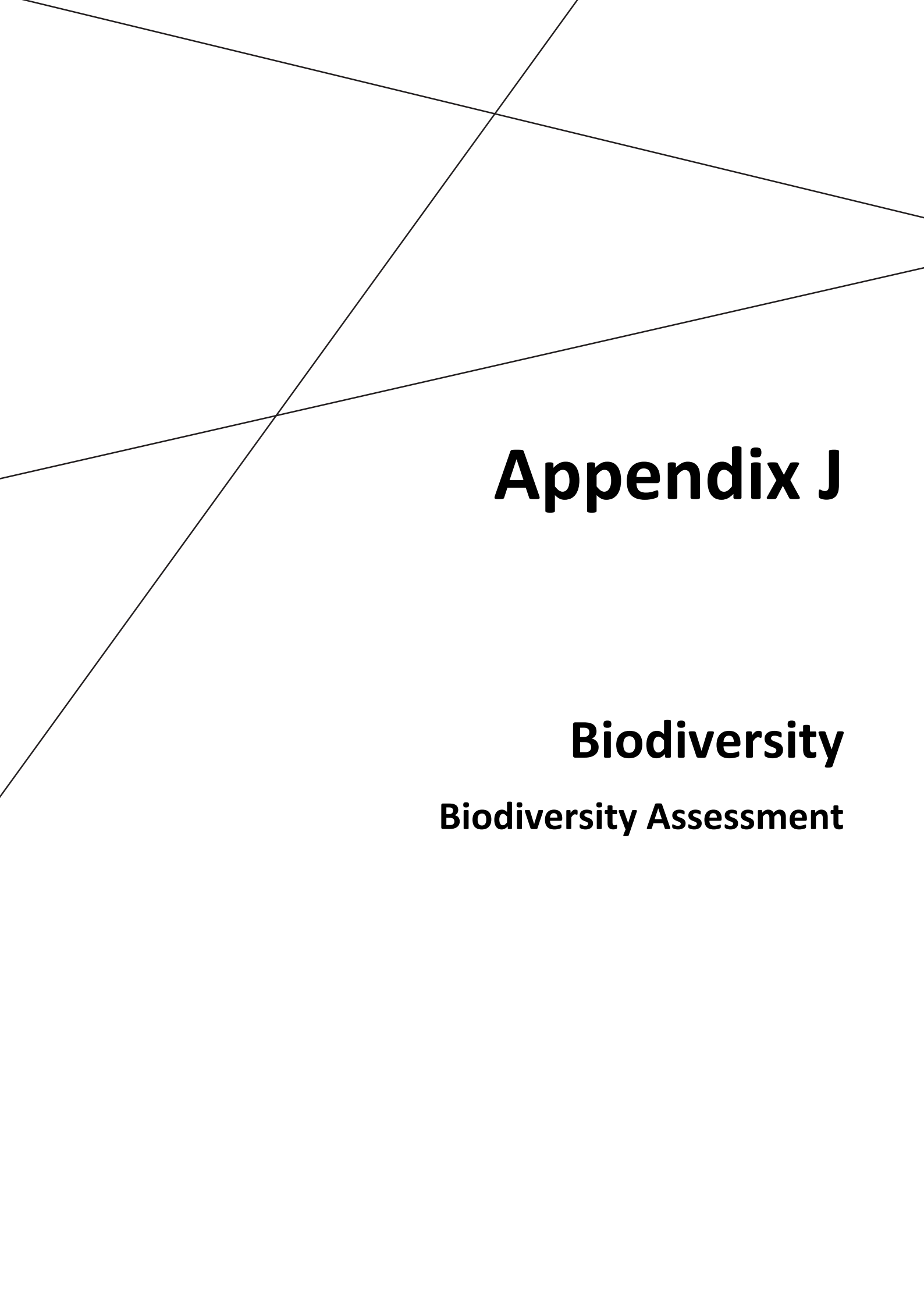


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Appendix J

Biodiversity

Biodiversity Assessment

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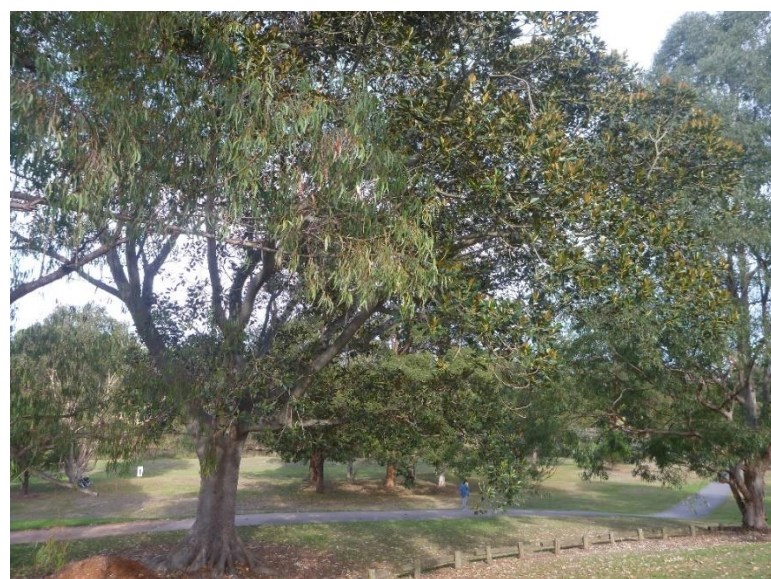


Western Sydney Stadium, Parramatta

Biodiversity Assessment

Prepared for
AECOM

30 June 2016



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Contents

Abbreviations.....	i
Executive summary.....	1
1 Introduction.....	3
1.1 Background.....	3
1.2 Purpose of this technical working paper.....	3
1.3 Scope of work.....	4
1.4 Report structure.....	4
2 Description of the Proposal.....	6
2.1 Site location.....	6
2.2 The Proposal.....	8
2.2.1 Western Sydney Stadium Concept Proposal.....	8
2.2.2 Demolition works.....	9
2.2.3 Plant and equipment.....	10
2.2.4 Traffic management.....	10
2.2.5 Hours and duration.....	11
2.2.6 Workforce.....	11
2.2.7 Program and schedule.....	11
3 Existing environment.....	12
3.1 Vegetation mapping of the study area.....	12
3.1.1 River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions.....	12
3.1.1 Planted native/exotic.....	14
3.2 Flora species.....	15
3.3 Fauna species and habitat.....	15
3.4 Legislative context.....	18
4 Methodology.....	20
4.1 Desktop review.....	20
4.2 Field survey.....	20
4.3 Assessment of significance.....	21
5 Impact assessment.....	22
5.1 Summary of impacts.....	22
5.1.1 Threatened Ecological Communities.....	22
5.1.2 Threatened flora.....	22
5.1.3 Threatened fauna.....	22

5.3.1	Assessment of Significance (7-Part Test)	24
5.3.2	Commonwealth Significant Impact Criteria (EPBC Act)	25
6	Mitigation measures	26
6.1	During demolition.....	26
6.2	During operation	26
7	Conclusion	28
	References	29
	Appendix A: Threatened species and communities likelihood of occurrence	31
	Appendix B: Flora species recorded within the study area.....	47
	Appendix C: Assessments of significance.....	49
	Appendix D: EPBC Act Significance Impact Assessment	63

