The pond in the Gardens provides an additional resource for fauna. The presence of a relatively large area of mangrove forest as compared with other sites in the study corridor adds to its habitat values. However the habitat values of the Gardens are somewhat tempered by the isolation of the site from other terrestrial habitat areas by the Brisbane CBD and the Brisbane River. It is also subject to intense human usage at least during daylight hours.
Count White Park, Kangaroo Point		
Count White Park is a thin strip of parkland located at the base of the Kangaroo Point Cliffs on the banks of the Brisbane River. The vegetation is mainly amenity planting with a mixture of native and introduced trees, shrubs and herbaceous plants and mown grass. There are patches of mangrove forest and scattered individuals consisting of an overstorey of Grey Mangrove and an understorey of River Mangrove.	The most notable bird species observed during current surveys was a Striated heron (*Butorides striatus*) on the edge of the Brisbane River. It is common around the coast of Queensland in mangroves and intertidal flats. Eastern Water Dragons were numerous during the survey. It is likely that Common Brushtail Possums (*Trichosurus vulpecula*) and the three species of Flying-fox recorded in the Brisbane area would use the park to feed in the figs and other flowering and fruiting trees within the park. Robust Velvet Gecko (*Oedura robusta*) is generally found in dry forests, woodlands and rock outcrops but not generally found in inner urban areas. It however is present in significant numbers on Kangaroo Point Cliffs according to a number of previous studies (Wilson 2005).	The area has limited habitat value due to its limited area and high human usage although the vegetation structure and species diversity is relatively high.

Vegetation description	Fauna	Habitat description
Dutton Park and South Brisbane Cemetery, Dutton Park		
The vegetation is dominated by native and introduced tree species in mown grass. There are areas of newly installed amenity landscaping adjacent to the approaches of the Eleanor Schonell Bridge. There is also a significant patch of open forest with a mid storey of shrubs and a ground storey dominated by introduced grasses with some forbs located in and around the gully which runs down the middle of the park towards the Brisbane River. Along the banks of the Brisbane River is a fringe of mangrove forest consisting of an overstorey of Grey Mangrove and an understorey of River Mangrove. This site contains a number of large, mature Forest Red Gums (*Eucalyptus tereticornis*) that are likely to be remnants of the original vegetation on the site. The largest of these is adjacent to the lower car park approximately 33 m tall with a DBH of 1.16 m. There are also a number of large native and introduced trees that have planted throughout the site. These include two large Hoop Pines (*Araucaria cunninghamii*) adjacent to TJ Doyle Memorial Park Drive approximately 34 m tall and 1.04 m DBH. Within the Cemetery is a large Bunya Pine (*Araucaria bidwillii*) approximately 30 m tall with a DBH of 1.02 m and an introduced Chir Pine (*Pinus roxburghii*) in the order of 30 m tall with a DBH of 1.52 m. The Cemetery was officially opened in 1870 and some of the larger trees may have been planted around this period which would make them at least 100 years old. A number of specimens of Plunkett Mallee (*Eucalyptus curtisii*) are located within the park and cemetery. This species is listed as Rare under the NC Regulation. However it is very likely that these are planted specimens. This species is commonly planted in amenity landscaping.	Common Brushtail Possums are common and observed throughout the site. Black Flying-foxes (*Pteropus alecto*) were observed feeding on a number of trees that were fruiting at the time of survey. These are commonly encountered throughout the Greater Brisbane area. The Grey-headed Flying-fox is likely to feed within the site from time to time when suitable species are in fruit or flower. The majority of the bird species are also common and widespread species adapted to urban landscapes. The most notable was a single Southern Boobook Owl (*Ninox boobook*) heard calling during a nocturnal survey. Whilst still common and widespread they are not commonly encountered. A Rainbow Lorikeet (*Trichoglossus haematodus*) was also observed entering and exiting a hollow in the base of a Forest Red Gum within the cemetery area.	Much of the vegetation across the park and cemetery has a relatively simple structure though it is relatively species rich. The large naturally occurring Forest Red Gums are an additional but limited habitat resource. The mangrove forest along the edge also provides additional habitat resources but again is limited in extent. The traffic noise and disturbance from TJ Doyle Memorial Park Drive diminishes the habitat values of the site. It is also relatively isolated from other terrestrial habitats by the surrounding urban development.

Vegetation description	Fauna	Habitat description
Gair Park, Dutton Park		
Gair Park is a small pocket park on the eastern side of Gladstone Road opposite Dutton Park. It is dominated by a stand of Spotted Gums approximately 30 m tall with a DBH around 0.6 m. There are small areas of garden containing native and introduced shrubs and herbaceous plants with most of the balance covered in mown grass. It has little habitat value due to its small size, its relative isolation (it is bound on all sides by streets and roads) and simple vegetation structure.	No fauna was seen during the diurnal survey of this site and no spotlighting was carried out due to the low habitat value of the park. It is likely that due to the small size of the park and the close proximity of the surrounding roads, only common, disturbance tolerant fauna would be present in this park.	Little habitat value due to its small size, its relative isolation (it is bound on all sides by streets and roads) and simple vegetation structure.
Southern Section		
JF O'Grady Memorial Park, Fairfield		
JF O'Grady Memorial Park is dominated by sports fields with a screen of trees along the back fences of the adjacent residences along the western boundary. Trees are also planted adjacent to the northern and eastern perimeter. The clubhouse and car park is located on the southern side of the site off Brougham Street and there are some shade trees and amenity landscaping associated with these.	No incidental fauna sightings were made in this survey site and no spotlighting was carried out. It is likely that Common Brushtail Possums and various species of Flying-fox recorded in the Brisbane area would use the park to feed in the figs and other flowering and fruiting trees within the site.	There is little habitat value at this site due to the limited extent of tree cover and very simplified vegetation structure.
Green space located along Railway Road between Bledisloe and Sunbeam Streets, Fairfield		
The small green space area located between Railway Road between Bledisloe and Sunbeam Streets is dominated by fig trees and Hoop pine species, with a scattering of native shrubs present.	Only a limited number of disturbance tolerant, common and widespread bird species were observed during surveys. In addition, the introduced Asian House Gecko (*Hemidactylus frenatus*) was present.	There is little habitat value at this site due to the limited extent of tree cover and simplified vegetation structure. However, the figs are likely to provide a foraging resource to frugivorous mammals and birds.
Robinson Park, Fairfield		
Robinson Park is on the southern side of Brougham Street adjacent to JF O'Grady Memorial Park. The vegetation within it is a mixture of introduced and native shade trees in mown grass interspersed with small garden areas.	Only two species of common and widespread bird species were noted. No spotlighting was carried out. It is likely that Common Brushtail Possums and the three species of Flying-fox recorded in the Brisbane area would utilise the park to feed in the figs and other flowering and fruiting trees within the site from time to time.	The simplified vegetation structure, its limited area and its proximity to high traffic noise from Fairfield Road limit its habitat values.

Vegetation description	Fauna	Habitat description
Southern extent of Fehlberg Park, Yeronga		
Fehlberg Park is a park of mown grass with a canopy of scattered trees. There are approximately five mature Plunkett Mallee in a row adjacent to Hyde Road. These are almost certainly planted as they are in a straight line, more or less equidistant apart in mown grass.	A small number of common and widespread bird species adapted to urban environments were observed during the survey. Scratches were observed on one of the Plunkett Mallee. These are most likely to be caused by Common Brushtail Possum. It is also likely that various species of Flying-fox recorded in the Brisbane area would utilise the park to feed in the eucalypts and corymbias and other flowering and fruiting trees within the Park.	The southern section of Fehlberg Park has relatively poor habitat values due to the relatively simple vegetation structure and the limited extent of tree cover.
Lagonda Park, Lagonda Street, Annerley		
The western half of this small pocket park consists of mown grass with a canopy dominated by jacaranda with a perimeter of planted native trees and shrubs. The eastern half is centred around a drainage gully which has been heavily planted with native trees, shrubs and herbaceous plants by local groups.	This small site has been subject to intense effort to improve its habitat value through the planting of native species and improving the gully system which runs through the park. Common Brushtail Possums and a Ringtail possum (*Pseudocheirus peregrinus*) were observed during the current survey. There was also Flying-fox activity in the private properties adjacent to the site. It is likely that various species of Flying-fox recorded in the Brisbane area would utilise the park to feed in the eucalypts and corymbias and other flowering and fruiting trees within the site. A juvenile frog was observed at the bottom of the gully but was not positively identified. Signage in the park indicates that five species of frog have been observed within the park. The introduced Asian House Gecko (*Hemidactylus frenatus*) was heard in neighbouring residential areas.	Although the Park is limited in area and is relatively isolated from adjacent habitat areas this site has moderate habitat values due to its relatively complex vegetation structure and species diversity. Frog ponds have been installed at the base of the gully and there is some rock and coarse woody debris to provide cover for ground dwelling fauna. Additionally this area appears to be highly valued by the surrounding community who have invested considerable time and effort to improve species diversity.
Rowlinson Park, Nelson Street, Yeronga		
This park is primarily mown grass with a band of trees along the Nelson Street boundary.	A small number of common and widespread bird species adapted to urban environments were observed during the survey.	There is little habitat value at this site due to the limited extent of tree cover, very simplified vegetation structure and the site's isolation from adjacent habitat.

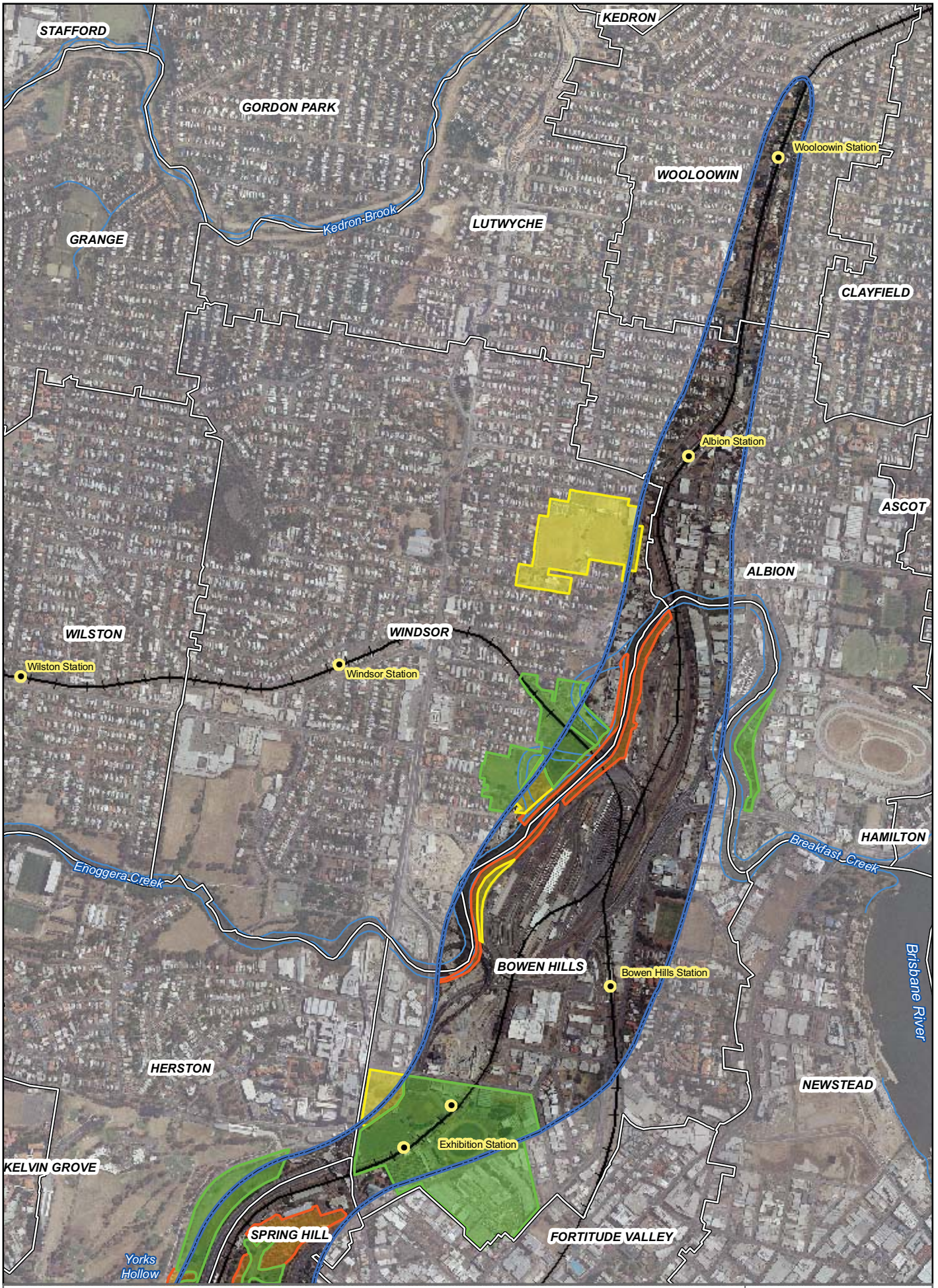
Vegetation description	Fauna	Habitat description
Brisbane Golf Club, Yeerongpilly		
The area of Brisbane Golf Club within the study corridor is a narrow strip adjacent to Fairfield Road. It contains a narrow band of mainly native trees, mainly Forest Red Gum.	No fauna survey was carried out at this site as it is located on the edge of the study corridor and is unlikely to be impacted by the Project. Additionally, due its proximity to Fairfield Road and the intense human activity that occurs there it is likely that common and widespread bird species adapted to urban environments would use the site.	There is little habitat value at this site due to the limited extent of tree cover, very simplified vegetation structure and the site's proximity to Fairfield Road.
Green space (Melbourne Street) Rocky Water Holes Creek, Moorooka		
This relatively small area of green space consists mainly of mown grass with a few small patches of trees and shrubs. Rank grass and other weeds and aquatic plants (primarily native) dominate from the top of bank and into the creek channel.	A number of bird species that are grassland specialists including the Golden-headed Cisticola (*Cisticola exilis*) were observed as well as a small number of common and widespread bird species adapted to urban environments. A number of Water dragons (*Physignathus lesueurii*) were also noted around the Creek.	There is little habitat value at this site due to the limited extent of tree cover and very simplified vegetation structure. Rocky Water Holes Creek has limited value because of its simplified channel structure and poor water quality.
Peter Scott Skate Park, Moorooka		
This small area is dominated by riparian vegetation along Rocky Water Holes Creek which includes large mature remnant trees and planted trees and shrubs. The groundstorey includes weeds and planted native herbaceous plants (mainly Creek Matrush (*Lomandra hystrix*)).	A small number of common and widespread bird species adapted to urban environments were observed during the survey.	There is little habitat value at this site due to the limited extent of tree cover and very simplified vegetation structure. Peter Scott Skate Park has limited value because of its simplified channel structure and poor water quality.
Green space (Railway Terrace) Rocky Water Holes Creek, Moorooka		
This is a series of three interlinked green spaces on the banks of Rocky Water Holes Creek at Moorooka. It includes a mix of native and introduced planted and regrowth trees, shrubs and herbaceous plants in a mown grass park. There are a number of large remnant trees adjacent to Cobden Street – a Grey Ironbark (*Eucalyptus siderophloia*) approximately 20 m tall with a DBH of 0.6 m and a Forest Red Gum of a similar height and a DBH of 0.9 m. Rank grass and other weeds and aquatic plants (primarily native) dominate from the top of bank and into the creek channel.	A small number of common and widespread bird species adapted to urban environments were observed during the survey. Scratches were observed on one of the tree trunks. These are most likely to be caused by Common Brushtail Possum. It is also likely that various species of Flying-fox recorded in the Brisbane area would utilise the park to feed in the eucalypts and other flowering and fruiting trees within the site.	There is little habitat value at this site due to the limited extent of tree cover and very simplified vegetation structure. However the mature trees provide a useful food source for blossom feeding birds and Flying-foxes. This green space has limited value because of its simplified channel structure and poor water quality.

