

**New M5 and St Peters Interchange  
Environmental Impact Statement  
– Review of Biodiversity Assessment**

**Report prepared for  
the City of Sydney and Marrickville Councils  
December 2015**

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## EXECUTIVE SUMMARY

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The City of Sydney and Marrickville Councils commissioned a review of the Biodiversity Assessment Report (BAR) prepared by Eco Logical Australia Pty Ltd for the proposed new M5, including the St Peters interchange, due to concerns about the impact of the project on biodiversity in these two local government areas (LGAs). The following sections present an overview of the issues identified during the review .

### Validity of the biodiversity assessment

The BAR was required to be prepared in accordance with the SEARs issued for the project, one of which specifies that it must be undertaken in accordance with the NSW Office of Environment and Heritage's (OEH) Framework for Biodiversity Assessment (FBA), including further consideration of impacts on species, populations and ecological communities identified by the OEH.

The following issues are of concern in relation to the SEAR requirements, and how the FBA was applied in preparation of the BAR:

- The BAR focuses on threatened species, populations and ecological communities, as does the FBA. However, the introductory SEAR statement and *Threatened Species Conservation Act 1995* definition of biodiversity values suggests more consideration should have been given to biodiversity more generally, including species and sites of local conservation significance within the City of Sydney and Marrickville Council LGAs, and the numerous initiatives that have been implemented to conserve and enhance habitat for/at them.
- No consideration was given to ecological reports and data held by the City of Sydney or Marrickville Councils in preparation of the BAR, including each Council's respective biodiversity strategies and recent records of threatened and migratory species, despite sections of the FBA that state such information can or should be considered.
- Important habitat features, including local wetlands and native vegetation in Sydney Park, Tempe Reserve, and Tempe Lands, were not mapped or otherwise identified in the BAR, despite requirements in the FBA for such features to be mapped. Although outside of the development footprint, some local wetlands and native vegetation are immediately adjacent to it and could be impacted. Identification of habitat features such as these through mapping would assist in identifying impacts and ensuring they are mitigated.
- It is not clear whether some of the above native vegetation should have been identified as Plant Community Types (PCTs) in accordance with the FBA as it appears to have been dismissed as 'urban exotic and native' without being carefully considered.
- The list of candidate 'species credit species' in the BAR does not include several such species that have recently been recorded in the vicinity, and/or for which suitable habitat (as described on the OEH Threatened Species Profile Database) is present within the development footprint, particularly at the Alexandria Landfill site where clearing has already commenced, and adjoining industrial and vacant land. These include the Eastern Bent-wing Bat, (possibly) the Southern Myotis, and the endangered inner west population of the Long-nosed Bandicoot. It appears these species have been incorrectly excluded from further consideration in application of the FBA, and that they should have been addressed further in the BAR in accordance with the requirements of Sections 6-12 of the FBA.
- The Long-nosed Bandicoot population was also identified by the OEH as requiring further consideration in accordance with Section 9.2 of the FBA, but no further consideration was given, despite the SEARs stating that specific surveys were required.
- The discussion of impacts to biodiversity values and proposed mitigation in the BAR is considered insufficiently detailed, and cumulative impacts to biodiversity are not mentioned despite being a requirement of the FBA.

### Threatened species, populations and communities in the City of Sydney and Marrickville LGAs

The threatened Eastern Bent-wing Bat and (possibly) the Southern Myotis, the endangered Long-nosed Bandicoot population, the endangered Coastal Saltmarsh community, and migratory species including the Great Egret, Cattle Egret, Sharp-tailed Sandpiper, Latham's Snipe and Rufous Fantail have all recently been

recorded in the City of Sydney and/or Marrickville LGAs, but as noted above were not identified or adequately considered in the BAR, despite potential for the project to impact upon them.

### **Relationship to Council initiatives**

The initiatives that have been implemented by the City of Sydney and Marrickville Councils and their respective community members to conserve and enhance habitats to promote biodiversity were not identified or otherwise considered in preparation of the BAR. These initiatives are guided by the City of Sydney's Urban Ecology Strategic Action Plan (UESAP) and Marrickville Council's Biodiversity Strategy 2011-2021 (BS) and Biodiversity Action Plan 2011-2015 (BAP). These documents outline 'priority' or 'target' species of local conservation significance in each LGA, along with 'priority' habitat sites and actual or potential habitat linkages/connectivity between them, as well as between sites in adjoining LGAs.

Priority/target species identified in both LGAs include:

- frogs such as the threatened Green and Golden Bell Frog (GGBF) (which is addressed in the BAR), Dwarf Eastern Tree Frog and Peron's Tree Frog;
- reptiles such as the Eastern Blue-tongue, Bar-sided Skink and Eastern Water Skink;
- small birds such as the Superb Fairy Wren, New Holland Honeyeater, Red-browed Finch, Grey Fantail, Silvereye and rainforest migrants including the Rufous Fantail and Spectacled Monarch;
- freshwater wetland birds such as the Australasian Reed Warbler, Black-fronted Dotterel, Black-winged Stilt, Buff-banded Rail and Royal Spoonbill;
- microbats including Gould's Wattle Bat and the threatened species previously mentioned;
- the Long-nosed Bandicoot; and
- the threatened Grey-headed Flying-fox (which is addressed in the BAR).

Despite comprising highly modified and/or constructed habitats, priority sites in the LGAs provide important habitat for the priority/target fauna species in this highly urbanised context, and include:

- Sydney Park, where at least 62 native fauna species have been recorded since 2010, including priority species such as the Superb Fairy Wren, New Holland Honeyeater, White-plumed Honeyeater, Australasian Reed Warbler, Rufous Fantail, Black-winged Stilt, Black-fronted Dotterel, Royal Spoonbill, Eastern Blue-tongue and Dwarf Eastern Tree Frog.
- Tempe Reserve, incorporating Tempe Lands, and the lower stretch of Alexandra Canal. 93 native bird species recorded have been recorded at this site in the past four years, including target species such as the Yellow Thornbill, White-browed Scrub Wren, Yellow-faced Honeyeater, White-plumed Honeyeater, White-naped Honeyeater, Spotted Pardalote, Brown Gerygone, Red-browed Finch, Silvereye, Superb Fairy-wren, Golden Whistler, Grey Fantail, and Australasian Reed Warbler. An additional eight target reptile and frog species have been recorded at this site, and there have been two recent confirmed records of the Short-beaked Echidna.