List of figures

Figure 1: Proposed site layout.....	5
Figure 2: Location of the Site	7
Figure 3: Vegetation communities and threatened fauna within the study area	13
Figure 4: Parramatta GHFF camp location and flight paths.....	17

List of tables

Table 1: Event calendar and attendees	9
Table 2: Fauna habitat at the site.....	15
Table 3: Legislative context.....	18
Table 4: Projected noise levels at nearest sensitive receiver	23

Abbreviations

Abbreviation	Description
°C	Degrees Celsius
DotE	Department of the Environment
EIS	Environmental Impact Statement
ELA	Eco Logical Australia Pty Ltd
EP&A Act	<i>NSW Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Commonwealth Environment Protection & Biodiversity Conservation Act 1999</i>
FBA	Framework for Biodiversity Assessment
GHFF	Grey-headed Flying-fox
GPS	Global Positioning System
LGA	Local Government Area
MNES	Matters of National Environmental Significance
OEH	Office of Environment and Heritage
OH&S	Occupational Health and Safety
PCCD	Pollution Control Consultancy and Design
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
TSC Act	<i>NSW Threatened Species Conservation Act 1995</i>

Executive summary

In September 2015, the NSW Government announced a package of works to renew the Sydney Stadium network over the next decade. The Western Sydney Stadium Project (the Project) forms a key part of this package and involves a proposal to construct a new 30,000 seat stadium on the site of the existing stadium in Parramatta (the Site). Assessment and approval for the Project will be undertaken in two stages under Section 83B of the *Environmental Planning and Assessment Act 1979* (EP&A Act):

1. initial application for the Concept proposal and demolition works to accommodate the Western Sydney Stadium (Stage 1) (subject of this Working Paper); and
2. a second separate application for the detailed design and subsequent construction and operation of the Western Sydney Stadium (Stage 2).