Vegetation description	Fauna	Habitat description
Kookaburra Park, Rocklea		
This is a relatively large park. Within the park there is an area dominated by Cadaghi (*Corymbia torelliana*) along the drain adjacent to the eastern boundary. This species is considered to be an environmental weed in South East Queensland. Perpendicular to this is a row of large Forest Red Gums.	A small number of common and widespread bird species adapted to urban environments were observed during the survey. In addition a number of waterfowl species were observed in Kookaburra Park.	There is little habitat value at this site due to the limited extent of tree cover and very simplified vegetation structure. However the mature trees provide a useful food source for blossom feeding birds and flying foxes. Kookaburra Parkhas limited value because of its simplified channel structure and poor water quality.
Green space, (Dollis Street) Rocklea		
This small patch of greenspace adjoins Rocky Water Holes Creek. The majority of the area is mown grass but there is a band of planted, regrowth and remnant tress adjacent to Dollis Street.	A small number of common and widespread bird species adapted to urban environments were observed during the survey. A hole in a termite nest in a tree was possibly the result of nesting Laughing Kookaburras (*Dacelo novaeguineae*).	There is little habitat value at this site due to the limited extent of tree cover and simplified vegetation structure.


Photograph 11-7 (A & B) **Wickham Park and Roma Street Parkland, Spring Hill/Brisbane CBD**


Photograph 11-8 (A & B) **City Botanic Gardens (Mianjin), Brisbane CBD**

Photograph 11-9 **Count White Park, Kangaroo Point**



LEGEND

- Study Corridor
- Suburbs
- Watercourse
- Station
- Track

Ecological Significance

- Low Habitat Potential
- Medium Habitat Potential
- High Habitat Potential

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-10

Habitat Potential of Survey Sites
Sheet 1 of 4 (Northern Section)

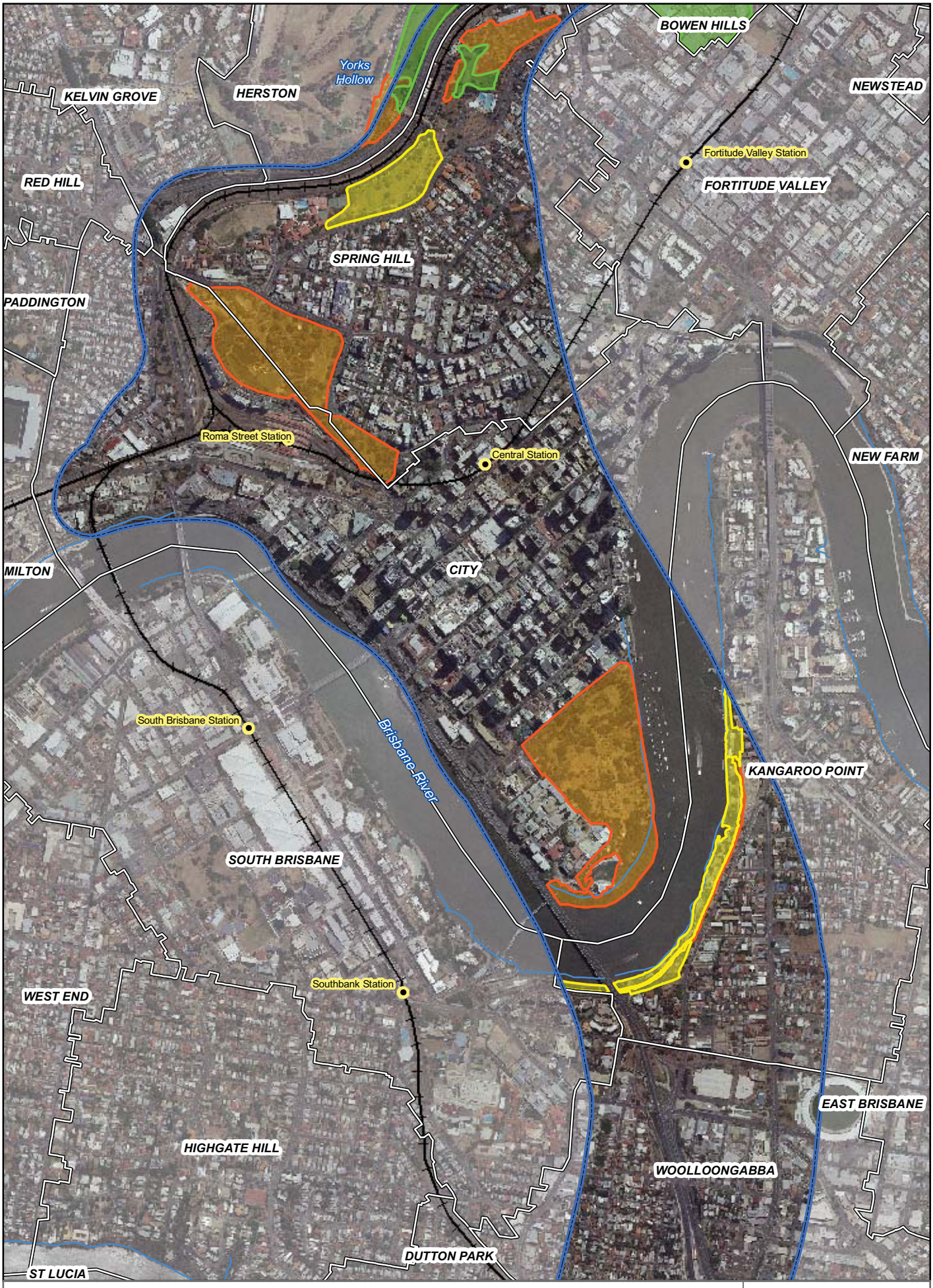
0 100 200 300 400 500 m
1:17,000 at A4

N

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRRVG073_CCR_Habitat_Potential_sheet1_A3_ver93.mxd 07/07/2011 17:51



LEGEND

- Study Corridor
- Suburbs
- Watercourse
- Station
- Track

Ecological Significance

- Low Habitat Potential
- Medium Habitat Potential
- High Habitat Potential

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-11

Habitat Potential of Survey Sites
Sheet 2 of 4 (Central Section)

0 100 200 300 400 500 m

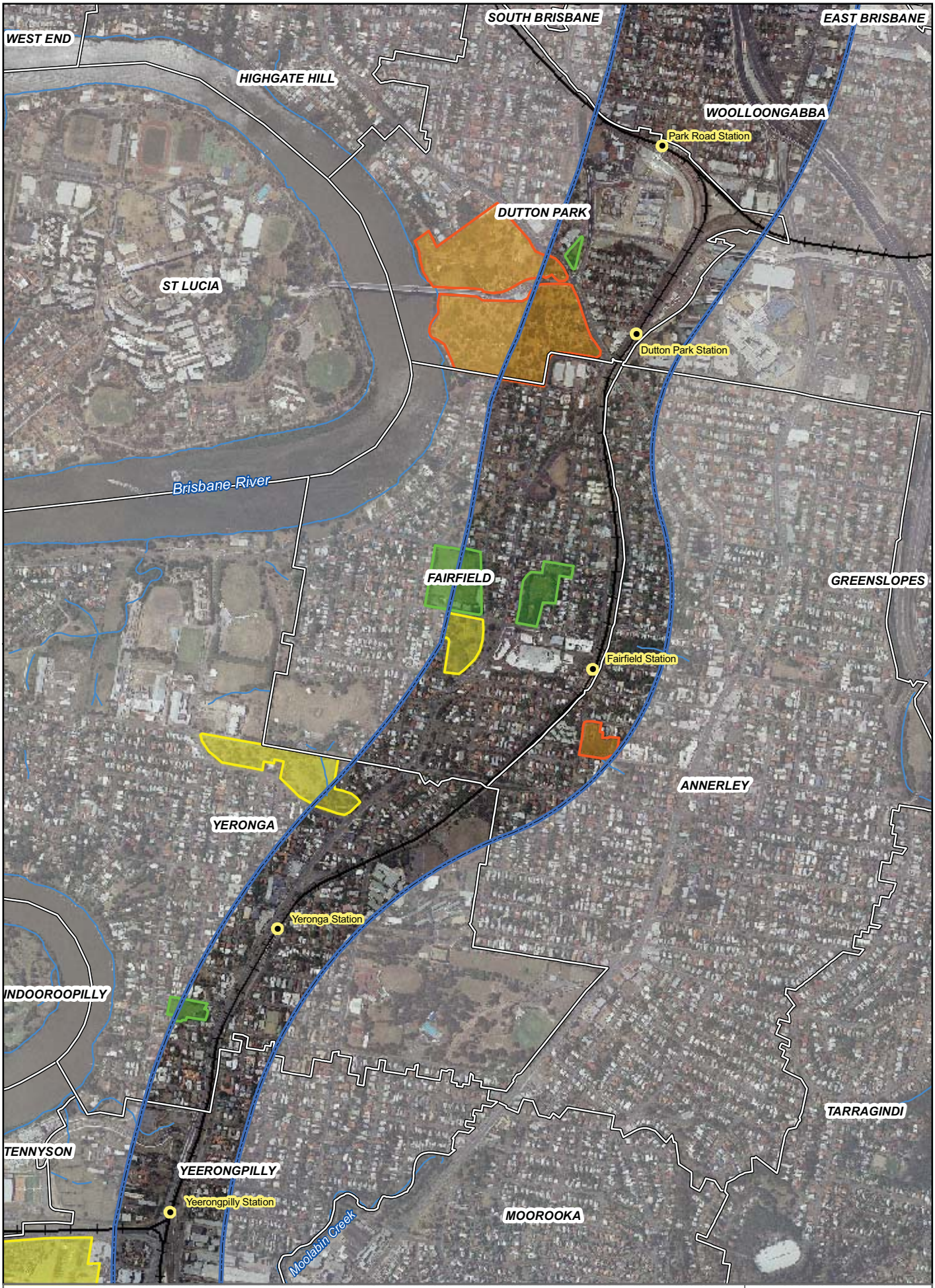
1:17,000 at A4

N

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G073_CCR_Habitat_Potential_sheet2_A3_ver93.mxd 07/07/2011 17:52



LEGEND

- Study Corridor
- Suburbs
- Watercourse
- Station
- Track

Ecological Significance

- Low Habitat Potential
- Medium Habitat Potential
- High Habitat Potential

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-12

Habitat Potential of Survey Sites
Sheet 3 of 4 (Southern Section)

0 100 200 300 400 500 m

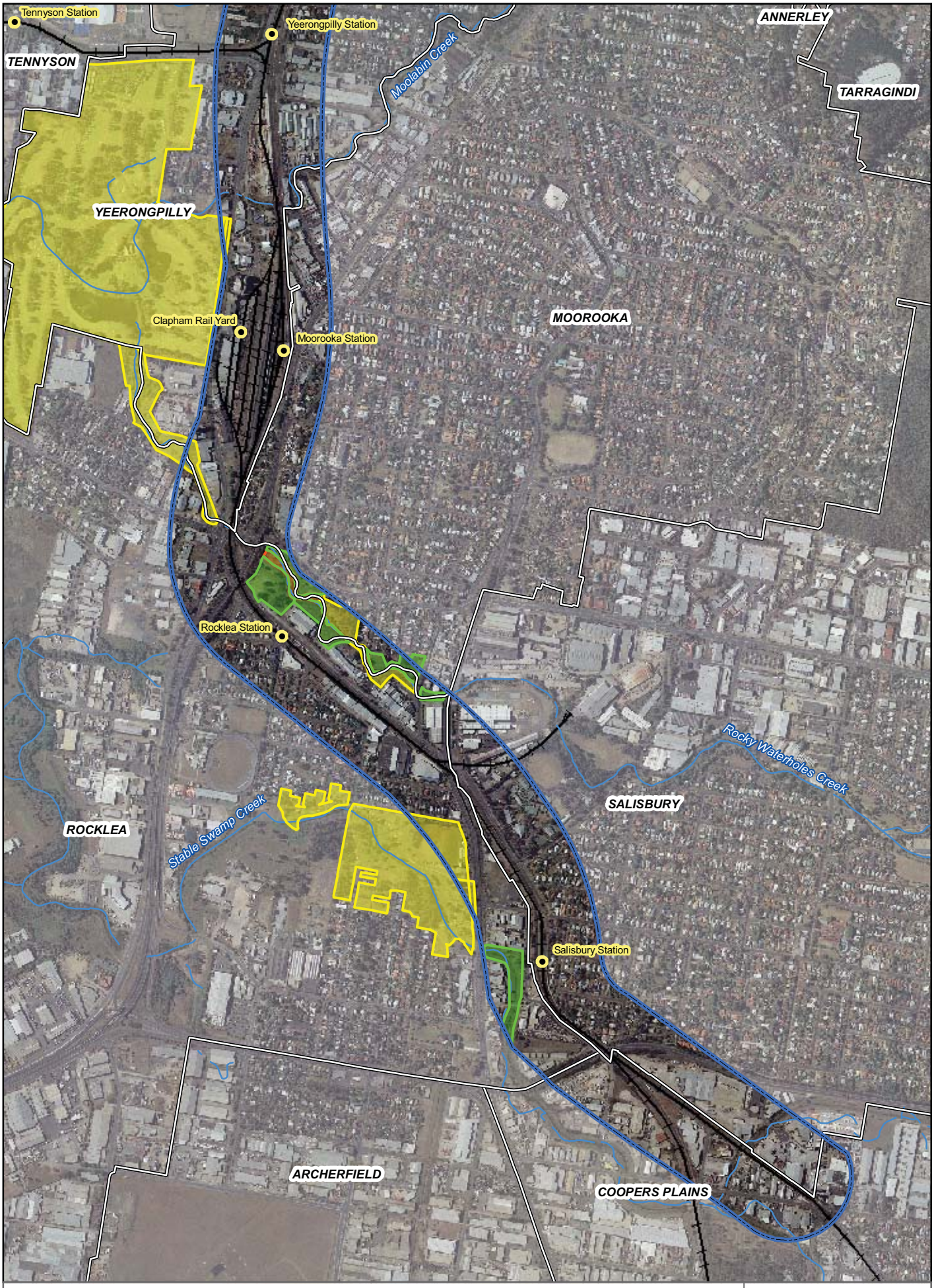
1:17,000 at A4

N

CrossRiverRail

SKM aurecon CRR JOINT VENTURE

Map by: MJS K:\Cross River Rail\600 Environment\619 GIS\Aurecon\205555_CRR\G073_CCR_Habitat_Potential_sheet3_A3_ver93.mxd 07/07/2011 17:52