The dense weeds, mature trees, rock crevices, sandstone boulders, piles of debris and other ground-level features at the Alexandria Landfill site are also of habitat value for priority species. The landfill contributes to local habitat connectivity between Sydney Park and Tempe Reserve and other sites on the Cooks River. The banks of Alexandra Canal are also important with regard to local habitat connectivity, with the UESAP, BS and BAP all recognising their potential for future habitat enhancement.

The City of Sydney and Marrickville Councils are both members of the Cooks River Alliance, a partnership of Councils working together with communities for a healthy Cooks River catchment. There have been substantial efforts through the alliance to improve water quality and re-establish native vegetation along the river to promote biodiversity and restore local and regional habitat connectivity.

While not necessarily required by the FBA, it is disappointing that there is no recognition of any of the above in the BAR, despite the development footprint for the St Peters interchange and local road upgrades extending from Alexandra Canal across the Alexandria Landfill and into Sydney Park, with a construction compound and

other works immediately adjacent to the park's habitats, and the location of Tempe Lands, Tempe Reserve and the Cooks River along the alignment of the proposed M5 tunnel.

### **Impacts on threatened and other priority/target species and priority sites**

While the potential impacts of the project are discussed in general terms in the BAR, it does not describe or address in detail all of the potential impacts of the project on the above species and sites during construction and operation, and as mentioned impacts to some threatened species are unknown. A more comprehensive discussion of all impacts, including site-specific details, should be included in the BAR.

### **Cumulative impacts of the project on biodiversity**

This project is likely to exacerbate the reductions in biodiversity values that have resulted from past development in the City of Sydney, Marrickville and surrounding LGAs, and there are likely to be further cumulative impacts from numerous current and proposed future developments in the area. Potential cumulative impacts to biodiversity are not identified or discussed in the BAR, despite being a requirement of the FBA as previously mentioned.

### **Recommendations for further assessment and mitigation measures to reduce impacts to biodiversity**

#### *Further assessment*

It is considered that further assessment is necessary in relation to:

- threatened species, populations and communities, in accordance with Sections 6-12 of the FBA;
- priority/target species and priority sites in both the City of Sydney and Marrickville LGAs; and
- similar species/sites that may be impacted in other LGAs.

Further assessment should also be undertaken in relation to any changes to the project that arise during the detailed design phase.

#### *Mitigation measures*

The mitigation measures outlined in the BAR are not considered adequate in terms of ensuring minimisation of impacts to biodiversity values in the City of Sydney and Marrickville LGAs. The fact that impacts to threatened species, populations and communities and to priority/target species were not specified in the BAR suggests these species etc may be overlooked in the Flora and Fauna Management Plan (FFMP) that is to be prepared for the project, particularly since application of the RMS Biodiversity Guidelines, which as described in the BAR will form the basis of the FFMP, is partly reliant on information in the environmental assessment documents.

More detailed measures are therefore recommended for addition to the BAR and FFMP along with/instead of others already specified, as well any additional mitigation measures identified through the recommended further assessment, and any identified for similar species/sites in other LGAs.

### **Opportunities for habitat creation/restoration**

The BAR does not recognise or discuss any of the opportunities presented by the development to create new habitats through site landscaping etc. While this might not be considered a particular requirement of the FBA, such opportunities have the potential to compensate for some of the adverse impacts and should therefore be documented.

While the Urban Design report and Landscape and Visual Impact Assessment prepared for the EIS identify some opportunities in this regard, there are many more possibilities that should be explored and developed with reference to the City of Sydney's UESAP and Marrickville Council's BS and BAP, and in consultation with the City of Sydney's Urban Ecology Coordinator and Marrickville Council's Team Leader, Biodiversity.

## **1. INTRODUCTION**

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This report is based on a review of the Biodiversity Assessment Report (BAR) prepared by Eco Logical Australia Pty Ltd (ELA) as part of the Environmental Impact Statement (EIS) for the proposed new M5 roadworks. This review was commissioned by the City of Sydney and Marrickville Council due to concerns about the impacts of the proposed development on biodiversity, particularly given significant efforts in recent years by both councils and community members to conserve and enhance it in these highly urbanised local government areas (LGAs). The review, and this report, therefore focuses on issues impacting on these two LGAs.

## **2. METHODOLOGY**

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The methodology employed in undertaking the review involved the following:

- Meetings with the City's Urban Ecology Coordinator and Acting Team Leader, Biodiversity at Marrickville Council, to discuss the scope of work and particular areas of concern in each LGA. These meetings also provided an opportunity for the council representatives to provide all relevant documents and data, and to discuss and agree on the format of this report.
- A thorough review of all relevant documents, including:
  - the Secretary of the NSW Department of Planning and Environment's Environmental Assessment Requirements (SEARs) for the EIS relating to the BAR;
  - the Framework for Biodiversity Assessment (FBA) prepared by the NSW Office of Environment and Heritage (OEH);
  - the BAR;
  - the Urban Design and Landscape and Visual Impact Assessment reports prepared for the EIS;
  - Biodiversity Guidelines: Protecting and Managing Biodiversity on Roads and Traffic Authority projects (hereafter referred to as RMS Biodiversity Guidelines);
  - the City of Sydney's Urban Ecology Strategic Action Plan;
  - Marrickville Council's Biodiversity Strategy 2011-2021;
  - Marrickville Council's Biodiversity Action Plan 2011-2015;
  - biodiversity-related data held by both Councils; and
  - other relevant documents provided by both councils.
- Preparation of this draft report following the review, with a view to it being incorporated with the broader submissions of both Councils. The report provides commentary on:
  - the validity of the biodiversity assessment;
  - impacts on threatened and priority species and priority sites, with particular consideration for Sydney Park, Tempe Lands, Tempe Reserve and Alexandra Canal and nearby sites with known or potential habitat for threatened/priority species;
  - cumulative impacts of the project on biodiversity;
  - recommendations for further assessment and mitigation measures to reduce impacts to biodiversity; and
  - identification of opportunities to restore/create habitat features through the project.

Upon receipt, comments from the City of Sydney and Marrickville Council on a draft were incorporated into this final report.

## **3. COMMENTARY ON THE BIODIVERSITY ASSESSMENT**

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### **3.1 Validity of the Biodiversity Assessment Report**

The BAR was required to be prepared in accordance with the SEARs issued for the biodiversity impact assessment, one of which specifies that it must be undertaken in accordance with the FBA, including further consideration of impacts on species, populations and ecological communities identified by the OEH.