The development application which this Biodiversity Assessment supports is only seeking approval for the Proposal (i.e. Stage 1) (**Figure 1**). Specifically, the Proposal includes:

- Concept Proposal for the Western Sydney Stadium, including parking and access facilities, ancillary infrastructure and landscaping; and,
- Staged demolition and removal of the existing stadium and Parramatta Swimming Centre and associated infrastructure, including the existing stadium and the associated hardstand areas where required (footpaths, roads, car parks etc.).

The Site is located at 11-13 O'Connell Street Parramatta, approximately 25 kilometers west of Sydney Central Business District (CBD) (**Figure 1**). The Site is situated within the broader context of Parramatta Park, approximately one kilometre north-west of Parramatta Station and the Parramatta central business district (CBD) (**Figure 2**).

A search of the Atlas of NSW Wildlife and the EPBC Protected Matters Search Tool was performed on 20 May 2016, using a radius of 5 km around the coordinates -33.808156, 151.999671 (Datum GDA94). Species from the database searches were combined to produce a list of threatened fauna and flora species that may potentially utilise the study area, with an assessment of the likelihood of occurrence for each species included in **Appendix A**. Eighteen threatened flora and 37 threatened fauna species listed under either the TSC Act and/or EPBC Act were identified by the data audit as known, or with the potential, to occur within a 5 km radius of the study area (**Figure 1**).

The study area was surveyed by ecologists Rebecca Dwyer and Alex Gorey on the 23 May 2016 for a total period of approximately 14 person hours. The entire study area was traversed slowly on foot, with all visible flora species identified. Each traverse included an assessment of all vegetation communities and their condition, floristic structure, and various microhabitats (e.g. hollow bearing trees (HBT)). This assessment was to validate vegetation communities against the mapped vegetation (OEH 2013) and ensure that all potential habitat niches were examined. A nocturnal fauna survey was undertaken by three ELA ecologists on 8 June 2016. The ecologists conducted one night of spotlighting and stag watching surveys at the Grey-headed Flying-Fox (GHFF) camp. This involved three ecologists being present on Site watching the camp for 30 minutes prior to sunset and 60 minute after sunset to identify the flight path of GHFF dispersing from the camp.

A review of the Native Vegetation of the Sydney Metropolitan Area (OEH 2013) mapping identified four vegetation types within the study area. The field survey confirmed the presence of Cumberland Riverflat Forest. It was also noted that Urban Exotic/Native, Plantation (native and/or exotic) and Weeds and Exotics

were very similar and have been amalgamated into Planted Native/Exotic (**Figure 3**). Cumberland Riverflat Forest is a component of the Endangered Ecological Community (EEC) *River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* (RFEF), listed under the *Threatened Species Conservation Act 1995* (TSC Act).

The Site provides potential habitat for a small number of threatened fauna although it is likely that most of these species utilise the Site in a transitory nature and it is unlikely to provide key breeding habitat. However, the HBTs recorded within the study area provide potential roosting habitat for some microchiropteran bat (microbat) species. Threatened fauna that are known or have the potential to utilise the Site include:

- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Mormopterus norfolkensis* (Eastern Free-tail Bat)
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
- *Myotis macropus* (Large-footed Myotis)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)
- *Ninox strenua* (Powerful Owl)

A known GHFF maternity camp is located directly adjacent to the northern boundary of the Site. Numbers in the camp fluctuate, but the camp has been growing in recent years with counts as high as 20,000 individuals recorded within River-flat Eucalypt Forest along Parramatta River (**Figure 4**). Site fidelity to camps is high with the same camp used for consecutive decades (OEH 2016b). The vegetation within the study area provides important foraging habitat especially for lactating mothers and supplementary roosting habitat for some individuals.

The Parramatta River GHFF camp is located approximately 150 m from the existing stadium. The acoustic assessment (AECOM 2016) for the project measured existing background noise levels, and likely noise levels during construction and events, at various sensitive receivers. The recorded noise levels at the nearest receiver (1 Fleet Street, North Parramatta), which was approximately 180 m from the existing stadium. The assessment predicted construction and demolition noise levels of between – 52 - 57 dB(A), and periodic elevated noise levels during events of between –52 - 73 dB(A). Noise levels predicted for large sporting and music events held at the Proposal are in the order of magnitude louder than demolition noise. The predicted noise levels for demolition and events are assumed to be similar to existing event noise levels (AECOM 2016), and are not anticipated to increase and disturb the GHFF camp.