LEGEND

- Study Corridor
- Suburbs
- Watercourse
- Station
- Track

Ecological Significance

- Low Habitat Potential
- Medium Habitat Potential
- High Habitat Potential

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-13

Habitat Potential of Survey Sites
Sheet 4 of 4 (Southern Section)

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

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In addition to the survey areas listed in **Table 11-4**, BCC has identified various areas or individual trees within the study corridor that require protection due to their community, landscape amenity or historical values. These areas can include individual trees, groups of trees or other vegetation and are placed under a Vegetation Protection Order (VPO) under the NALL. As part of the field survey, all vegetation under an individual VPO was inspected to confirm the species' identity and any other notable features. Nine trees protected under an individual VPO were identified within the study corridor. These are described in **Table 11-5**. Photographs of the VPOs listed below are included in **Appendix G5.**

Table 11-5 Significant vegetation protected under an individual VPO within the study corridor

Location	Description
Corner of Hudson Street and Lisson Street, Wooloowin (northern section)	*Ficus* sp. (Fig) Very large weeping fig. Appears to be in good health.
27 Cintra Road, Bowen Hills (northern section)	*Ficus* sp. (Fig) Large fig growing within the church grounds located along Cintra Rd. Appears to be in good health and was fruiting at the time of investigation.
O'Connell Terrace, Bowen Hills (northern section)	*Ficus* sp. (Fig) Small fig which has been pruned into an ornamental shape. Appeared to be in good health at the time of investigation.
Leichardt Street, Spring Hill (central section)	1 Grevillea robusta (Silky Oak), and 1 Brachychiton sp. Both trees are in good health.
Intersection of Eagle Street, Queen Street and Wharf Street, Brisbane (central section)	*Ficus* sp. (Fig) Medium sized weeping fig which appears to be in good health.
10 Lower River Terrace, South Brisbane (central section)	*Ficus* sp. (Fig) The fig appears to be in good health. It is growing alongside the driveway access to the South Bank Apartments off Vulture St. within a highly modified landscaped setting.
Corner of Main and Quinton Street, Kangaroo Point (central section)	*Ficus* sp. (Fig) Large to medium sized fig which appears to be in good health growing on the road edge. Appears to have been heavily pruned in the past, probably due to the proximity of the road edge and powerlines.
Between 34 and 36 Lockhart Street, Woolloongabba (central section)	Araucaria cunninghamii (Hoop pine) Mature Hoop pine which is located within the front yard of the property in close proximity to the existing house. The lower branches have been heavily pruned (probably due to the closeness to the house).
5 Belfast Street, Yeronga (southern section)	*Ficus* sp. (Fig) Large fig which appears to be in good health. The fig is currently growing in a vacant lot.

In addition to these individual VPOs, there are also a number of other Significant Landscape Trees (SLT) identified by BCC located within the study corridor. These are listed in **Table 11-6**. Photographs of these SLTs are included in **Appendix G5.** It is noted that the last tree listed in **Table 11-6** located at 10 Lower River Terrace, South Brisbane is also listed under an individual VPO and has been included in both **Table 11-5** and **Table 11-6**.

Table 11-6 Significant landscape trees within the study corridor

Significant Landscape Tree (SLT)	Address	Lot, Plan & Description
Mixed species comprising mainly of: *Ficus benjamina* (Weeping Fig), *Eucalyptus microcorys* (Tallowwood), *Grevillea robusta* (Silky Oak)	Rusk Street, Annerley (Area of land at the junction of Kent Street and Cornwall Street within the southern section)	Lot 42 RP37992 The trees described as occurring within this patch of SLT are all present. The vegetation described occurs as a narrow strip located between a parking area for a railway station and a recently completed set of laboratories. The majority of the trees appeared to be in good health however a number appeared to be extensively pruned, probably a result of the recent development adjacent to this area.
Ficus benjamina (Weeping Fig)	58 Merton Road, Dutton Park. (Situated on the vacant lot adjacent to Park Road Station) (central section)	Lot 111 B3224 The fig appears to be in good health. It is currently growing in a vacant lot which is located next to the Park Road Station.
Ficus benjamina (Weeping Fig)	151 Annerley Road, Dutton Park (central section)	Lot 21 RP12289 The fig appears to be in good health. It is growing on the edge of a vacant lot which is currently an open grassed area. The fig is also starting to encroach on the road corridor.
Ficus sp. (Fig)	10 Lower River Terrace, South Brisbane. (East side of main access driveway to South Bank Apartments via Vulture St) (central section)	Lot 1 RP181095 The fig appears to be in good health. It is growing alongside the driveway access to the South Bank Apartments off Vulture Street within a highly modified landscaped setting.

All forms of vegetation identified under the NALL including Council Controlled Vegetation (CCV), Vegetation Protection Order (VPO), Significant Native Vegetation (SNV), Valued Urban Vegetation (VUV), Waterway Vegetation (WAV), Wetland Vegetation (WEV), Significant Landscape Trees (SLT) as well as VPO protected trees are identified in **Figure 11-6** to **Figure 11-9**.

Generally, the NALL provides that "*no person other than a Council employee in the due performance of his or her duties may interfere with street trees or gardens, or vegetation in any park or other land or premises owned or occupied by Council*" as this vegetation is protected under the NALL (p.8). To interfere, trim or remove any of this vegetation, approval is generally required from the Council.

Declared pest flora

A number of flora species observed within the study corridor are declared pest plants under the LP Act and listed in the *Land Protection (Pest and Stock Route Management) Regulation 2003* (LP Regulation). These species, along with the general locations they were observed have been listed in **Table 11-7**. A number of introduced weed species were also recorded from the study corridor. These are included in the species listed in **Appendix G4**.

Reasonable steps to keep the land free of Class 2 and Class 3 declared species is required under the LP Act. A person must not, without reasonable excuse, introduce a declared pest to any of the following areas unless a declared pest permit has been obtained:

- the owner's land
- unfenced land comprising part of a road or stock route that adjoins or is within the owner's land
- other land that is fenced within the owner's land

- the bed, banks and water of a watercourse on the owner's land
- the bed, banks and water to the centre-line of a watercourse forming a boundary, or part of a boundary, of the owner's land.

Lantana camara is considered to be a 'Weed of National Significance' due to its invasive nature and potential impacts to the environment and the economy (Weeds Australia 2000).

Any pests located within the existing rail corridor are currently managed by Queensland Rail. Any observations of declared weed infestations within the construction phase of the Project would be controlled by the construction contractor and notified to Queensland Rail for their reference. The key objective in relation to pest species is to not spread or import new weeds in to the corridor.

Table 11-7 Declared pest flora within the study corridor

Scientific name	Common name	LP Act status	General location
Ambrosia artemisiifolia	Annual ragweed	C2	Green space located along Railway Road between Bedosloe and Sunbeam Streets, Fairfield
Anredera cordifolia	Madeira vine	C3	Flynn Oval/Mann Park, Windsor (northern section) Count White Park, Kangaroo Point (central section) Peter Scott Skate Park, Moorooka (southern section)
Asparagus plumosus	Asparagus fern	C3	Kookaburra Park, Rocklea (southern section)
Bryophyllum tubiflorum	Mother of millions	C2	Dollis Street green space, Rocklea (southern section)
Celtis sinensis	Chinese celtis	C3	Flynn Oval/Mann Park, Windsor (northern section) RNA Grounds Bowen Hills (central section) Victoria Park (including York's Hollow) at Herston/Spring Hill (central section) Wickham Park and Roma Street Parkland, Spring Hill/ Brisbane CBD (central section) Dutton Park and South Brisbane Cemetery, Dutton Park (central section) JF O'Grady Memorial Park (southern section) Brisbane Golf Club, Yeerongpilly (southern section) Peter Scott Skate Park, Moorooka (southern section) Kookaburra Park, Rocklea southern section)
Cinnamomum camphora	Camphor laurel	C3	Flynn Oval/Mann Park, Windsor (northern section) Victoria Park (including York's Hollow) at Herston/Spring Hill (central section) Dutton Park and South Brisbane Cemetery, Dutton Park (central section) Rowlinson Park, Nelson Street, Yeronga (southern section)

Scientific name	Common name	LP Act status	General location
Lantana camara	Lantana	C3	Count White Park, Kangaroo Point (central section) Green space (Railway Terrace) Rocky Water Holes Creek, Moorooka (southern section) Kookaburra Park, Rocklea (southern section) Dollis Street green space, Rocklea (southern section)
Macfadyena unguis-cati	Cat's claw creeper	C3	Victoria Park (including York's Hollow) at Herston/Spring Hill (central section)
Opuntia sp.	Prickly pear	C1*	Green space (Railway Terrace) Rocky Water Holes Creek, Moorooka (southern section)
Schinus terebinthifolius	Broad-leaf pepper tree	C3	Yowoggera Park Breakfast Creek (northern section) Count White Park, Kangaroo Point (central section) Peter Scott Skate Park, Moorooka (southern section) Green space (Railway Terrace) Rocky Water Holes Creek, Moorooka (southern section) Dollis Street green space, Rocklea (southern section)
Sphagneticola trilobata	Singapore daisy	C3	Victoria Park (including York's Hollow) at Herston/Spring Hill (central section) Green space (Railway Terrace) Rocky Water Holes Creek, Moorooka (southern section) Dollis Street green space, Rocklea (southern section)

Note:
**Prickly pear (Opuntia spp.) is a declared Class 1 plant under the Land Protection (Pest and Stock Route Management) Act 2002. O. ficus-indica is not declared. O. Stricta, O. aurantiaca, O. monacantha, O. tomentosa and O. streptacantha species are Class 2 declared pest plants.*

Terrestrial fauna

Database searches indicate that there are a large number of fauna species previously recorded, or mapped as sighted, within the study corridor.

Thirty two threatened fauna species (ie those species listed under the EPBC Act and/or NC Act) may occur within the study corridor, based on the presence of suitable habitat (**Table 11-8**). Three of these species are listed under the EPBC Act and six under the NC Act.

In addition to the EVR Commonwealth or State species there are also 70 fauna species identified from database searches which are recognised as regionally or otherwise significant by BCC. These include a total of seven birds and two mammals. None of the species considered significant by BCC were noted during the site investigations.

The likelihood of an identified species, listed in **Table 11-8**, being encountered within the study corridor is briefly identified in the last column of the table. Species which are 'not likely' to occur within the study corridor based on the lack of suitable habitat and/or recorded sightings of the species within the study corridor have not been included in the table.

Table 11-8 Likely presence of significant terrestrial fauna species identified from database searches

Scientific name	Common name	Status	Source	Likely presence
Birds				
Ephippiorhynchus asiaticus	Black-necked Stork	NT (Qld) BCC (SC)	2, 3	**Possible –** Not located during survey. May occur as a vagrant as they forage along intertidal shoreline and mangrove vegetation (DEC 2005).
Erythrotriorchis radiatus	Red Goshawk	VU (Aust) EN (Qld) BCC (-)	1	**Possible –** Not located during survey of area. Occur in a wide range of habitats particularly in ecotones, however due to the urban nature of the corridor any individuals located are likely to be vagrants (DERM 2006a).
Falco peregrinus	Peregrine Falcon	BCC (SC)	3	**Possible –** Not located during survey of area, however there are two recorded nesting pairs within the Brisbane CBD (DEWHA 2009). As these species have become adapted to the city environment it is unlikely that the Project would affect these species.
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	BCC (SC)	1, 2	**Possible** – Not located during survey of area. However they can occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity (DEWHA 2010).
Ninox strenua	Powerful Owl	V (Qld) BCC (R)	2	**Possible -** Not located during survey. Inhabits a wide range of vegetation types from woodland and open sclerophyll forest to tall open wet forest and rainforest. However the Project is unlikely to disturb any areas in which this species is likely to roost or hunt (DEC 2005).
Rostratula australis (Rostratula benghalensis s. lat.)	Australian Painted Snipe (Painted Snipe)	VU (Qld) VU (Aust)	1, 2	**Possible –** Not located during survey. The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans (DEWHA 2010).
Sternula albifrons	Little Tern	EN (Qld) BCC (-)	2, 4	**Possible -** Not located during survey of area. Inhabits sheltered coastal environments, including lagoons, estuaries, river mouths and deltas, lakes, bays, harbours and inlets, especially those with exposed sandbanks or sand-spits (DEWHA 2010).
Mammals				
Pteropus poliocephalus	Grey-headed Flying-fox	VU (Aust)	1, 2, 3	**Present –** Located during survey of area. However no roosting sites are located within the study corridor.
Xeromys myoides	Water Mouse, False Water Rat	VU (Qld) VU (Aust)	1	**Possible –** Not located during survey of area. Species normally found in mangroves but sometimes in adjacent coastal freshwater lagoons, swamps and sedged lakes (DERM 2006a).

Notes:
***Status** – EN: Endangered, VU: Vulnerable, R: Rare, NT: Near Threatened, Qld: Status under the Qld NC (Wildlife) Regulation 2006, Aust: Status under the Commonwealth EPBC Act. BCC = status under Action Plan for relevant taxon – (V: Vulnerable, PV: Potentially Vulnerable, SC: Special Concern, ST: Stable, R: Rare).*
***Source** – 1: EPBC Protected Matters Database, 2: DERM Wildnet database, 3: Queensland Museum database, 4: Birdata Database.*

In addition to the significant fauna species above, there are also an additional 82 bird species identified from the desktop searches which are listed as either marine and/or migratory species under the EPBC Act and/or International Agreements, ie JAMBA, CAMBA, ROKAMBA or the Bonn Convention. These have been omitted from the table above as they are unlikely to be located within the study corridor as there are no marine environments or Ramsar wetlands located within the study corridor. Any species which may have been sighted within the area are likely to be limited to flyovers or only occurred as vagrants. Examples of these marine and/or migratory species which were noted during the site investigations include the Whistling Kite (*Haliastur sphenurus*) noted within Kookaburra Park (southern section) (**Photograph 11-10**), the Australian White Ibis (*Threskiornis molucca*) noted within Yowoggera Park (southern section) (**Photograph 11-11**), Victoria Park, Wickham Park and Roma Street Parkland, City Botanic Gardens and JF O'Grady Park (central section) (**Photograph 11-12**), Silvereye (*Zosterops lateralis*) noted within Wickham Park and Roma Street Parkland (central section), and the White Egret (*Ardea alba*) noted within Peter Scott Skate Park and Kookaburra Park (southern section).


Photograph 11-10 (A & B) Kookaburra Park, Rocklea (southern section)


Photograph 11-11 (A & B) Yowoggera Park, Albion (northern section)

Photograph 11-12 JF O'Grady Memorial Park, Fairfield (central section)

There are numerous other habitat areas within the Greater Brisbane Region which would provide better habitat value for these species and other flyover or vagrant species potentially using the areas located within the study corridor. It is considered that the removal of small areas of vegetation in these areas is unlikely to have a significant impact on these species.