However, the following issues are of concern in relation to the SEAR requirements, and how the FBA was applied in preparation of the BAR:

- The SEARs state that the BAR should be 'An assessment of the potential ecological impacts of the proposal', and FBA Section 2.1.1.3 states the FBA must be used by a proponent to assess all biodiversity values on the development site for a Major Project. The FBA states that the definition of 'biodiversity values' is the same as that under the NSW *Threatened Species Conservation Act 1995* (TSC Act), i.e. it 'includes the composition, structure and function of ecosystems, and includes (but is not limited to) threatened species, populations and ecological communities, and their habitats.' It is furthermore noted that the EIS states that one of the objectives of the project is to 'Minimise impacts on natural systems including biodiversity'.
- Comment:** The BAR focuses on threatened species, populations and ecological communities, as does the FBA. However, the SEAR statement, TSC Act definition of biodiversity values and stated objective of the project suggests more consideration should have been given to biodiversity more generally. There are species and sites that are considered to be of local conservation significance within the City of Sydney and Marrickville Council areas, and numerous initiatives have been implemented to conserve and enhance habitat for/at them (refer Sections 3.2 and 3.3 of this report), but these have not been identified in the BAR.
- FBA Section 2.2.2.1 states that when preparing a BAR, an assessor is generally required to make use of databases maintained by the OEH. Section 2.2.2.4 however states that 'Local data may be used if the consent authority, in consultation with OEH, is of the opinion that it more accurately reflects local environmental conditions than the data in the databases.'
  - **Comment:** No consideration was given to local data held by the City of Sydney or Marrickville Councils. It is not clear why this was the case. Threatened species records held by both Councils are discussed in Section 3.2 of this report, as well as records of migratory species listed under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act).
  - FBA Section 4.1.1.2 requires that both the Site Map and Location Map in the BAR should show local wetlands and the extent of native vegetation in the outer assessment circle or the buffer area surrounding the development footprint.
- Comment:** The wetlands and the majority of fringing native vegetation in Sydney Park, and scattered plants of the endangered Coastal Saltmarsh community along Alexandra Canal are not indicated on these or any other maps in the BAR. Similarly, native vegetation including Coastal Saltmarsh and Grey Mangroves at Tempe Reserve are not indicated on any maps, despite being within the outer assessment circle. Finally, the wetlands and native vegetation at Tempe Lands are not indicated on any other maps. Although this site is outside of the outer assessment circle, it is close to the tunnel alignment, suggesting it could be impacted and therefore should have been included.
- FBA Section 4.1.1.12 states that 'Any other important and local wetlands that are adjacent to or downstream from the development site and within the outer assessment circle must be identified and shown on the Location Map.'
- Comment:** Local wetlands in Sydney Park, immediately adjacent to the development site, and Tempe Lands are not shown on any maps.
- FBA Section 5.2.1.1 requires the assessor to identify and map the distribution of plant community types (PCTs) on a development site according to the NSW PCT classification as described in the VIS Classification database.
- Comment:** It is not clear whether the vegetation at Sydney Park, Tempe Reserve and Tempe Lands should have been identified as PCTs, despite having been planted (with the exception of Grey Mangroves). It appears this vegetation was dismissed as 'urban exotic and native', without being carefully considered, as illustrated by the fact that no vegetation at all was mapped in Sydney Park on Figure 9 of the BAR, or in Tempe Reserve on Figure 8. It is understood this vegetation is not within the development footprint, but in the case of Sydney Park it is immediately adjacent to it, and as mentioned above, Tempe Reserve is within the outer assessment circle and Tempe Lands, although outside of the outer assessment circle, could be impacted. It is considered that identifying the vegetation at these sites through mapping would assist in identifying impacts and ensuring they are mitigated.

- FBA Section 5.2.1.3 states that the assessor should review any existing data and information that is currently available on native vegetation relevant to the development site and land in the outer assessment circle, including existing maps of native vegetation in the area such as those held by a local government authority, or existing data or information in ecological reports, soil surveys or previous native vegetation surveys that are relevant to the development site.

**Comment:** Both the City of Sydney and Marrickville Council have prepared biodiversity strategies including vegetation mapping relevant to the study area, as discussed further in Section 3.3, but neither these or associated reports or data were reviewed for or otherwise referenced in the BAR.

- FBA Section 6.1.1.2 states that 'An assessor may use more appropriate local data instead of data from the Threatened Species Profile Database (TSPD) for the purpose of obtaining the information required at Paragraph 6.1.1.1, if: (a) in the opinion of the assessor, the local data more accurately reflects the local environmental conditions of the development site, and (b) the Secretary of DP&E, in consultation with the Chief Executive of OEH, approves the use of that data as more appropriate local data.

**Comment:** As mentioned previously, no local data held by the City of Sydney or Marrickville Councils was sourced or otherwise considered in preparation of the BAR. Recent records of threatened species held by both Councils that are relevant to the development are discussed further in Section 3.2 of this report.

- FBA Section 6.5 outlines the steps that must be followed in relation to identifying 'species credit species' on a development site. FBA Section 6.5.1.2 states "Using data from the TSPD, the assessor must identify a threatened species as a candidate species for the development site if: (a) the species is identified as a species credit species in the TSPD, and (b) the geographic distribution of the species is known or predicted to include the IBRA subregion in which the development site is located, and (c) the development site contains habitat features or components associated with the species, as identified in the TSPD, OR (d) past surveys undertaken at the development site indicate that the species is present."

**Comment:** It is unclear how the list of candidate species credit species (Table 15 of the BAR) was generated. The list does not include several species credit species (as identified on the TSPD) that have been recorded in the vicinity of the development site in recent surveys, and/or for which suitable habitat (as described on the TSPD) is present on the development site. These include the Eastern Bent-wing Bat and (possibly) Southern Myotis, and the endangered inner west population of the Long-nosed Bandicoot (refer Section 3.2 for more detail). All of these species are listed in Appendix A of the BAR as having been identified for consideration in relation to the development from database searches, along with statements that there is no suitable habitat present within the development site. This is incorrect as, according to the information provided on the TSPD, there is suitable habitat for all of them, particularly at the Alexandria Landfill and adjoining industrial sites, where clearing has already commenced. The TSPD states that the Long-nosed Bandicoot population occurs within 'Highly disturbed areas with no or limited native vegetation', and that the Southern Myotis is also associated with this type of habitat. Furthermore, the Southern Myotis and other microbats are known to roost in buildings, under bridges, and/or in stormwater drains. It appears that these species have been incorrectly excluded from further consideration in application of the FBA, and that they should have been addressed further in the BAR in accordance with the requirements of Sections 6-12 of the FBA. The Long-nosed Bandicoot population was also identified by the OEH as requiring further consideration in accordance with Section 9.2 of the FBA, but no further consideration was given, despite the SEARs stating that specific surveys were required for the species that OEH identified. Table 25 of the BAR states that the Long-nosed Bandicoot population does not occur within the development site, but this cannot be known since no surveys were undertaken.