The frequency of events is predicted to double, from 22-23 games per year to 42-43 games per year, which may have an impact on the GHFF camp. Although, to date the GHFF camp has experienced similar levels of disturbance from events held at the current stadium, there is a possibility for the proposed increase in frequency of events to cause increased stress levels within the GHFF's at the Parramatta River camp.

An Assessment of Significance consistent with s5A of the EP&A Act was undertaken for EEC RFEF and six threatened fauna, and concluded that the proposed activity is unlikely to constitute a significant impact (see **Appendix C**). No Species Impact Statement is required. An impact assessment consistent with EPBC Act was also undertaken for the GHFF, and concluded that the proposed works may have a significant impact on a population of GHFF. A referral to the Commonwealth Department of the Environment for assessment and approval by the Environment Minister is recommended.

1 Introduction

1.1 Background

In September 2015, the NSW Government announced a package of works to renew the Sydney Stadium network over the next decade. The Western Sydney Stadium Project (the Project) forms a key part of this package and involves a proposal of a new 30,000 seat stadium on the site of the existing stadium in Parramatta (the Site). Assessment and approval for the Project will be undertaken in two stages under Section 83B of the *Environmental Planning and Assessment Act 1979* (EP&A Act):

1. initial application for the Concept proposal and demolition works to accommodate the Western Sydney Stadium (Stage 1) (subject of this Working Paper); and
2. a second separate application for the detailed design and subsequent construction and operation of the Western Sydney Stadium (Stage 2).

The development application which this Biodiversity Assessment supports is only seeking approval for the Proposal (i.e. Stage 1) (**Figure 1**). Specifically, the Proposal includes:

- Concept Proposal for the Western Sydney Stadium, including parking and access facilities, ancillary infrastructure and landscaping; and,
- Staged demolition and removal of the existing stadium and Parramatta Swimming Centre and associated infrastructure, including the existing stadium and the associated hardstand areas where required (footpaths, roads, car parks etc.).

Works associated with the removal of below ground infrastructure, excavation works and construction of the Western Sydney Stadium, will be assessed under Stage 2 once a detailed design has been prepared. These works will not be considered further for the Stage 1 assessment.

The majority of the proposed works would be contained within the Site boundary except for off-site works associated with upgrades to servicing infrastructure and utilities. These upgrade works will be further defined and assessed as part of the Stage 2 development

1.2 Purpose of this technical working paper

The Project was declared to be State Significant Development (SSD). Assessment and approval is being pursued in accordance with the EP&A Act. The Secretary's Environmental Assessment Requirements (SEARs) for the Project with regards to Biodiversity are for:

- Biodiversity impacts related to the proposed development are to be assessed and documented in accordance with the Framework for Biodiversity Assessment (FBA) (OEH 2014), unless otherwise agreed by OEH, by a person accredited in accordance with s142B(1)(c) of the *Threatened Species Conservation Act 1995*.

The field survey confirmed that the Site does not contain any native vegetation communities indigenous to the area. Therefore, the calculation of credits is not required, and the FBA cannot be undertaken for the proposed development. Correspondence between ELA and OEH on 31 May 2016, confirmed that the FBA would not be appropriate for this Project, and a Flora and Fauna Assessment report is suitable

to assess impacts of the proposed works on threatened flora and fauna species, populations and ecological communities, and migratory species, likely to occur in the study area (**Figure 1**) through assessment of significance in accordance with the EP&A Act and the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act).

This Biodiversity Assessment has been prepared to inform the EIS for the Proposal, and to satisfy assessment of impacts on biodiversity matters being prepared as required by the SEARs.

1.3 Scope of work

The key objectives of this assessment are to:

- Identify and describe any threatened flora and fauna species, populations, ecological communities, as well as migratory species and their habitats, that may occur within the study area.
- Assess the impact of the Stage 1 works on threatened flora and fauna species, populations and ecological communities, and migratory species, likely to occur in the study area through assessment of significance in accordance with the EP&A Act and EPBC Act.
- Recommend measures to avoid, reduce or mitigate the impacts of the proposal on native flora and fauna and their habitats.