In addition to these bird species the Grey-headed Flying-fox, which is listed as Vulnerable under the EPBC Act, was also located during the site surveys. The Grey-headed Flying-fox ranges across most Brisbane suburbs from major roosting sites, usually in inaccessible mangrove areas along the Brisbane River. Grey-headed Flying-foxes from the roosting site on Indooroopilly Island in the Brisbane River are likely to fly over the study corridor on their nocturnal feeding trips.

However, the Project is unlikely to impact on the roosting or breeding of the Grey-headed Flying-fox due to the roosting sites being remote from the Project and its associated worksites.

The fauna habitat value of selected sites within the study corridor was assessed during the field survey. A brief description of the sites and associated values are provided in **Table 11-4** along with a broad overview of the fauna found at the study sites within the study corridor.

Native fauna which was widespread throughout the study corridor included the Brushtail Possum (*Trichosurus tulpecular*), Ringtail Possum (*Pseudocheirus peregrinus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*). A comprehensive list of fauna species recorded during current surveys is included in **Appendix G6**.

Koalas

Three sets of maps are associated with the State Planning Policy 2/10: Koala Conservation in South East Queensland (SPP) and South East Queensland Koala Conservation State Planning Regulatory Provisions (SPRP) (both commenced on 31 May 2010). The study corridor was cross referenced with each map to determine the applicability of the SPP and SPRP to the Project.

Overall the Koala SPP and SPRP do not apply to the Project as it is not mapped as occurring within the study corridor. The study corridor is not covered by the:

- SPRP Trigger map, which highlights assessable development areas as defined under the SPRP
- SPRP Koala Habitat Values Map, which depicts koala habitat values occurring within assessable development areas defined under the SPRP, or the
- SPP Koala Habitat Values Map, which depicts koala habitat values across the entire Koala Protection Area as defined under the SPP.

No Koala habitat values were noted within the study corridor.

Pest fauna species

The study corridor is situated in an urban and industrial environment, which is therefore highly disturbed and subject to anthropogenic activities, lending the area susceptible to invasion by pest species. Pest species can impact on the biodiversity of an area through increased competition for resources, habitat destruction, weed distribution, increased risk of diseases and predation.

The European Fox (*Vulpes vulpes*) was encountered during the fauna surveys of Victoria Park (including York's Hollow) at Herston/Spring Hill in the central section. The European Fox is a Class 2 declared pest species under the LP Act. Landowners must take reasonable steps to keep land free of Class 2 pests.

A number of Cane Toads (*Rhinella marinus*) were recorded throughout the study corridor. The Cane Toad is not a declared pest species under the LP Act, as there are no cost effective, broad scale control measures available.

The impacts from the introduction of foxes and the cane toad are listed under the EPBC Act as Key Threatening Processes. A key threatening process is one that threatens or may threaten the survival, abundance or evolutionary development of a native species or ecological community (DEWHA 2009).

The Red Imported Fire Ant (RIFA) (*Solenopsis invicta*) is an introduced ant from South America which poses a serious social, economic and environmental threat. RIFA are considered to be the greatest ecological threat to Australia since the introduction of the rabbit and are potentially worse than the Cane toad. This species is also listed under the EPBC Act as a Key Threatening Process.

South East Queensland is a RIFA Restricted Area. The Biosecurity Queensland map of the South East Queensland RIFA Restricted Area, Version 42 (Biosecurity Queensland 2010) identifies a number of suburbs which are RIFA restricted areas. The mapped RIFA restricted areas through which the study corridor transverses include Fairfield, Yeronga, Yeerongpilly, Moorooka, Rocklea and Salisbury (within the southern portion of the study corridor).

RIFA are a notifiable pest under the *Plant Protection Act 1989* and landholders who believe or know they have RIFA on their property are legally obliged to inform the QPIF of the infestation.

Bioregional corridors

Bioregional corridors (or ecological corridors) are areas of State or regional significance outlined to preserve the natural values of a designated region. These corridors are developed based on Regional Ecosystems and vegetation of both State and Regional significance as determined by data generated or sourced by the Queensland Herbarium (EPA 2002). Essentially, these corridors convey regions of similar significant vegetation throughout Queensland.

These corridors are identified by DERM through the Biodiversity Planning Assessment (BPA) methodology. The Biodiversity Assessment and Mapping Methodology (BAMM) on which the BPAs are based, identifies areas with various levels of significance for biodiversity reasons. These include threatened ecosystems and/or species, large tracts of habitat in good condition and buffers to wetlands or other types of habitat important for the maintenance of biodiversity or ecological processes (EPA 2002). Areas that are assessed as being significant for biodiversity at the bioregional or State scales are located wherever remnant Regional Ecosystems have been mapped in links. DERM's Management's BPAs identify bioregional wildlife corridors while individual local governments may have identified ecological corridors significant to their local area which may be identified in planning schemes or conservation strategies (refer to **Figure 11-14** to **Figure 11-18**). The main state and regionally recognised corridors, within the study corridor, follow the Brisbane River and its riparian areas. Enoggera Creek/Breakfast Creek in the northern section and a number of the vegetated areas along the Brisbane River through the central area are also identified as having state recognised biodiversity significance.

Wildlife corridors

Wildlife corridors are areas of land which support appropriate habitat which allow flora and fauna species to move across a wider area. This allows wildlife to:

- respond to environmental variability, eg move from food/water scarce areas to food/water plentiful areas
- respond to population/resource pressure, eg move from over populated to under populated areas
- access a wider range of breeding partners, thus preventing inbreeding and loss of genetic diversity in a local population (Urban Ecology Australia 2006).

The study corridor is situated within highly urbanised and industrial environments where vegetated areas are sparse. As vegetation within the study corridor is highly fragmented, opportunities for fauna movement are limited, with the type of species which potentially use the areas restricted.

Some fauna species are likely to use waterways and parks which provide for a degree of connectivity, thus functioning as wildlife corridors in an urbanised environment. A summary of such areas within the study corridor is provided below.

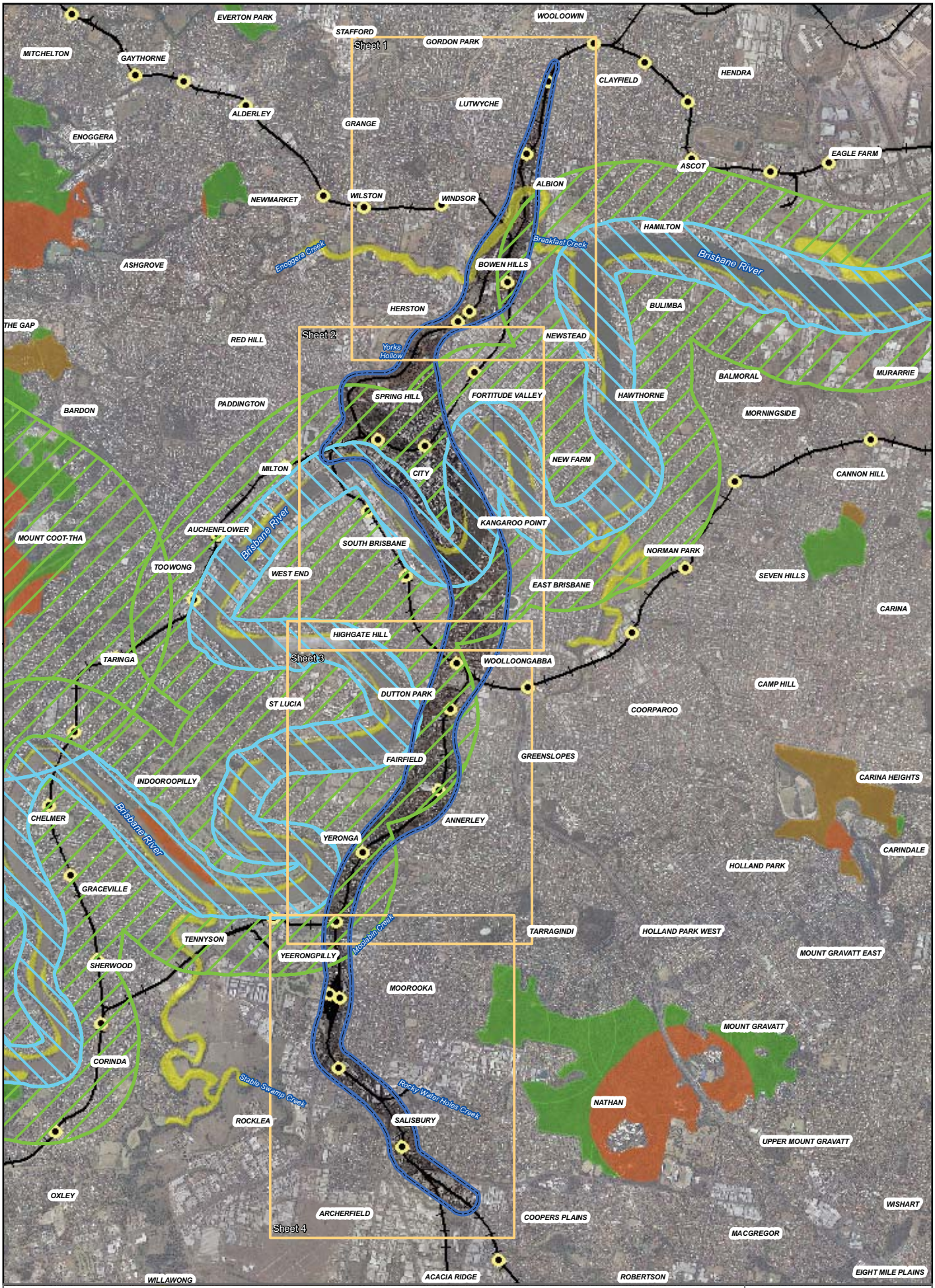
Enoggera Creek/Breakfast Creek (northern section)

Enoggera Creek/Breakfast Creek forms an ecological corridor and provides a valuable link from the Brisbane River through to the north-western suburbs following Breakfast Creek, Enoggera Creek, Ithaca Creek and Fish Creek. Linkages to the Mt Coot-tha Reserve and the Enoggera Reservoir through The Gap have also been identified (SKM-CW JV 2006a and BPA for the South East Queensland Bioregion).

Enoggera Creek starts in the D'Aguilar Range and then follows an easterly direction for approximately 39 km to where it connects with the Brisbane River at Newstead as Breakfast Creek. Enoggera Creek becomes Breakfast Creek at the Hudson Road crossing, Albion. The upper extent of the Creek is protected by the D'Aguilar National Park, however the middle and lower reaches of the Creek flow through urbanised and industrial areas (BCC 2010c).

The value of Enoggera Creek/Breakfast Creek as a wildlife corridor has been reduced due to this urbanisation surrounding the Creek and the disjointed nature of the riparian vegetation. However the Creek does support a regionally significant mangrove community along its banks (SKM-CW JV 2006a and BPA for the South East Queensland Bioregion).

Through local bushland group revegetation activities there is the potential for the Enoggera Creek/Breakfast Creek corridor to provide a better connection for the fauna from Ithaca Creek to the Brisbane River. BCC is also actively attempting to reconnect and strengthen wildlife corridors within the City limits. Many of these are to be based on creek systems (SKM-CW JV 2006a, 11-12).



LEGEND

- Study Corridor
- Sheets
- Station
- Track

Biodiversity Significance South East Queensland

- State Habitat for threatened taxa
- State
- Regional
- Local or Other Values

Corridor Buffers South East Queensland

- State
- Regional

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-14

Regional, State and Local Biodiversity Planning Assessment

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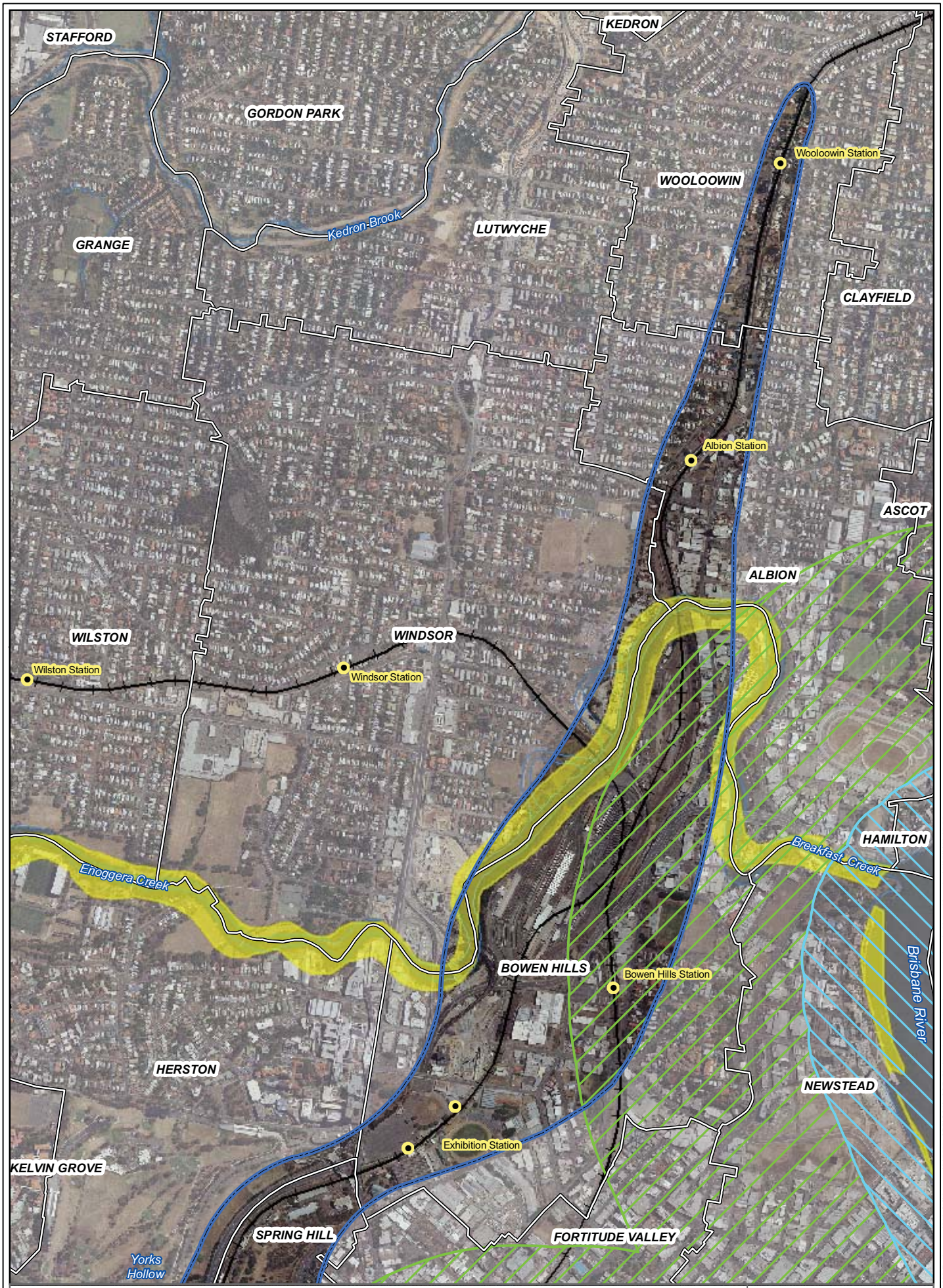