- FBA Section 8 requires the BAR to include an assessment of the direct and indirect impacts of the project on biodiversity values, and to document the measures that will be implemented to avoid and minimise these impacts, including cumulative impacts (Section 8.3.1.8 (c)).

**Comment:** It is felt that the discussion of impacts to biodiversity values and proposed mitigation in the BAR is insufficiently detailed, and cumulative impacts to biodiversity are not discussed at all. It is felt that more detail should be provided, including site-specific information relating to Sydney Park, Alexandra Canal, Tempe Reserve, Tempe Lands and the Cooks River (as discussed further in Sections 3.4, 3.5, 3.6 and 3.7 of this report), including of course in relation to any further assessment undertaken for the threatened species and population mentioned above.



### **3.2 Threatened species, populations and communities in the City of Sydney and Marrickville LGAs**

The BAR discusses impacts to the threatened Green and Golden Bell Frog and Grey-headed Flying-fox, but as mentioned in Section 3.1, threatened microbats, the endangered population of the Long-nosed Bandicoot in inner western Sydney, the endangered Coastal Saltmarsh community, and a number of migratory species listed under the EPBC Act, were not identified or adequately considered in the BAR. This is despite confirmed recent records of:

- the threatened Eastern Bent-wing Bat (plus unconfirmed records of the threatened Southern Myotis) at Sydney Park adjacent to the proposed St Peters interchange, as well as at Tempe Lands, Tempe Reserve and elsewhere along the Cooks River in the Marrickville LGA, and the presence of suitable roosting habitat for these and other threatened microbats within the proposed development footprint – particularly the roof and/or wall cavities of many of the industrial buildings that are to be demolished for the works, the mature trees that will be removed, the bridge over Alexandra Canal that is to be demolished, and potentially any stormwater channels that are to be demolished.
- the Long-nosed Bandicoot at Alexandria, and suitable habitat present for this species within the weed-infested Alexandria Landfill site, which is to be cleared for the St Peters interchange (with clearing already commenced), as well as possibly adjoining industrial sites that will also be developed for the interchange;
- scattered Coastal Saltmarsh plants occurring along Alexandra Canal, potentially in the vicinity of the bridge/s that require demolition and the proposed new bridges, and a patch of Coastal Saltmarsh at Tempe Reserve; and
- migratory species at Sydney Park, including the Great Egret, Cattle Egret, Sharp-tailed Sandpiper, Latham's Snipe, and Rufous Fantail, the latter of which also potentially occurs periodically in association with the weed infestations on the Alexandria Landfill site.

### **3.3 Relationship to Council initiatives**

Both the City of Sydney and Marrickville Councils and their respective community members have implemented numerous initiatives in recent years to conserve and enhance habitats to promote biodiversity to the extent possible in these highly urbanised areas. These initiatives are guided by:

- the City of Sydney's Urban Ecology Strategic Action Plan (UESAP);
- Marrickville Council's Biodiversity Strategy 2011-2021 (BS); and
- Marrickville Council's Biodiversity Action Plan 2011-2015 (BAP).

These documents outline the 'priority' or 'target' species for conservation in each LGA, along with 'priority' sites for biodiversity conservation and actual or potential habitat linkages/connectivity between them, as well as between sites in adjoining LGAs. As mentioned in Section 3.1, these and other ecological reports and data held by both Councils were not reviewed or otherwise considered in preparation of the BAR.

Biodiversity has obviously drastically reduced from its original state within both LGAs. Many of the species present today have adapted well to urbanisation and are abundant and widespread. However, a number of other species that have declined in urban areas generally are still present in small numbers in both LGAs. Most of these species are dependent on particular habitat features that are limited within both LGAs and many other urban areas, such as dense shrubby vegetation, tree hollows, rock crevices, ground-level features such as sandstone boulders and logs, and freshwater wetlands. These species have been identified as 'priority' species in the City of Sydney's UESAP, and 'target' species in Marrickville's BS & BAP, and include:

- frogs such as the threatened Green and Golden Bell Frog (GGBF), a small population of which occurs at Rosebery, the Dwarf Eastern Tree Frog and Peron's Tree Frog;
- reptiles such as the Eastern Blue-tongue, Bar-sided Skink and Eastern Water Skink;
- small birds such as the Superb Fairy Wren, New Holland Honeyeater, Red-browed Finch, Grey Fantail, Silveryeye and rainforest migrants including the Rufous Fantail and Spectacled Monarch;
- freshwater wetland birds such as the Australasian Reed Warbler, Black-fronted Dotterel, Black-winged Stilt, Buff-banded Rail and Royal Spoonbill;
- microbats including Gould's Wattled Bat and the threatened species previously mentioned;

- the Long-nosed Bandicoot; and
- the threatened Grey-headed Flying-fox.

While the majority of these are not threatened and are common in large bushland areas around Sydney, they are considered to be of local conservation significance. There have been significant efforts to protect and enhance habitats for them, particularly at priority sites, and to enhance connectivity between these sites.

One of the priority sites identified by the City of Sydney's UESAP is Sydney Park (refer Appendix A for site photos). At least 62 native fauna species have been recorded at the park since 2010, including priority species such as the Superb Fairy Wren, New Holland Honeyeater, White-plumed Honeyeater, Australasian Reed Warbler, Rufous Fantail, Black-winged Stilt, Black-fronted Dotterel, Royal Spoonbill, Eastern Blue-tongue and Dwarf Eastern Tree Frog. Its habitats include:

- constructed freshwater wetlands at which there have been significant habitat enhancement works undertaken in recent years, with the most recent works completed as part of a stormwater harvesting scheme earlier in 2015;
- bush restoration sites established and maintained in accordance with a Bush Restoration Management Plan (BRMP) by:
  - the City of Sydney, including small patches planted with species characteristic of the endangered Eastern Suburbs Banksia Scrub (ESBS) and Sydney Turpentine Ironbark Forest (STIF) communities, both of which are thought to have originally occurred in the area prior to development; and
  - Conservation Volunteers Australia (CVA) and a local community group known as 'I HEART Sydney Park', through which hundreds of inner city residents have volunteered their time over the past two years to restore, maintain and gradually expand small pockets of native vegetation that also incorporate other habitat features; and
- substantial ground-level habitat features such as sandstone boulders and logs.