LEGEND

- Study Corridor
- Suburbs
- Station
- Track

Corridor Buffers South East Queensland

- State
- Regional

Biodiversity Significance South East Queensland

- State Habitat for threatened taxa
- State
- Regional
- Local or Other Values

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-15

Regional, State and Local Biodiversity Planning Assessment
Sheet 1 of 4 (Northern Section)

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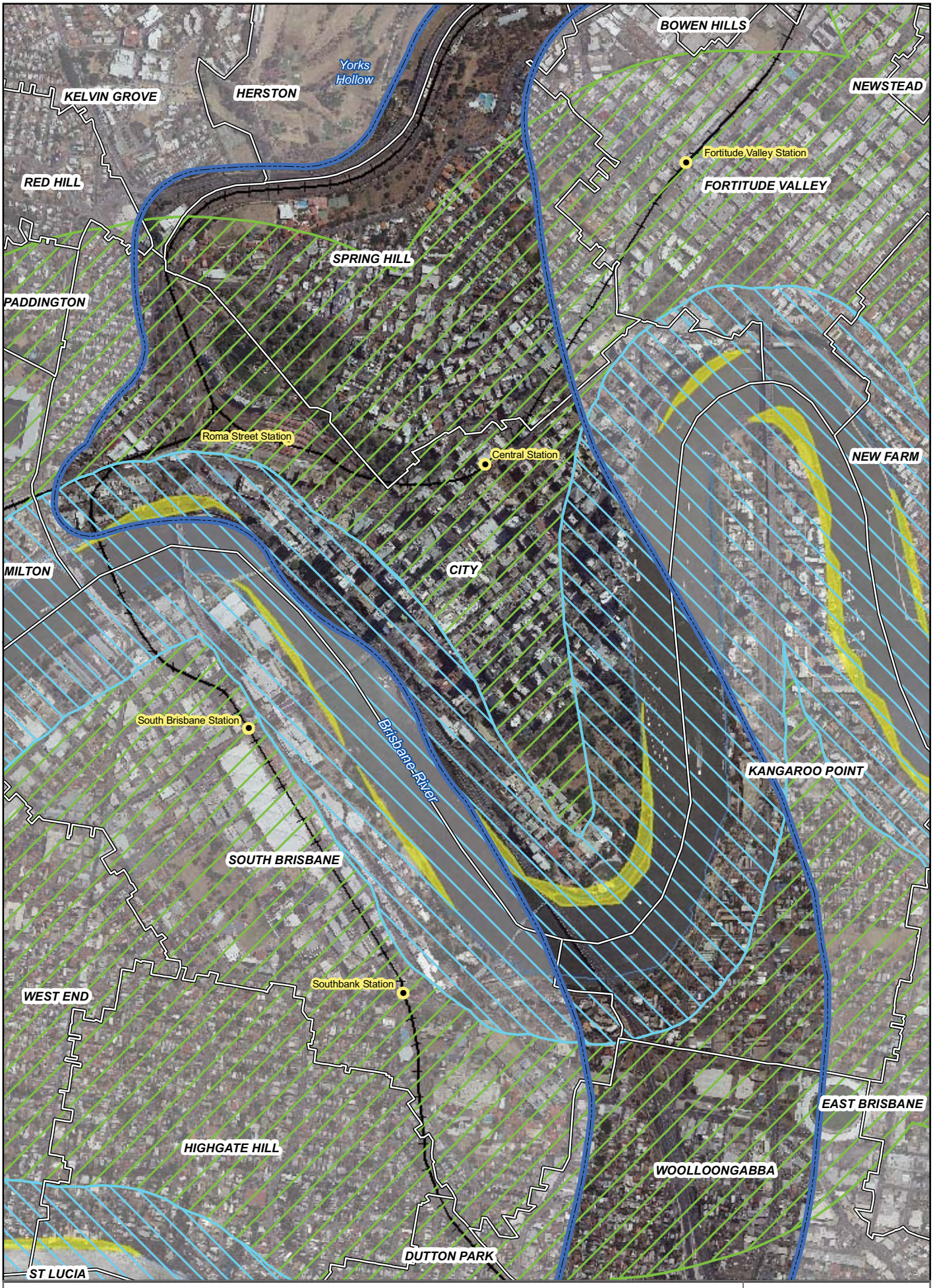

LEGEND

- Study Corridor
- Suburbs
- Station
- Track

Corridor Buffers South East Queensland

- State
- Regional

Biodiversity Significance South East Queensland

- State Habitat for threatened taxa
- State
- Regional
- Local or Other Values

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-16

Regional, State and Local Biodiversity Planning Assessment
Sheet 2 of 4 (Central Section)

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

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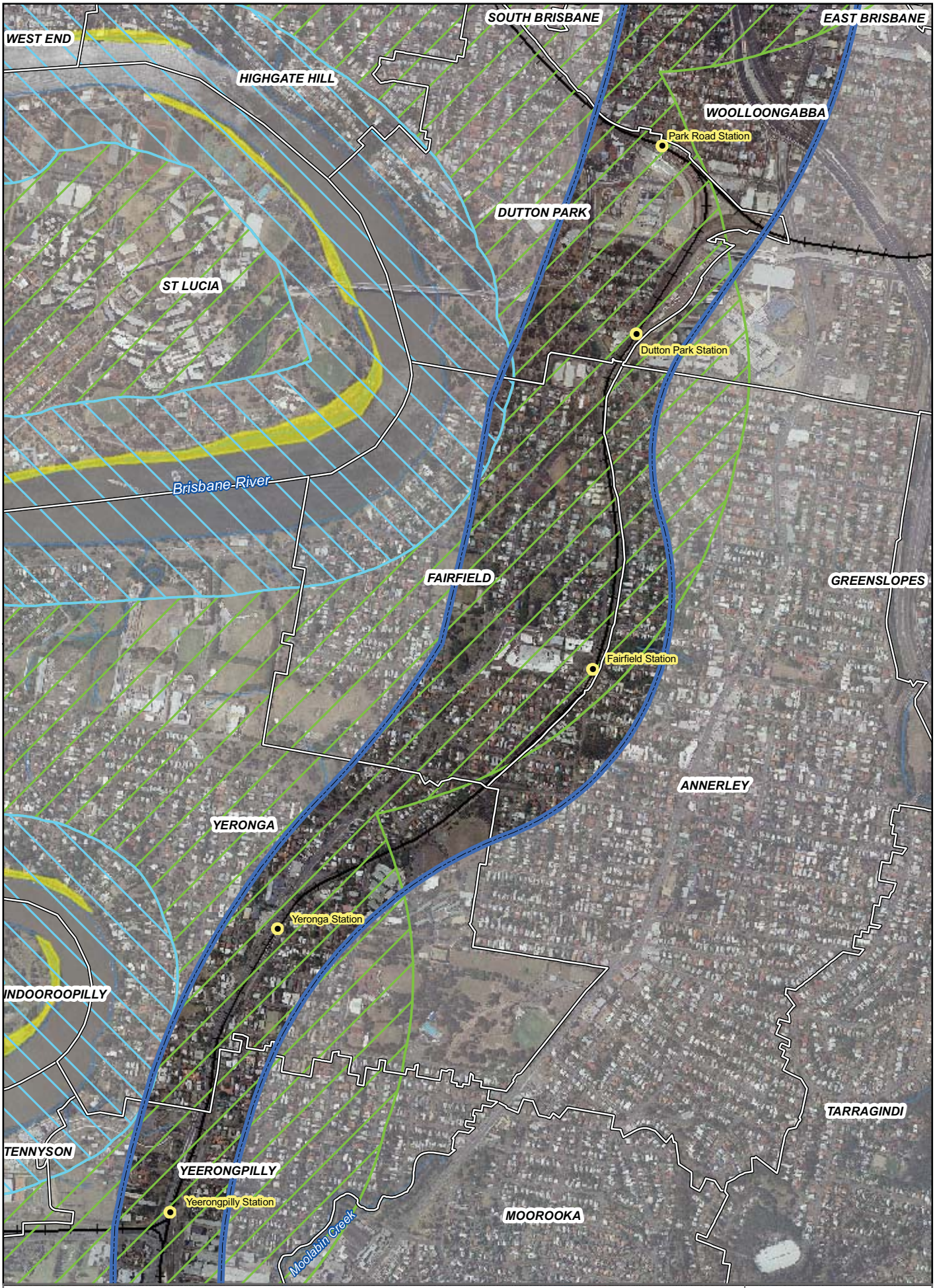

LEGEND

- Study Corridor
- Suburbs
- Station
- Track

Corridor Buffers South East Queensland

- State
- Regional

Biodiversity Significance South East Queensland

- State Habitat for threatened taxa
- State
- Regional
- Local or Other Values

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-17

Regional, State and Local Biodiversity Planning Assessment
Sheet 3 of 4 (Southern Section)

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

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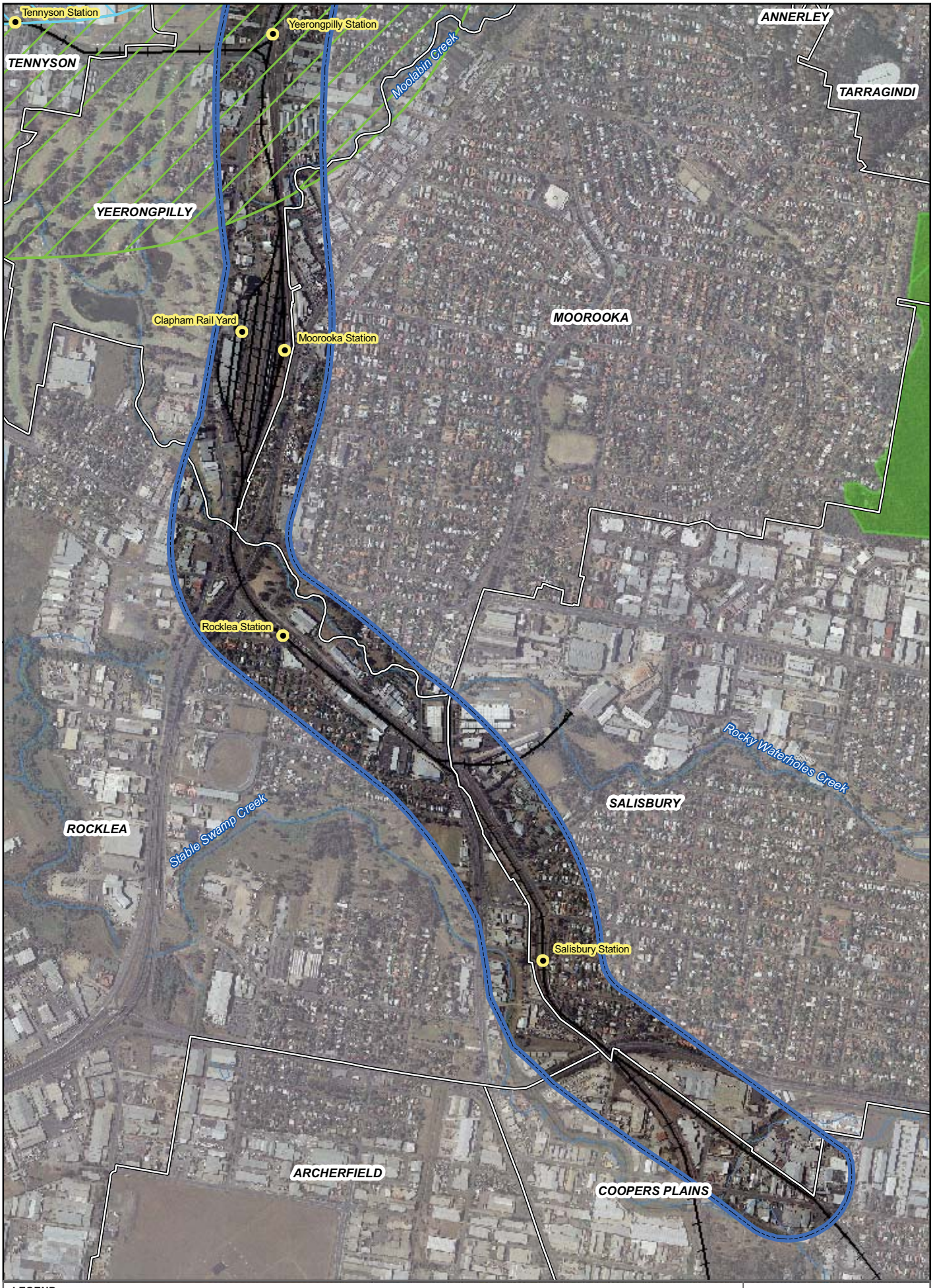

LEGEND

- Study Corridor
- Suburbs
- Station
- Track

Corridor Buffers South East Queensland

- State
- Regional

Biodiversity Significance South East Queensland

- State Habitat for threatened taxa
- State
- Regional
- Local or Other Values

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-18

Regional, State and Local Biodiversity Planning Assessment
Sheet 4 of 4 (Southern Section)

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

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Brisbane River (central section)

The Brisbane River has also been mapped as a State wildlife corridor. These areas are comprised of highly fragmented mangrove communities and other riparian vegetation. These mapped areas are unlikely to provide much movement opportunities to fauna using the River's edge as in some places along the River there is no riparian vegetation as urban development has occurred to the River's edge.

Aquatic flora and fauna

Database searches identified a number of significant aquatic species as potentially being present within the study corridor (refer to **Table 11-9**). It should be noted that the majority of these species are unlikely to occur in the study corridor as they are marine species. However they may occasionally occur within the Brisbane River as it is tidal. Any species which were listed only as a marine species have not been included in the table below due to a lack of suitable habitat within the study corridor.

Additionally species which are 'not likely' to occur within the study corridor based on the lack of suitable habitat and/or recorded sightings of the species within the study corridor have not been included in **Table 11-9**. For the full list of potential significant terrestrial fauna species identified from database searches refer to **Appendix G3**. The likelihood of an identified species, listed in **Table 11-9**, being encountered within the study corridor is briefly identified in the last column of the table.

Table 11-9 Likely presence of significant aquatic flora and fauna species identified from database searches

Scientific name	Common name	Status	Source	Likely presence
Fish				
Neoceratodus forsteri	Australian Lungfish	VU (Aust)	1	**Present –** Not located during survey of area. It has been previously recorded in Enoggera Creek/Breakfast Creek in 1981, however the area of this creek in which the Project is located is estuarine in nature and this species only lives in freshwater systems. It was also introduced into the lakes at Roma Street Parkland in December 2003 (QLD Government undated).