The dense weeds, mature trees, rock crevices, sandstone boulders, piles of debris and other ground-level features at the Alexandria Landfill (refer Appendix A for site photos), which straddles the border of the City of Sydney and Marrickville LGAs adjacent to Sydney Park, is also of habitat value for priority species, particularly small birds and reptiles, and as mentioned in Section 3.1, potentially microbats and the Long-nosed Bandicoot. The landfill contributes to local habitat connectivity between Sydney Park and Tempe Reserve and other sites on the Cooks River in the Marrickville LGA.

The banks of Alexandra Canal are also important with regard to local habitat connectivity, with the UESAP, BS and BAP all recognising their potential for future habitat enhancement.

Tempe Reserve, incorporating Tempe Lands, and the lower stretch of Alexandra Canal (refer Appendix A for site photos) are identified as the highest priority sites in the Marrickville LGA according to the BS and BAP, and comprise part of a designated wildlife corridor in the Marrickville Local Environmental Plan 2010. Monthly bird surveys have been undertaken at Tempe Reserve and Tempe Lands for over four years by a committed group of community members, the 'Tempe Birdos', with a total of 93 native bird species recorded, including target species such as (in the last two years) the Yellow Thornbill, White-browed Scrub Wren, Yellow-faced Honeyeater, White-plumed Honeyeater, White-naped Honeyeater, Spotted Pardalote, Brown Gerygone, Red-browed Finch, Silvereye, Superb Fairy-wren, Golden Whistler, Grey Fantail, and Australasian Reed Warbler. An additional eight target reptile and frog species have been recorded at this site, and there have been two recent confirmed records of the Short-beaked Echidna. The habitats of this priority site include:

- constructed freshwater wetlands at Tempe Lands, which form a loose chain with those in Sydney Park to the north, and to freshwater wetlands in the Rockdale LGA to the south;
- a large patch of Coastal Saltmarsh adjoining the Cooks River in Tempe Reserve, constructed in 2005-2006 and now considered representative of the endangered ecological community;
- patches of Grey Mangroves and Coastal Saltmarsh along the Cooks River adjoining Tempe Reserve;
- large garden beds planted with species characteristic of the endangered Swamp Oak Floodplain Forest and STIF communities, and sandstone heath; and
- the Cooks River Valley Garden, established to demonstrate local native species of the area.

The City of Sydney and Marrickville Councils are also both members of the Cooks River Alliance, a partnership of eight Councils who are working together with their communities for a healthy Cooks River catchment. There have been substantial efforts through the alliance to improve water quality and re-establish native vegetation along the river to promote biodiversity and restore local and regional habitat connectivity.

While not necessarily required by the FBA, it is nevertheless disappointing to note that there is no recognition of any of the above in the BAR, despite the development footprint for the St Peters interchange and local road upgrades extending from Alexandra Canal across the Alexandria Landfill and into Sydney Park, with a construction compound and other works immediately adjacent to two of the park's wetlands and bush restoration sites, and the location of Tempe Lands, Tempe Reserve and the Cooks River along the alignment of the proposed M5 tunnel.

Although not directly referred to in the BAR, these priority sites have apparently been dismissed as 'urban native and exotic' vegetation, but the reality is that despite being modified environments they provide important habitat for fauna species in this highly urbanised context, as demonstrated by the priority/targeted species that have been recorded at them. The project should not detract from efforts to conserve and enhance their habitat values.

### **3.4 Impacts on threatened and priority/target species and priority sites**

While the potential impacts of the project are discussed in general terms in the BAR, it does not describe or address in detail all of the potential impacts of the project on the above species and each site during construction and operation. These include:

- Mortality of fauna during clearing of dense weeds, mature trees, sandstone boulders and other rocks and ground-level features, particularly at:
  - the Alexandria Landfill and surrounding industrial and vacant sites (which as previously mentioned provide suitable habitat for threatened microbats, the endangered Long-nosed Bandicoot population, small birds, Eastern Blue-tongues and other lizards – and as previously noted, clearing has already commenced at the landfill site);
  - the site of the construction compound in Sydney Park, along Campbell Rd (where sandstone boulders are likely to shelter Eastern Blue-tongues and other lizards as well as frogs).
- Reduction in habitat extent and local habitat connectivity as a result of the above clearing, plus reduced potential for future enhancement of this connectivity between Sydney Park and Tempe Lands, Tempe Reserve and other sites on the Cooks River.
- Damage to/removal of vegetation in bush restoration sites in Sydney Park, including adjacent to the Sydney Park construction compound, and a small patch planted with species characteristic of the endangered STIF community adjacent to Euston Road.
- Noise, dust, light, shade and other visual disturbance to the Sydney Park wetlands, including bioretention swales, and Sydney Park bush restoration sites, to Alexandra Canal, and potentially to Tempe Lands wetlands and Tempe Reserve during both construction and operation, with resultant decrease in habitat value.
- Potential removal/disturbance to endangered Coastal Saltmarsh and its habitat along Alexandra Canal during demolition of the existing bridge and construction of new bridges.
- Sedimentation and pollution of the Sydney Park wetlands, Alexandra Canal, the Cooks River, and potentially Tempe Lands wetlands, reducing water quality and potentially including severe contamination, with adverse impacts to aquatic habitats as a result of:
  - earthworks, and particularly excavation of contaminated soils at Alexandra Landfill and Sydney Park (it is assumed that excavation will be required for the proposed construction compound at the latter due to the current slope of land at this site);
  - storage of spoil at the Alexandria Landfill site;
  - demolition of existing bridges and new bridge construction across Alexandra Canal; and
  - construction and/or earthworks that may affect Tempe Lands wetlands (note while no surface works are proposed in the vicinity of these wetlands, it is unclear whether stormwater flows will be impacted).