Notes:
***Status** –VU: Vulnerable, Aust: Status under the Commonwealth EPBC Act.*
***Source** – 1: Queensland Museum database.*

As noted in the methodology, field surveys of the aquatic flora and fauna consisted of riparian vegetation assessments and incidental sightings. **Table 11-10** provides a brief description along with any habitat values of the waterways and wetlands identified within the study corridor. As the majority of the alignment will be located underground and the majority of the land within the study corridor is urban in nature, the Project is unlikely to have a significant impact on the flora and fauna within the existing waterways and wetlands. Additionally it should be noted that there are no works currently proposed to occur within tidal areas.

Due to the lack of direct impact on the waterways located within the study corridor the crustaceans and aquatic invertebrates have not been described in this chapter.

Table 11-10 Waterways and wetlands within the study corridor

Location	Brief description and habitat values
Enoggera Creek/Breakfast Creek (northern section)	Enoggera Creek/Breakfast Creek supports a large section of Mangrove vegetation and other salt tolerant species along its banks as riparian vegetation. There are two key species of mangroves which occur along the creek bank in the section investigated as part of the site survey for the Project, the Grey mangrove (*Avicennia marina* var *australasica*) and River mangrove (*Aegiceras corniculatum*). This riparian vegetation is likely to provide habitat values for mangrove specialist fauna and act as nurseries for some species of marine fish and invertebrates, many of which are a source of primary production for Moreton Bay and surrounds. However it is unlikely that any aspects associated with Enoggera Creek/Breakfast Creek, including the riparian vegetation, would be affected by the Project as the reference design begins south of the rail bridge which crosses the creek.
York's Hollow gully and pond system (central section)	Within the southern extent of the area known as York's Hollow, is a highly modified freshwater gully and pond system which runs through Victoria Park in Herston, adjacent to the ICB. This ornamental feature was created in the 1930's and was partially filled and modified as part of the works undertaken by the ICB project (Connell Wagner 1998). Despite being a highly modified area there is the potential for frogs and other native species to use the area. These include the Tusked Frog (*Adelotus brevis*), Cascade Treefrog (*Litoria pearsoniana*) and the Southern Barred Frog (*Mixophyes iteratus*), which were identified from the database searches. However the urban nature of the surrounding area, the water quality and the mown grass surrounds may preclude these species. Furthermore this area would not be directly affected by the Project alignment as the Project would be located in an underground driven tunnel between the proposed Victoria Park portal and Yeerongpilly Station.
Roma Street Parkland lakes (central section)	The Roma Street Parkland include a large lake which incorporates small streams which are artificially pumped to generate water flow and maintain the water quality in the lakes and wetland areas. The lake has a surface area of over 6,000 m^2 and holds 11 million litres of water. Since 2001 the lake has been stocked with a number of native freshwater fish including Silver perch (*Bidyanus bidyanus*), Fresh water mullet (*Trachystoma petardi*), Queensland lungfish (*Neoceratodus forsteri*), Pacific blue-eye (*Pseudomugil signifer*), Duboulay's rainbowfish (*Melanotaenia duboulayi*), Firetailed gudgeon (*Hypseleotris galii*) and Flyspecked hardyhead (*Craterocephalus stercusmuscarum*) (QLD Government undated).The parklands occur within the study corridor. However the construction works within this area would be underground in a driven tunnel and therefore are unlikely to impact on the parkland lakes.
City Botanic Gardens ornamental ponds (central section)	The City Botanic Gardens include freshwater ornamental ponds. The 'top' pond was designed by Harry Oakman and was constructed between 1958 and 1960. The lower pond formed part of the original natural creek system (BCC 2010e). Both of these ponds contain fish and are home to numerous common bird species. Those noted during the field survey included the Mallard (*Anas platyrhynchos*), Pacific black duck (*Anas superciliosa*), Eurasian coot (*Fulica atra*) and Dusky moorhen (*Gallinula tenebrosa*). This area would not be directly affected by the Project as there are no surface works planned within the City Botanic Gardens and the tunnelling which is to occur beneath this area would occur under the bedrock.
Brisbane River (central section)	Two species of mangroves fringe the Brisbane River, Grey mangrove and River mangrove. Mostly these occur as discrete patches of forest. There is also a smaller patch at Count White Park, Kangaroo Point. This area would not be directly impacted upon as a result of the proposed development as the Project is in tunnel beneath the River.
Moolabin Creek (southern section) Rocky Water Holes Creek (southern section) Stable Swamp Creek (southern section)	These three creeks are very similar as they pass through a number of highly urbanised residential, commercial and industrial areas. They all receive large amounts of urban stormwater runoff and have been extensively modified from their original state. All three are freshwater creeks and support small patches of vegetation along their banks within the study corridor. However the habitat values are low due to the poor condition of much of the vegetation and the lack of structural diversity.The proposed alignment will pass over all three creeks, therefore there is the potential to negatively impact on the creeks. However all impacts would be minimised through appropriate mitigation measures.

No State declared aquatic pest species were identified within any of the aquatic environments investigated within the study corridor.

City Botanic Gardens

As discussed in **Chapter 3 Project Development**, in addition to considering options for station entry points within the City Botanic Gardens, the option of using a part of the Gardens as a construction site for the Project was also considered. However, this option was not progressed given the potential for significant impacts on both cultural heritage and flora and fauna within the City Botanic Gardens.

This site contains a highly diverse range of flora species planted from around Australia and the world. This includes relatively large mangrove forests along the edges of the Brisbane River containing Grey Mangroves and River Mangroves (which cannot be cleared or pruned without a permit issued under the *Fisheries Act 1994*). Specimens of Ponytail Palm (Woodyetia bifurcata), which is listed as Vulnerable under the NC Act and EPBC Act, are also present at this site. The site also contains the oldest and most historically significant individual plantings of colonial Brisbane.

The Grey-headed Flying-fox, which is listed as vulnerable under the NC Act and EPBC Act, is likely to feed within the site when suitable species are in fruit or flower. The Botanic Gardens also provides a number of roosting sites for different bird species.

11.2.2 Existing environment summary

The majority of the study corridor is highly urbanised with low natural habitat values and integrity. The flora and fauna located within the study corridor were predominantly common and widespread species of the Brisbane metropolitan area. Such species are urban specialists or disturbance tolerant species. The most significant species observed was the Grey-headed Flying-fox, which is listed as Vulnerable under the EPBC Act. It is likely to use suitable fruiting and flowering trees across the study corridor and the Brisbane metropolitan area. However, no roosting sites were located within the study corridor.

A number of specimens of Plunkett mallee, listed as Rare under the NC Act were located in two locations within the study corridor but these are not considered to constitute wild populations. A single specimen of Macadamia nut was also located and again it is highly likely that this has been planted.

The areas within the study corridor which have the most significant habitat values are the areas located along Enoggera Creek/Breakfast Creek in the northern section and its fringing mangrove forest, Victoria Park (including York's Hollow), Wickham Park, Roma Street Parkland, the City Botanic Gardens and the vegetated area along the Kangaroo Point cliffs in the central section and Dutton Park (including the South Brisbane Cemetery) and Lagonda Park in the southern section.

11.3 Potential impacts and mitigation

11.3.1 Sites directly impacted upon by the Project

The key nature conservation sites which are directly impacted upon by the Project works are:

- the large figs located at the RNA Showgrounds (northern section of the study corridor)
- the vegetation located in the northern section of Victoria Park where the northern portal to the tunnel is to be located (central section of the study corridor), specifically, a number of mature fig and eucalypt species
- the figs located along Alice Street in the City due to the underground concourse from Albert Street Station to the City Botanic Gardens (central section of the study corridor)
- Flindersia's, which were planted along both sides of the Albert Street corridor and along both sides of Mary Street in 1996, would be cleared as part of the construction activities associated with the Albert Street Station (central section of the study corridor)

- creeks in the southern section of the corridor - the alignment would pass over Moolabin Creek, Rocky Water Holes Creek and Stable Swamp Creek, therefore potentially impacting on these creeks (southern section of the study corridor).

The Project alignment is located within a highly urbanised landscape, which has limited conservation value. Areas which have important nature conservation values have either been avoided by the Project, through the design or they are situated above the proposed tunnel and therefore are unlikely to be disturbed (**Figure 11-19** to **Figure 11-22**).

11.3.2 Benefits and opportunities

Landscape and soil stabilisation works associated with the Project may provide an opportunity to improve the habitat value of a number of sites through the revegetation of disturbed areas and the improved connection of isolated patches of vegetation.

Other potential opportunities presented by the Project to improve habitat value and function include:

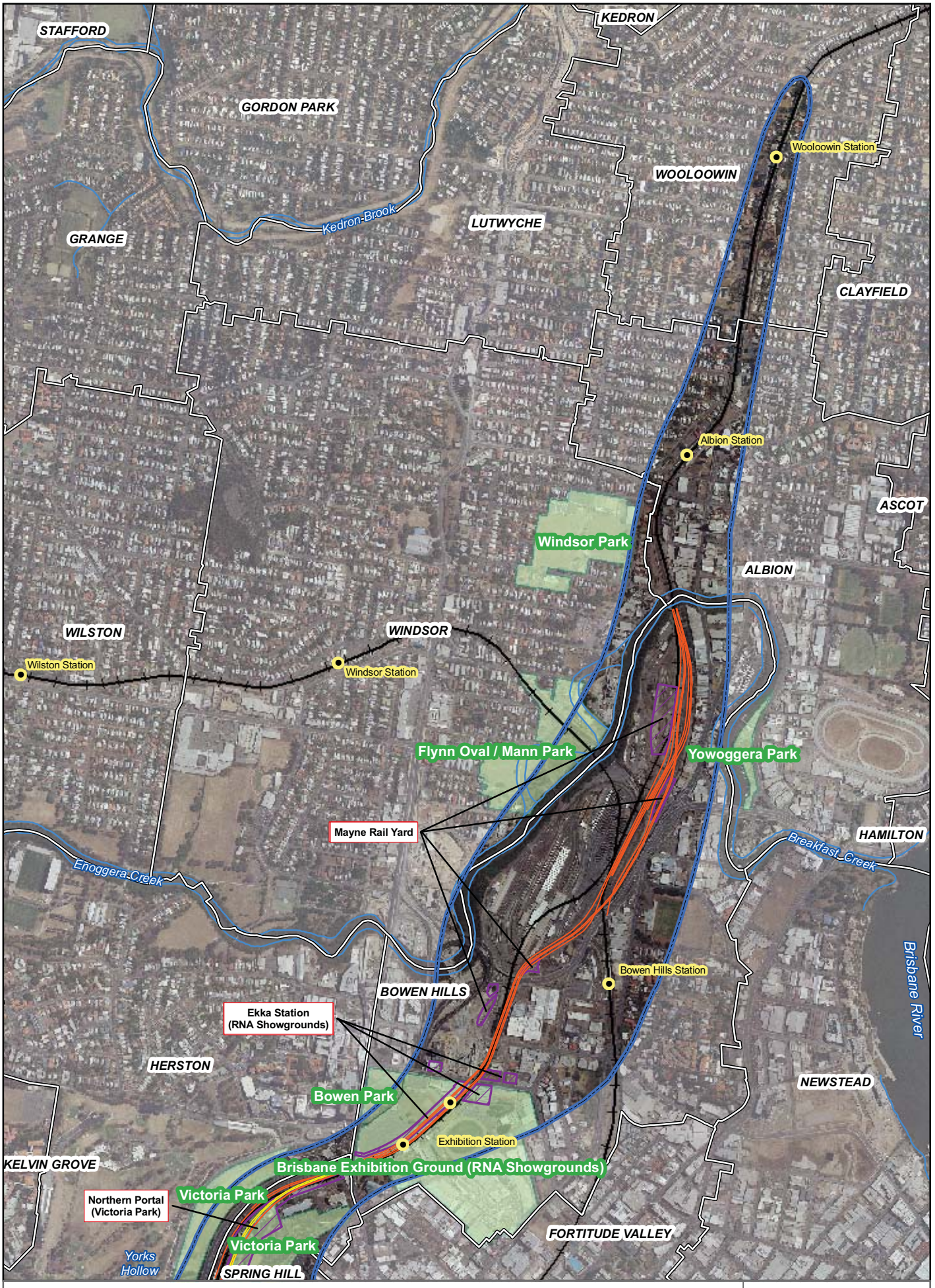
- removal or control of weed species and revegetating around new infrastructure within and/or adjacent to the creeks with applicable endemic and or native plant species (improving micro habitats and consolidation of the beds and banks of creeks)
- incorporating retention basins and other Water Sensitive Urban Design devices to provide potential habitat for frogs, aquatic fauna and birds.

Impacts on the areas surrounding the Mayne Rail Yard in the northern section are also significantly minimised by containing the majority of works within the existing developed and heavily modified rail yard area. This would remove the potential to impact on the Regional Ecosystem areas which are mapped to the west of the Mayne Rail Yard and restrict disturbance to an area which is already heavily modified.

The majority of the central section of the alignment is to be located within a driven tunnel. This provides an important benefit as the majority of the areas which have nature conservation values are avoided. Some of these key habitat areas which have been avoided include the Brisbane River, a number of riparian areas throughout the study corridor, York's Hollow in Victoria Park, Wickham Park, Roma Street Parkland and the City Botanic Gardens, other than the potential impact on fig trees bordering Alice Street.

The majority of the surface works within this central section are also in highly developed and modified sites that have limited vegetation cover, with the exception of the northern portal in Victoria Park.

There is an opportunity to improve nature conservation values through urban design measures to incorporate native shade trees surrounding the Gabba Station and Boggo Road Station locations (in compliance with commuter safety standards).