- Alteration of hydrological regimes to the Sydney Park wetlands, Alexandra Canal, the Cooks River, and potentially Tempe Lands wetlands through increased surface run-off and dewatering and discharge of groundwater with potential impacts to aquatic habitats, bioretention swales and fringing vegetation at Sydney Park and Tempe Lands, as well as aquatic habitats in, and Coastal Saltmarsh and Grey Mangroves adjoining, the Cooks River and Alexandra Canal. The BAR does not clearly describe the proposed stormwater detention mechanisms or where surface flows will be directed (for example, it is not clear whether there will be changes to current flows from Campbell Road to the Sydney Park wetlands), and it is noted that Sections 6.3.5, 6.3.6 and 6.4.7 of the BAR, which relate to hydrology, aquatic habitat and disturbance to waterways are not completely consistent with each other.

It is considered that the nature and ; extent of a number of the above potential impacts, particularly those with potential to affect threatened microbats and the endangered Long-nosed Bandicoot population, are unknown due to the perceived shortcomings in application of the FBA outlined in Section 3.1.

### **3.5 Cumulative impacts of the project on biodiversity**

This project is likely to exacerbate the reductions in biodiversity values discussed in Section 3.3 of this report that have resulted from past developments in the City of Sydney, Marrickville and surrounding LGAs, and there are likely to be further cumulative impacts from the following current and proposed future developments in the area:

- numerous large-scale, high-rise residential and mixed use developments in the locality, for example at Green Square, Alexandria, and Wolli Creek;
- additional WestConnex roadworks such as the M4-M5 Link – Haberfield to St Peters and the Sydney Gateway;
- other roadworks such as the widening of Marsh St in Arncliffe for the Airport West Precinct;
- the Sydney Metro – Sydenham to Bankstown rail corridor development; and
- numerous residential developments along the light rail corridor.

Potential cumulative impacts to biodiversity are not identified or discussed in the BAR, although they are very briefly, but not comprehensively, addressed in Chapter 27 of the EIS. They include:

- further decreases in habitat extent and quality, and local habitat connectivity, with associated declines in species diversity;
- ongoing disturbance to the Sydney Park wetlands and bush restoration sites, particularly as a result of the construction compound that will remain adjacent to the park on Campbell Rd for the construction of the M4-M5 Link;
- further increases in traffic, noise, dust, light, shade and other visual disturbance;
- further potential for impacts to water quality, hydrology etc of the Sydney Park and Tempe Lands wetlands, Alexandra Canal and Cooks River;
- increased pressure on open space for recreational use from increased residential development removing existing habitat, including existing bush regeneration sites, and/or potential habitat;
- increased disturbance to existing habitats from increased human activity; and
- increased predation and other disturbance from pets as a result of the above.

It is noted that the project will also directly impact on the endangered GGBF. Although impacts to this species will occur outside of the City of Sydney and Marrickville LGAs, and are addressed in detail in the BAR, both Councils are nevertheless concerned, particularly given the cumulative impact of this project in relation to past developments that have also adversely affected the habitats of this species, including not just the existing M5 but a development that resulted in destruction of habitat at Rosebery in the City of Sydney LGA, where the population is consequently restricted to a small residential backyard on private property and is at high risk of extinction.

It is further noted that the project will directly impact the vulnerable GHFF, through removal of approximately 10.8 hectares of potential foraging habitat, including an estimated 200 GHFF feed trees in or adjacent to Sydney Park, in addition to the removal of a substantial number of trees for other stages of the WestConnex

project, and for the many other developments in this and other parts of Sydney. Both the City of Sydney and Marrickville Councils are concerned about the cumulative impacts of these developments on the GHFF, which are not acknowledged in the BAR.

Conversely to the potential for cumulative adverse impacts to biodiversity, if appropriate, site-specific mitigation measures are applied and opportunities for habitat creation/restoration are realised through site landscaping and other measures (such as those outlined in Section 3.6), there is potential for impacts associated with this project to be reduced, and for it to over time to contribute somewhat to biodiversity values through enhancement of habitats and connectivity in the area.

### **3.6 Recommendations for further assessment and mitigation measures to reduce impacts to biodiversity**

#### **3.6.1 Further assessment**

As mentioned in Section 3.4, the nature of actual or potential impacts to threatened species, populations and communities that will result from the development are unknown due to the perceived shortcomings in application of the FBA outlined in Section 3.1. Further assessment is therefore considered necessary in accordance with Sections 6-12 of the FBA, with the BAR updated based on the results.

As also outlined in Section 3.4, impacts to other priority/target species and priority sites in both LGAs have not been specifically identified or assessed; the BAR should be updated with this information as well.

Further assessment is also recommended in relation to similar species/sites that may be impacted in other LGAs.

Further assessment should also be undertaken in relation to any changes to the project that arise during the detailed design phase.

#### **3.6.2 Mitigation measures**

The mitigation measures outlined in the BAR are quite general and are not considered adequate in terms of ensuring minimisation of impacts to the biodiversity values of the City of Sydney and Marrickville LGAs that have been highlighted in this report, along with similar biodiversity values that may occur in other affected LGAs.

The BAR states that ecological impacts will be mitigated through adherence to the RMS Biodiversity Guidelines, and that it is anticipated that requirements will be incorporated into a Flora and Fauna Management Plan (FFMP), to be implemented during construction and operation. However, the fact that many of the impacts described in Section 3.4 were not identified in the BAR suggests they may be overlooked in the FFMP, particularly since the RMS Guidelines specify that the environmental assessment documents should be referred to as a guide when applying them, but also because the RMS Guidelines appear to focus mainly on bushland areas and naturally-occurring habitat features, which presents a risk that habitats in highly urbanised areas may be overlooked.

It is also of concern that clearance has commenced at the Alexandria Landfill, as previously mentioned, and it is not clear whether an FFMP is being implemented in relation to the works that are currently taking place.

The more detailed measures outlined below are therefore recommended for addition to the BAR and FFMP along with/instead of others already specified, as well any additional mitigation measures identified through the further assessment recommended in Section 3.5.1, and any identified for similar species/sites in other LGAs and/or by the Cooks River Alliance:

- The development footprint should be clearly delineated prior to clearance of vegetation and other habitat features to ensure clearance is kept to the absolute minimum necessary, particularly at and around:
  - The proposed St Peters interchange site

➤ the Sydney Park construction compound

- Removal of dense weed infestations and other vegetation at the Alexandria Landfill site should cease until the results of further assessment recommended in Section 3.5.1 are obtained, or at the very least weed removal should be undertaken in gradual stages, with complete removal delayed as much as possible.
- Building demolition works at the Alexandria Landfill site and surrounding industrial sites, and clearance of hollow-bearing trees should also be delayed until the results of further assessment recommended in Section 3.5.1 are obtained, or at the very least should be timed to avoid the breeding season of microbat species.
- The trunks and branches of large trees that are removed should be stored and re-used in site landscaping, for example as ground level habitat features and/or as stags in the water at Tempe Lands and/or Sydney Park wetlands.
- Where possible, tree hollows that are removed should be stored and re-used by attaching them to trees that remain.
- Clearance of sandstone boulders and other ground-level habitat features at Alexandria Landfill and Sydney Park (sandstone boulders along Campbell Road), as well as mature trees in this vicinity should be undertaken carefully and supervised by an ecologist, with any animals found to be relocated to suitable habitat in Sydney Park and/or an alternate location such as Tempe Lands (subject to appropriate licences under the *National Parks and Wildlife Act 1974*).
- Sandstone boulders and other ground-level habitat features should be stored and re-used in site landscaping.
- Frog and reptile exclusion fencing (shadecloth or similar) should be attached to construction site fencing to prevent access by frogs and reptiles at the Sydney Park construction compound and elsewhere around the St Peters interchange site during construction.
- Site landscaping incorporating appropriate soils/other growing media such as crushed sandstone, and maximising locally native shrubs, grasses and groundcover species that will provide similar habitat to the dense weeds removed (i.e. not just trees, and preferably incorporating tree-free areas to discourage aggressive species such as the Noisy Miner) should be commenced as soon as possible, prior to or immediately after each stage of weed removal, to maximise the time available for it to develop some value as replacement habitat.
- Dense infill planting of shrubs, grasses and groundcover species should also be undertaken as soon as possible to further develop habitats at Sydney Park, Tempe Lands and Tempe Reserve, to compensate for those removed at the Alexandria Landfill site.
- The species to be planted should be selected to create/enhance habitat for priority/target species, and should be based on specialist ecological advice.
- Vegetation should be fenced after planting and subject to intensive, specialist bush regeneration maintenance practices, including watering, weeding, and infill planting to replace plant failures etc, to both ensure its establishment and maximise its habitat value.
- Regular watering should be undertaken to suppress dust in the vicinity of Sydney Park, Alexandria Canal, Tempe Reserve, and Tempe Lands.
- Appropriate, site-specific measures to prevent sedimentation and pollution of the Sydney Park wetlands, Alexandria Canal, Tempe Lands wetlands and the Cooks River should be incorporated during both construction and operation, including in relation to earthworks, storage of spoil, and bridge demolition and construction, to prevent any adverse impacts to water quality.
- Appropriate, site-specific measures should be incorporated to prevent flow of contaminants to the above habitats from landfill excavated at Alexandria Landfill and Sydney Park, during construction and operation.
- Appropriate, site-specific measures should be incorporated to minimise both release of contaminants that may be accumulated in instream sediments, and instream turbidity during demolition and construction of bridges across Alexandria Canal.
- Appropriate, site-specific measures (appropriate drainage structures, stormwater detention basins etc) should be incorporated to ensure maintenance of appropriate hydrological regimes at the Sydney Park wetlands, Tempe Lands wetlands, Alexandria Canal and the Cooks River.
- Stormwater drainage should not exacerbate, but rather should be designed to resolve existing problems associated with drainage carrying gross pollutants and high sediment loads from Campbell Road to the bioretention swale at Wetland 4 in Sydney Park.

- Appropriate measures should be incorporated to ensure groundwater is treated to an appropriate standard before discharge to Alexandra Canal and the Cooks River, and to ensure that discharge volumes do not adversely impact the hydrology/geomorphology of these receiving waters.
- Low sodium and/or directional lighting should be used to avoid light spill into the Sydney Park wetlands and other habitats in Sydney Park and around the St Peters interchange, and Tempe Reserve and Tempe Lands if impacted, during both construction and operation, including at all construction compounds.
- Noise barriers, batters and/or other physical barriers (preferably vegetated) should be incorporated adjacent to Sydney Park and Alexandra Canal, including at construction compounds and in relation to cycleways and pedestrian paths, and Tempe Lands and Tempe Reserve if impacted, to minimise noise as well as visual disturbance from vehicle, personnel movements etc, and to prevent/reduce access by fauna during both construction and operation.
- The Sydney Park construction compound should be designed and situated to ensure that access for volunteers to the adjoining bush restoration site is not restricted and their safety not compromised.
- The on-ramp to the shared cycleway/pedestrian bridge across Campbell Road should be realigned to avoid disturbance to the bioretention swale at Wetland 4, and the adjoining bush restoration site. It would be preferable for this on-ramp to be located away from these habitat areas.
- Fauna underpasses for frogs and reptiles should be established in new culverts or similar, incorporating rocks and thick grasses/sedges at each end. The number of underpasses should be maximised to the extent feasible, due to the imitations the interchange will place on the movement of these and other less mobile fauna species.
- Culverts or other drainage structures should be left ungated to allow access for roosting microbats.
- One or more fauna overpasses incorporating dense native shrubs should be established for birds, potentially as part of cycleway/pedestrian bridges. Such overpasses should provide continuous connectivity to other habitat areas in Sydney Park and other site landscaping that has been designed to provide habitat,
- Feed trees for the Grey-headed Flying-fox should be incorporated into site landscaping to replace those that will be removed around Sydney Park.
- Landscape plans should be developed with specialist ecological advice, with reference to the City of Sydney's UESAP and Marrickville Council's BS and BAP, and in consultation with the City of Sydney's Urban Ecology Coordinator and Marrickville Council's Team Leader, Biodiversity.
- All mitigation measures should be included in the Flora and Fauna Management Plan (FFMP) for the project, including specific details of the affected species and sites to/at which the RMS guidelines will be applied.
- The FFMP should be expanded to incorporate opportunities for habitat creation/restoration, as discussed in Section 3.5.3.
- The draft FFMP should be provided to all stakeholders for review and comment prior to finalisation.
- Any changes to the nature/extent of surface works that arise during the detailed design phase should be subject to further assessment, and the FFMP updated with additional mitigation measures if necessary.

### **3.5.3 Opportunities for habitat creation/restoration**

Finally, the BAR does not recognise or discuss any of the opportunities presented by the development to create substantial new habitats through landscaping etc in and around the proposed open space adjoining the St Peters interchange and along Alexandra Canal. While this might not be considered a particular requirement of the FBA, such opportunities would compensate for some of the adverse impacts of the project to biodiversity and should therefore be explored.