LEGEND

- Study Corridor
- Suburbs
- Surveyed Areas
- Worksite
- Watercourse
- **Alignment**
  - Above Ground
  - Underground
- Station
- Track

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-19

Potential Impact Areas
Sheet 1 of 4 (Northern Section)

0 100 200 300 400 500 m
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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

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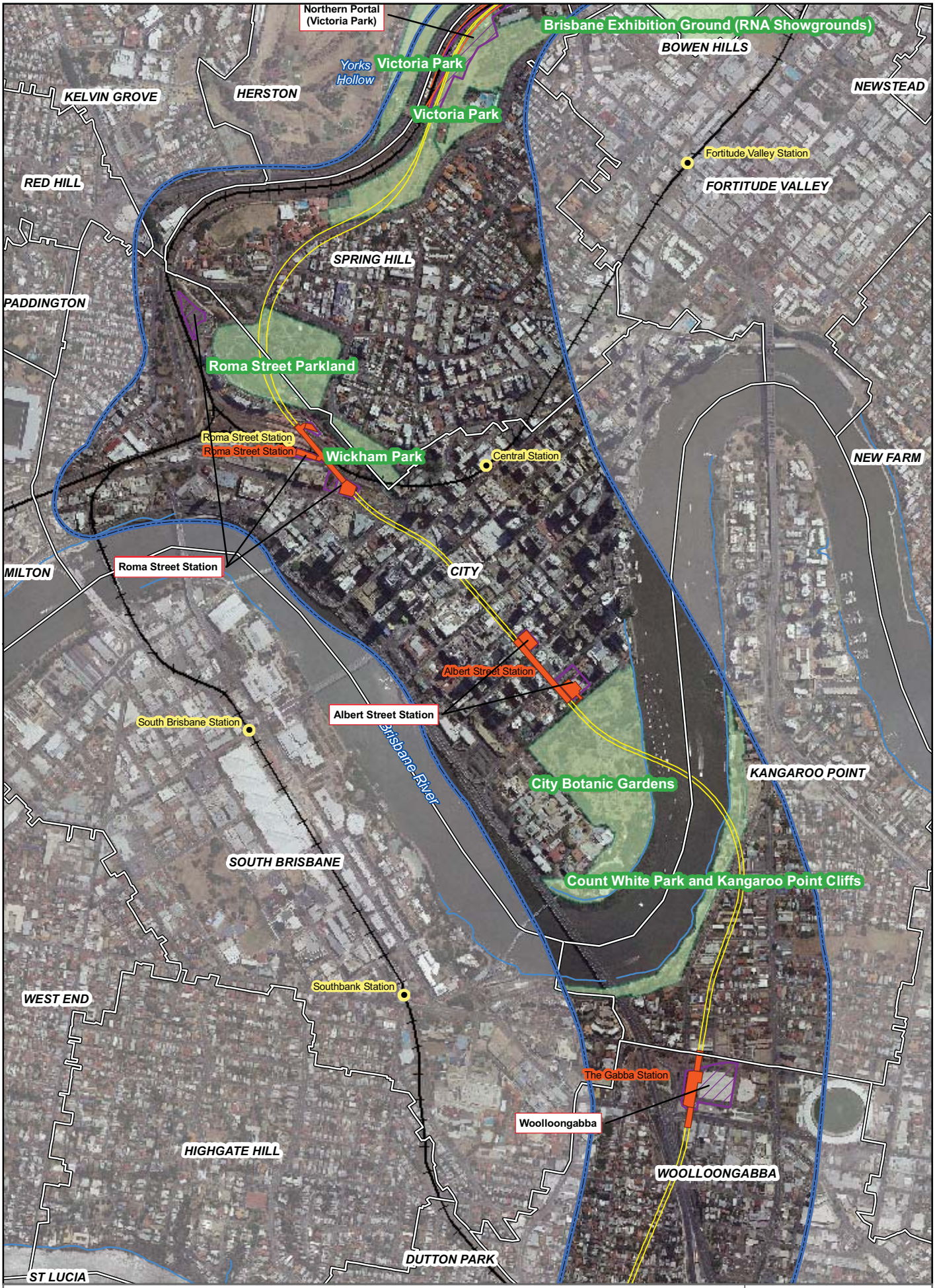

LEGEND

- Study Corridor
- Suburbs
- Surveyed Areas
- Worksite
- Underground Station
- Watercourse
- **Alignment**
  - Above Ground
  - Underground
- Station
- Track

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-20

Potential Impact Areas
Sheet 2 of 4 (Central Section)

0 100 200 300 400 500 m

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CrossRiverRail

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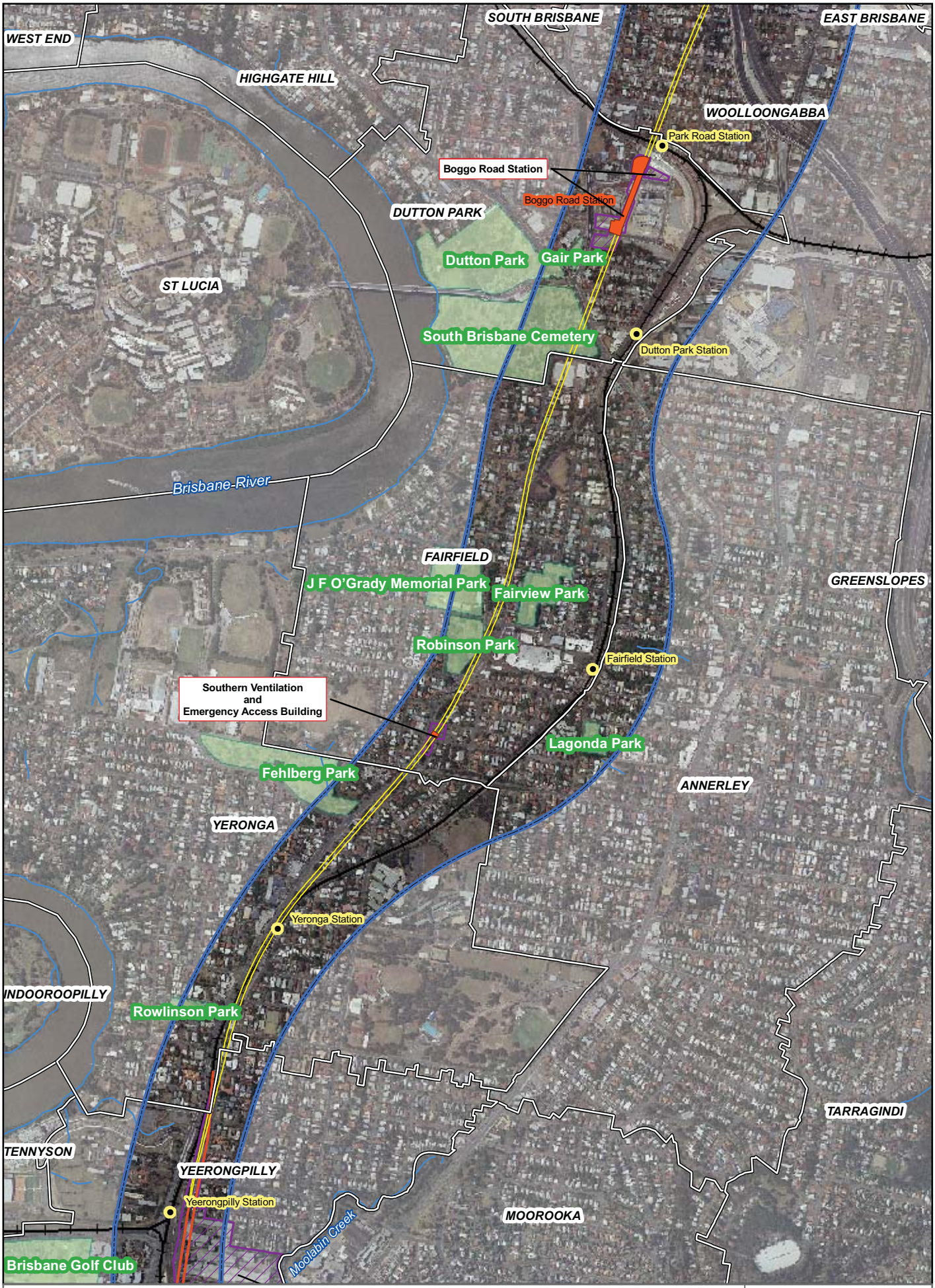

LEGEND

- Study Corridor
- Suburbs
- Surveyed Areas
- Worksite
- Underground Station
- Watercourse
- **Alignment**
  - Above Ground
  - Underground
- Station
- Track

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-21

Potential Impact Areas
Sheet 3 of 4 (Southern Section)

0 100 200 300 400 500 m
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CrossRiverRail

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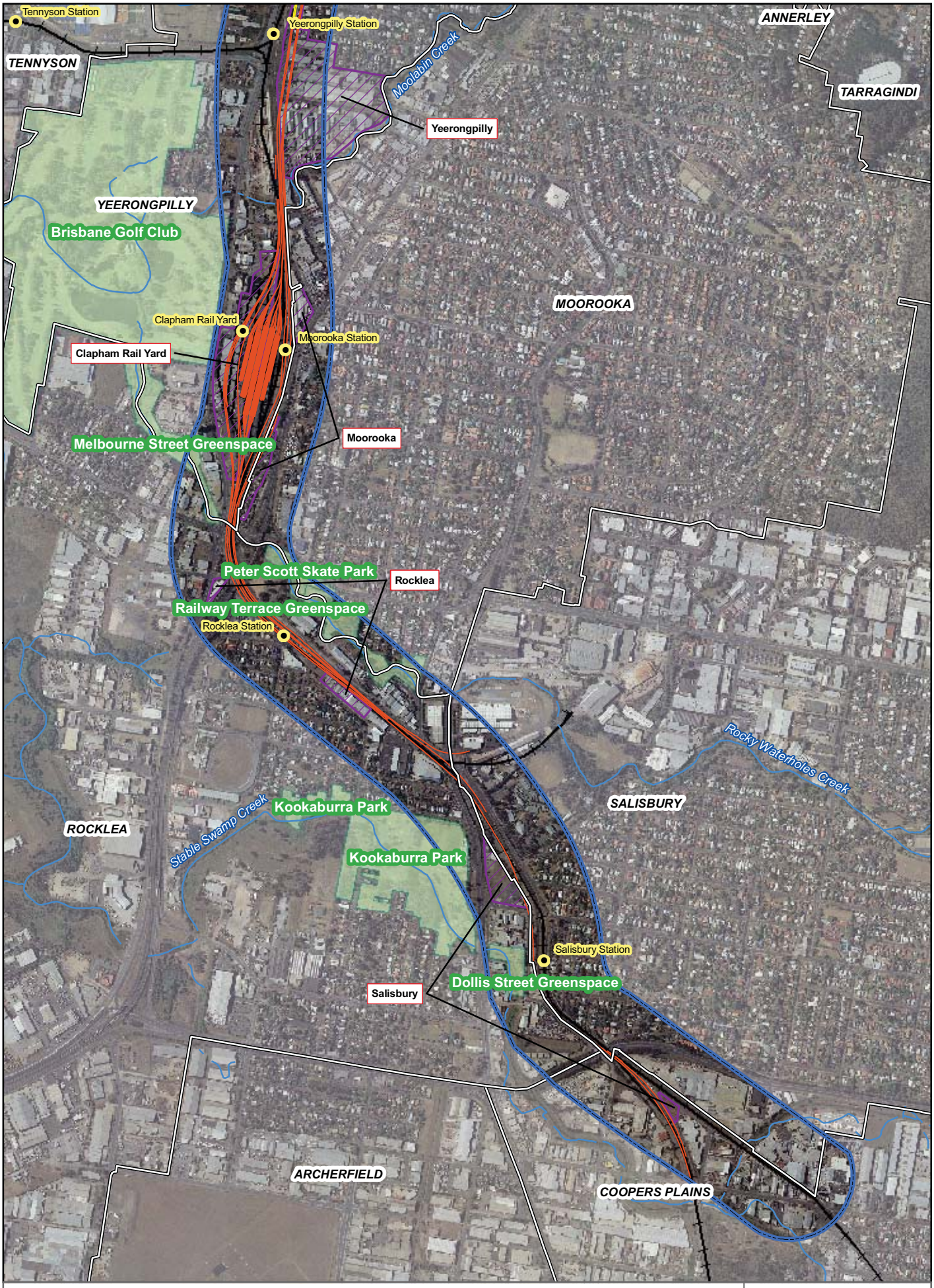

LEGEND

- Study Corridor
- Suburbs
- Surveyed Areas
- Worksite
- Watercourse
- **Alignment**
  - Above Ground
  - Underground
- Station
- Track

CROSS RIVER RAIL
ENVIRONMENTAL IMPACT STATEMENT

Figure 11-22

Potential Impact Areas
Sheet 4 of 4 (Southern Section)

0 100 200 300 400 500 m

1:17,000 at A4

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CrossRiverRail

SKM aurecon CRR JOINT VENTURE

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The southern section of the alignment crosses three creeks (Moolabin Creek, Rocky Water Holes Creek and Stable Swamp Creek) all of which have been highly modified. Therefore, as part of the Project, there is an opportunity to improve the riparian condition of these creeks through re-vegetation works and/or landscaping features. In addition, a landscaped area incorporated shade trees and shrubs will be provided between the new Yeerongpilly Station and existing houses in Wilkie Street. When combined with the proposed acoustic barrier, this would improve the screening of the station from these residences.

Langonda Park in Annerley (also in the southern section) should also be avoided, as per the reference design, as this small site has been subject to intense re-vegetation efforts to improve its habitat values by the Langonda Park Bushcare Group and surrounding community.

11.3.3 Potential impacts

The nature conservation values of the alignment are highly disturbed. Accordingly, the overall impact of the Project on flora and fauna would be minor. In addition, a large section of the Project would be located underground and constructed using tunnelling methods, thereby avoiding direct contact with flora, fauna and associated habitat. Any potential impacts on flora and fauna are likely to occur:

- in the northern and southern sections where the alignment is above ground
- at the portal locations
- in areas which require surface works such as stations, at the ventilation and emergency access building and at worksites.

The worksite locations may also cause a minor, localised temporary displacement of common and widespread fauna species which occur in urban environments. The displacement can be minimised by rehabilitating the areas as soon as practicable after construction activities cease. Also construction activities at the worksites have the potential to cause impacts on the flora and fauna of nearby waterways through sedimentation and pollution. This aspect of the Project would be managed by appropriate soil erosion and sedimentation control measures at each of the worksites (refer to **Chapter 24 Draft Outline EMP**).

The majority of the land within the study corridor is highly urbanised, however there are a number of areas which have some ecological value or provide resources for native fauna. Some of these areas include Regional Ecosystem mapped areas adjacent to Enoggera Creek/Breakfast Creek (northern section) and parkland areas including Victoria Park (and York's Hollow), Wickham Park and Roma Street Parkland, City Botanic Gardens, Dutton Park and South Brisbane Cemetery (central section), and Lagonda Park in the southern section. These areas are likely to provide important habitat and food resources for native fauna living in urban environments, including significant fauna species such as the Grey-headed Flying-fox. As stated earlier, the majority of these areas have been avoided through environmental input into the reference design or due to their location being in the central tunnelled section of the alignment.

Areas within the study corridor consisting of mapped Regional Ecosystem and large patches of remnant vegetation would not be directly disturbed by the construction of the Project. The areas which are directly impacted by the Project include Victoria Park which is the proposed location of the northern portal and potentially some border fig trees along the City Botanic Gardens fence line due to the construction of the Albert Street Station in the central section and associated underground concourse.

The section of the alignment which is located at ground level is to follow the existing rail alignment and any disturbance would largely occur within previously developed areas or existing rail reserves thereby minimising the loss of vegetated areas.

Within the previously developed areas however, clearing of existing vegetation and widening of the existing rail line has the potential to reduce connectivity between areas of existing habitats. The works would also have localised impacts through some loss of vegetated areas and/or significant trees, ie BCC Protected Vegetation, and result in unavoidable clearing of other vegetation protected under the NALL.

Clearing and construction activities associated with the Project have the potential to increase weed infestation and erosion risk, through topsoil disturbance and vehicle movements.

Movement and disturbance of topsoil also holds a risk of spreading RIFA from the southern section of the Project corridor to surrounding areas. The RIFA restricted areas through which the study corridor transverses include Fairfield, Yeronga, Yeerongpilly, Moorooka, Rocklea and Salisbury (southern section).

The construction and operation of the Project may also cause a number of indirect impacts including noise, vibration, dust and lighting. These temporary impacts have the potential to influence the behaviour, movement and distribution of species which currently utilise habitat in the vicinity of the proposed construction worksites.