It is noted that the Urban Design report and Landscape and Visual Impact Assessment prepared for the EIS identify some opportunities in this regard, but these focus mainly on establishing heavily treed areas which are unlikely to support many of the priority/target species, but rather to encourage the species that are well-adapted to urban environments and that are very common as a result. Additionally, Appendix L of the Volume 2E Urban Design Report Part 8 indicates a very limited and inappropriate landscape concept plan for the St Peters Interchange. A species list is to be created in consultation with ecologists and the City's Urban Ecology Coordinator, to largely focus on Eastern Suburbs Banksia Scrub (ESBS) species so as to enhance and maximize habitat potential for priority and target species. Bioretention plantings should also consist of a diversity of locally native grasses, sedges and reeds and not the species identified for mass plantings in the concept.

There are many more possibilities and it is considered that these should be incorporated into the BAR, and/or the Urban Design report and Landscape and Visual Assessment, and further developed with reference to the City of Sydney's UESAP and Marrickville Council's BS and BAP, and in consultation with the City of Sydney's Urban Ecology Coordinator and Marrickville Council's Team Leader, Biodiversity. They include the potential to:

- Incorporate dense reed beds and sedges and potentially bioretention swales to maximise the habitat value of stormwater detention basins, whilst also maximising their effectiveness in treating road run-off.
- Incorporate additional ponds if feasible to maximise freshwater wetland habitat.
- Incorporate fine mesh structures if feasible over stormwater inlets to prevent access by the Mosquito Fish (*Gambusia holbrooki*), which preys on tadpoles.
- Incorporate fences around stormwater detention basins/other ponds, to restrict access by dogs and people.
- Create habitat for the endangered GGBF through the above ponds/wetlands as part of offsetting impacts to this species at Arncliffe (in addition to the mitigation described for the GGBF in the BAR), to which tadpoles from the captive breeding program described in the BAR could potentially be released. As mentioned in Section 3.6, a large GGBF population once occurred at Rosebery, but as a result of past development the population is now restricted to one residential backyard and is at high risk of extinction. Creation of habitat at St Peters could be a means of restoring a population to this locality and assisting to ensure the conservation of the Cooks River Key Population.
- Re-establish vegetation representative of the endangered ESBS community, which was also widespread in the locality prior to development, in sunny areas around the interchange (potentially adjoining but set back from the above wetland areas) (refer Appendix B).
- Establish shade-tolerant/rainforest vegetation in shaded areas around the interchange to provide habitat for small, migratory rainforest species.
- Create new habitat features for reptiles, such as dry-pack sandstone retaining walls.
- Incorporate scuppers in the design of new bridges to provide roosting habitat for microbats.
- Create a substantial fauna overpass vegetated with shrubs, grasses and groundcovers across part/all of the interchange that would also contribute to additional open space (refer Appendix B for an example), and could potentially link to Alexandria Canal where there are likely to be future opportunities to enhance connectivity to Tempe Reserve and other sites along the Cooks River.
- Implement large scale offset native habitat planting at Tempe Reserve.
- Construct habitat for the endangered Coastal Saltmarsh community along Alexandria Canal as part of landscaping adjacent to the new bridges, in consultation/collaboration with Sydney Water, who are currently doing this at the mouth of the canal in Tempe Reserve.
- Install sections of trunks from trees that have been removed in Alexandria Canal and/or the Cooks River, as snags with cut-in habitat boxes.
- Engage community volunteers in planting associated with site landscaping, and in subsequent maintenance.
- Provide funds for a combined Council monitoring initiative (over 5-10 years) to monitor changes to biodiversity over time as a result of the project.
- Provide funds, or a pathway to funds, to offset ongoing ecological impacts that are highlighted by monitoring.
- Establish a community native plant nursery, seed orchard and Community Environmental Education Centre at Tempe Reserve/elsewhere.





Bioretention swale vegetated with native species at Wetland 4 in Sydney Park. The wetland provides habitat for a range of small birds, freshwater wetland birds, reptiles, frogs and microbats. The construction compound in Sydney Park will be immediately adjacent to this important habitat.



Additional bioretention swales at Wetland 4 – recently constructed as part of a stormwater harvesting scheme, they incorporate native vegetation and other habitat features.



Sydney Park's wetlands provide habitat for priority species including the migratory Latham's Snipe and the Superb Fairy Wren (photographed on December 15, 2015 when a total of three snipe were recorded in a brief inspection).



Bush restoration site (vegetated area at right), maintained by community volunteers, immediately adjacent to the construction compound site in Sydney Park.





Sandstone boulders at the Sydney Park construction compound site provide habitat for reptiles and frogs



Wetland 5 at Sydney Park, located near the corner of Campbell Road and Euston Road, immediately adjoining proposed roadworks. Although difficult to see, Black-winged Stilts are foraging in the shallows.





Vegetation characteristic of the endangered Sydney Turpentine Ironbark Forest, recently planted at Sydney Park and incorporating other habitat features, is situated within a few metres of the proposed roadworks on Euston Road.



One of three wetlands at Tempe Lands which provide important habitat for small birds, freshwater wetland birds, reptiles, frogs, and microbats, with two recent records of the Short-beaked Echidna. The alignment of the new M5 tunnel is close to this site.





Endangered Coastal Saltmarsh at Tempe Reserve, adjoining the Cooks River near the alignment of the new M5 tunnel.



Native vegetation at Tempe Reserve, including Grey Mangroves at left, in the intertidal zone on the Cooks River





Current Sydney Water works to create habitat for endangered Coastal Saltmarsh near the mouth of Alexandra Canal. There is potential for similar works associated with the new bridges over the canal.



Dense infestations of Lantana and other weeds with mature canopy trees at the Alexandria Landfill site provide important habitat for small birds, and possibly microbats and the endangered inner west Long-nosed Bandicoot population. Rocky features provide habitat for reptiles.





Further illustration of the dense weed infestations at the Alexandria Landfill site.



Buildings such as this that are within the development footprint of the St Peters interchange may provide roost sites for microbats, potentially including threatened species. Construction materials and debris in the adjoining yard provide habitat for reptiles such as the Eastern Blue-tongue.



Further illustration of potential reptile habitat within the footprint of the St Peters interchange: a vacant site with piles of sandstone blocks, polypipe and other construction materials.





Eastern Suburbs Banksia Scrub vegetation, which provides excellent habitat for a range of priority/target species and could be incorporated into landscaping around the St Peters interchange



Example of vegetated fauna overpasses in northern NSW. While overpasses of this extent may not be feasible at St Peters, smaller versions could potentially be incorporated with proposed cycle/pedestrian bridges.