There are a range of potential impacts which could affect the natural environment in the northern section of the alignment as the majority of the development in the northern section would be above ground. There are potential construction impacts on Enoggera Creek/Breakfast Creek depending on the proximity of the construction works to the riparian zone of the creek. Potential impacts may include contaminated runoff and sediment runoff into the creek.

Generally, marine plant species cannot be cleared or pruned without a development permit issued under the SPA. Additionally clearing of riparian vegetation may also impact on habitat values. The riparian vegetation in this location is also mapped as protected Wetland Vegetation under NALL. However the potential for these impacts to occur is low as the rail alignment avoids the marine plant and riparian habitats.

Construction works within the Mayne Rail Yard (northern section) are unlikely to have a major impact on any features of nature conservation significance located along Enoggera Creek/Breakfast Creek. The works are proposed to occur to the east of the rail yard area, and within the existing Rail Yard boundary. As the only major sensitive areas in this section are located to the western edge of the rail yard (ie Regional Ecosystem areas) it is unlikely that these would be impacted as a result of the construction works. The Mayne Rail Yard is mapped as Significant Native Vegetation under the NALL. However due to the industrial nature of this site this does not reflect the actual vegetation present on site.

The construction of the proposed Ekka Station (within the central section between Victoria Park and Mayne Rail Yard) and the redevelopment of O'Connell Terrace are likely to disturb/remove vegetation which is protected under the NALL. The area to the north of the RNA Showgrounds is mapped as Council Controlled Vegetation and the northern section of land within the RNA Showgrounds is mapped as a Protected Vegetation area. However the habitat value of this site is low due to the limited extent of vegetation, its structural simplicity and isolation from other habitat areas.

Other impacts anticipated within the central section of the alignment are at the northern portal of the tunnel, and at the various areas along the alignment where surface works are required. These areas include:

- At the northern portal the proposed construction area is located within the northern section of Victoria Park directly adjacent to the ICB. The worksite and construction area for this portal would require the removal of a number of mature trees, including a number of mature figs and eucalypt species.

- The construction site to the east of the Roma Street Station is located in Emma Miller Place which is part of Wickham Park and Roma Street Parkland. Within this area there is a large fig which is located in close proximity to the Roma Street Transit Centre which would need to be removed as part of the construction works.
- The construction of the Albert Street Station would require the clearing of Flindersia's, which were planted along both sides of the Albert Street corridor and along both sides of Mary Street in 1996.
- The proposed pedestrian concourse located beneath Alice Street which connects the Albert Street Station with the City Botanic Gardens may potentially impact on the mature figs which grow along the edge of the gardens. An arborist should be engaged to determine the potential impacts and appropriate mitigation strategies. As identified in **Chapter 19 Non Indigenous Cultural Heritage**, no construction storage or construction activity is proposed within the City Botanic Gardens, as this would impact adversely on the site's cultural heritage values.
- Construction of the proposed Boggo Road Station would require the clearing of a small pocket of 'gully' vegetation which is located along the southern side of Peter Doherty Street, to the south of the Boggo Road Urban Village site.
- The construction of the proposed tunnel may also result in changes to ground water which may affect some vegetation (refer to **Chapter 12 Groundwater** for more details regarding groundwater dependent ecosystems).

The majority of the impacts in the southern section of the alignment are likely to be associated with the southern portal and the section above ground involving new track work and three creek crossings. Specifically these impacts are the above ground works for this section of the alignment which would cross Moolabin Creek and Rocky Water Holes Creek and may impact on nature conservation values in these creeks.

11.3.4 Mitigation

The following mitigation measures are proposed to minimise the risk and potential impact of the Project on the natural values located within the study corridor, during the detailed design, construction and operation phases.

Detailed design

- Where possible, avoid or minimise the loss of vegetation and habitat by refining the construction and development footprint, and follow the existing rail corridor and road reserves to minimise the loss or disturbance to vegetated areas with habitat potential.
- Where significant vegetation, including large areas of vegetation, legally protected vegetation, vegetation which has a high habitat potential or riparian vegetation, would potentially be reduced in size and/or area or negatively impacted upon in terms of modifying the surrounding habitats, a Rehabilitation Plan to consolidate exposed surfaces is to be prepared for further development in the construction phase and is to incorporate endemic native species where practicable.
- Include within the urban design and/or landscape plan suitably sized native trees (to comply with the *Electrical Safety Act 2002* and Queensland Rail maintenance policies), shrubs, forbs and grasses, particularly within the southern section of the Project and at the northern portal. The vegetation should provide habitat for fauna found to exist within the area.
- Develop a Pest Management Plan (to be further developed and implemented during the construction phase) regarding the prevention of pest and potential pest species proliferating within the Project corridor, consistent with existing Queensland Rail procedures.
- Ensure sufficient land is secured to implement soil erosion and sedimentation for the construction phase of the Project.

- Obtain a report from a suitably qualified arborist to determine the potential impacts that the underground concourse may cause to the roots of the large figs located along Alice Street adjacent to the Albert Street Station. Ensure that this information is used to develop an appropriate management plan for these trees to minimise any potential impacts on these figs.

Construction

- Develop and implement soil erosion and sedimentation controls to reduce potential for sediment to leave the Project construction sites and enter creeks, drainage lines and stormwater systems such as Enoggera Creek/Breakfast Creek in the northern section and Rocky Water Holes Creek in the southern section.
- Lighting associated with night works should incorporate fittings to lights which cause minimal dispersion of light outside the target area and avoid the use of mercury lamps, to limit insect associated problems such as encouraging fauna to enter close to construction activities and/or traffic areas. This is particularly important along Enoggera Creek/Breakfast Creek (northern section) and Victoria Park (central section) as a number of nocturnal fauna are likely to utilise the riparian vegetation adjacent to the Mayne Rail Yard and the mature trees within Victoria Park at night. Therefore where safety considerations allow, lighting should not extend up into the canopy of the surrounding trees in this area.
- Minimise clearance of native vegetation to that necessary for construction to avoid unnecessary impacts, to reduce rehabilitation costs and minimise exposed surfaces that could lead to erosion and sediment issues.
- Minimise clearance of native vegetation to that necessary for construction and site maintenance and operation, and ensure all the necessary statutory clearing permits have been obtained prior to works commencing. In particular minimise construction impacts on the existing mature trees located within Victoria Park in the central section.
- Protect and clearly define/mark all vegetation for retention (eg flagging tape, barricade webbing or similar high visibility marking) and project boundaries. This is particularly important within Victoria Park where the construction area is located in close proximity to existing stands of mature vegetation which are to be retained eg the large stand of Eucalypts which were planted in 1959 by the local community.
- Stockpiling of material (ie soil and mulch) is to be within designated areas only and covered and/or contained with soil erosion and sedimentation control devices down slope. Within the northern section of the alignment, these areas should be located away from Enoggera Creek/Breakfast Creek to further prevent contaminated runoff entering the surrounding waterways and within Victoria Park in the central section these areas should be located away from any mature trees which are to be retained.
- Ensure a qualified fauna spotter/catcher is present prior to and during the initial clearing to capture and relocate any fauna that is disturbed. The fauna spotter/catcher shall be registered through DERM and hold applicable licences/permits.
- Acknowledge and communicate to construction staff that all native fauna is protected and is not to be intentionally harmed or handled as a result of works or worker actions.
- If any injured or dead fauna is located within or adjacent to the project area it should not be touched by workers and a qualified fauna spotter/catcher should come and collect the injured or dead animal and ensure that it receives the attention required. All incidents should be included in the Environmental Incident report by the spotter/catcher.
- Where hollow bearing trees need to be removed the hollow sections should be cut into suitable lengths and a floor and lid attached as necessary to make them suitable for fauna to use. These should then be relocated to adjacent trees to be retained or nearby locations (after obtaining the appropriate approvals), and attached at a similar height, facing south.
- Heavy machinery and equipment is to be stored in designated pre-cleared areas only, away from mature trees.

- Exclude parking of vehicles, storage of plant and equipment, stockpiling and creating hardstands within the drip zone of trees to be retained.
- Develop and implement a Weed Management Plan regarding the prevention of pest and potential pest species proliferating within the Project corridor, especially those listed under the LP Regulation. The plan will include mapping of significant areas of exotic or weed species.
- Revegetate areas along the exposed surfaces of drainage lines and creeks where applicable (refer to BCC recommended species lists for Water Sensitive Urban Design systems).
- Implement a revegetation/landscape plan to provide additional softening and screening to the railway and to improve visual amenity (refer to BCC recommended species lists for street tree plantings) and ensure trees would not create an issue under the *Electrical Safety Act 2002* or Queensland Rail maintenance requirements.
- Develop and implement a RIFA Risk Management Plan approved by Biosecurity Queensland.

In addition to the general, project wide mitigation measures there are also a number of specific construction mitigation measures which would be implemented for the central and southern sections of the Project corridor.

The following additional construction mitigation measures would be implemented in the central section of the alignment to avoid and/or minimise potential construction impacts:

- Disturbance to vegetation communities within Victoria Park surrounding the northern portal works should be minimised to retain ecological value and buffering abilities.
- Where existing fauna boxes are removed for the Project, move and repair where necessary or replace the existing fauna boxes present in the northern section of Victoria Park to a new more suitable location.
- Develop and implement a management plan which reduces the impacts of the underground concourse at Alice Street and the overall tunnelling activities may have on the existing mature figs within the City Botanic Gardens. Ensure that an arborist provides input into a management plan for the ongoing health of those specimens.
- An arborist should also provide input into the monitoring of trees (ie figs) which may have been affected by the excavation of the tunnel along the tunnel alignment after excavation of the tunnel in that locality has passed, including the health of the tree and any potential response to groundwater drawdown.

The following additional specific construction mitigation measures should be considered in the southern section of the alignment to avoid and/or minimise potential construction impacts:

- Where possible and appropriate, revegetate disturbed areas along the drainage lines where applicable, in particular Moolabin Creek and Rocky Water Holes Creek, to promote stability of the riparian zones (refer to BCC recommended species lists for Water Sensitive Urban Design systems and endemic plant lists for rehabilitation).
- An arborist should be engaged to undertake an assessment of any significant trees prior to the excavation of tunnel areas underneath these specimens, and provide input into a management plan for the on-going health of those specimens.
- An arborist should also provide input into the monitoring of trees (ie figs) which may have been affected by the excavation of the tunnel, after excavation of the tunnel in that locality has passed, including the health of the tree and any potential response to groundwater drawdown.

- Implement a tree planting strategy to provide additional softening and screening to the southern ventilation shaft, and to improve visual amenity around the new Yeerongpilly Station where possible (refer to BCC recommended species lists for street plantings). It is recommended that the species used around the ventilation and emergency access building and the new station incorporate existing species present within the surrounding areas. Ensure trees would not create an issue under the *Electrical Safety Act 2002.*

Operation

- Lighting associated with the Project should incorporate fittings to lights which cause minimal dispersion of light outside the target area with mercury lamps avoided, to limit potential insect issues. It should be noted however that public and passenger safety takes priority in lighting mitigation strategies.
- All native fauna is protected and is not to be intentionally harmed or handled as a result of maintenance works or worker actions.
- If any injured or dead fauna is located within or adjacent to the Project area it should not be touched by workers and a qualified fauna spotter/catcher should collect the injured or dead animal and ensure that it receives the attention required. All incidents should be included in the Environmental Incident report by the spotter/catcher.
- Operational maintenance works are to be carried out within designated area(s) and/or offsite and not disturb surrounding vegetation.
- Heavy machinery and equipment to be stored in designated pre-cleared areas only.
- Ensure qualified personnel are employed to conduct maintenance regimes on vegetation for sustainable rehabilitation and renewed connectivity within the Project corridor.
- Qualified personnel should be employed to undertake ongoing monitoring of vegetation and fauna communities which may have been negatively impacted upon due to construction works (including tunnelling activities).
- These mitigation measures would be implemented through the Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP) (refer to **Chapter 24 Draft Outline EMP**).

11.4 Summary

The areas with nature conservation value are primarily located within parklands and riparian vegetation associated with the two major waterways within the study corridor, the Brisbane River and Enoggera Creek/Breakfast Creek. The majority of these areas are poorly connected to other areas both within and adjacent to the study corridor, the main exception to this being Enoggera Creek/Breakfast Creek complex which has reasonable connectivity from the area located within the study corridor through to larger areas of remnant vegetation located further upstream. However the existing parkland areas and riparian vegetation within the study corridor provide ‘stepping stone’ habitats for the more mobile and disturbance-tolerant fauna species as well as habitats in their own right for some less mobile species.

Consequently, the majority of the flora and fauna species located within the study corridor are common and widespread species frequently found within the Brisbane metropolitan area, which are urban specialists and/or disturbance tolerant species. The most conservationally significant fauna species observed was the Grey-headed Flying-fox (*Pteropus poliocephalus*), which is listed as Vulnerable under the EPBC Act. It is widespread throughout South East Queensland and is likely to forage amongst suitable fruiting and flowering trees within the study corridor and throughout the Brisbane metropolitan area. No roosts were located within the study corridor.

The only conservationally significant flora species located within the study corridor are a number of Plunkett mallee (*Eucalyptus curtisii*) specimens which are listed as Rare under the NC Act and a single specimen of Macadamia nut (*Macadamia integrifolia*) which is also listed as Rare under the NC Act and the Vulnerable under the EPBC Act. Both of these species appear to be planted for domestic cultivation within the locations where they were identified. They are therefore not considered to constitute wild populations or naturally occurring and are therefore not protected under the applicable legislation.

The surveyed areas within the study corridor which have the most significant habitat values are the areas located along Enoggera Creek/Breakfast Creek and its fringing mangrove forest including mapped Regional Ecosystem areas, Victoria Park (including York's Hollow) at Spring Hill, Wickham Park, Roma Street Parkland and the City Botanic Gardens in Brisbane City, the Kangaroo Point cliffs along Count White Park at Kangaroo Point, Dutton Park (including the South Brisbane Cemetery) at Dutton Park and Lagonda Park at Annerley.

The mapped Regional Ecosystem areas within the Mayne Rail Yard would not be directly disturbed by the Project. The main areas of nature conservation value which are likely to be directly impacted by the Project include Victoria Park which is the proposed location of the northern portal, and other isolated vegetation areas such as the potential interface with fig trees bordering the City Botanic Gardens due to the proposed Alice Street entry to the Albert Street Station concourse.

Overall, the majority of the potential nature conservation impacts which could occur as a result of the Project are anticipated to be minimal and manageable due to the urban nature of the study corridor and the large portion of the alignment situated underground through the central section. Most of the nature conservation impacts which are likely to occur as a result of the reference design would be within various open green spaces and parks and where the alignment crosses or is adjacent to waterways.

Where the Project does impact on the existing nature conservation values located within the study corridor or potentially impacts on the surrounding and/or downstream environments the potential impacts would be minimised and appropriately managed through site specific mitigation measures. Additionally where there is an opportunity to improve the existing environment through rehabilitation measures, these opportunities would be explored for feasibility and practicality during the detailed design and construction phases with all subsequent EMPs updated accordingly.