1.4 Report structure

The technical working paper is structured as follows:

- **Chapter 1 – Introduction.** This chapter introduces the Proposal and the proponent, and describes the study area.
- **Chapter 2 – Description of the Proposal.** This chapter provides a description of the Proposal during the demolition works and operation of the Concept Proposal as relevant to this impact assessment.
- **Chapter 3 – Existing environment.** This chapter provides a description of the existing environment within and surrounding the study area.
- **Chapter 4 – Assessment methodology.** This chapter summarises the assessment criteria that applies to this assessment.
- **Chapter 5 – Impact assessment.** This chapter assesses the impacts of the demolition works and operational noise on threatened flora and fauna species, populations and ecological communities, and migratory species.
- **Chapter 6 – Mitigation and management.** The chapter outlines the recommended mitigation and management measures to avoid or reduce impacts on the existing environment.
- **Chapter 7 – Conclusion.** This chapter presents the conclusion to the assessment.



Figure 1: EIS Assessment Areas

2 Description of the Proposal

2.1 Site location

The Site is located at 11-13 O'Connell Street Parramatta, approximately 25 kilometers west of Sydney Central Business District (CBD) (**Figure 1**). The Site is situated within the broader context of Parramatta Park, approximately one kilometer north-west of Parramatta Station and the Parramatta central business district (CBD) (**Figure 2**).

The Site comprises the existing stadium and stadium complex, surface car parking facilities (to the north and west of the stadium), Parramatta Swimming Centre to the east of the stadium (located on Crown Land), and a training field to the south of the stadium. The Site is legally described as Lots 951, 952, 953, 954, 955, 956, 957, 958, 959, 961, 962, 963 in Deposited Plan (DP) 42643 and Crown Land Lot 80-3000 (part).

The demolition works area comprises the parts of the Site where the demolition works and supporting activities will take place. This area excludes two predominantly vegetated areas to the north and west, and part of the training field (refer to **Figure 1**). No activities or impacts are proposed in these excluded areas.

A key feature of the local area is Parramatta River, which is located to the west and south of the Site and eventually flows into Sydney Harbour approximately 20 km south east of the Site. Parramatta Park extends across Parramatta River to the west of the Site and includes the world heritage listed Old Government House, approximately 200 m south west of the Site.

Other land uses surrounding the Site include the car park to the south east on Parramatta Park land, the old Kings Oval to the south west and the Parramatta Leagues Club and associated surface car park immediately adjacent to the north.

Land use to the east of the Site across O'Connell Street is primarily comprised of low density residential development, as well as mixed use and public recreation. Notable uses include schools and places of worship (our Lady of Mercy College and St Patricks Cathedral), and the Old Kings School site to the south east.



Figure 2: Location of the Site

2.2 The Proposal

The Proposal comprises Stage 1 of development for the Project. Specifically, the Proposal includes:

- Concept Proposal for the Western Sydney Stadium, including parking and access facilities, ancillary infrastructure and landscaping
- staged demolition and removal of the existing above ground structures, including the existing stadium, swimming centre and the associated hardstand areas where required (footpaths, roads, car parks etc.).

2.2.1 Western Sydney Stadium Concept Proposal

The Western Sydney Stadium Concept Proposal provides for:

- a maximum total Gross Floor Area (GFA) of 60,000-65,000 m² for the stadium development
- a maximum total Gross Floor Area (GFA) of 12,000 m² for community uses
- transport accessibility and parking facilities
- landscaping and public domain elements throughout the Site.

Stadium features

The Proposal would provide the following facilities:

- additional seating for approximately 10,000 more spectators via provision of a seating bowl with 30,000 seats, including 27,000 general admission seats 3,000 corporate seats
- five levels of premium box/terrace, function/lounge offerings and a number of suite offerings
- flood lighting and stadium video screens
- additional facilities for team, media, administration and amenity such as changing rooms, media rooms, and food and beverage facilities.

Parking and access

The Concept Proposal would provide a new at grade car park of approximately 500 bays to the north and west of the existing stadium.

- Vehicular access to the stadium complex would be provided via the following options:
- A two way vehicular access road via O'Connell Street on the northern side of the Site, with a bus turning circle or 'kiss and ride' drop-off point to the west of the new stadium
- A new one way restricted access ring road from O'Connell St north of the stadium along the western side of the stadium to exit south back on to O'Connell St. This access road would allow staff and player vehicles to enter and exit the Site via O'Connell Street and minimise congestion.

Workforce

Workforce at the stadium complex would vary between event and non-event days.

On event days, the in-house stadium co-ordinator would be responsible for overseeing all events held at the new stadium. Up to 1,000 staff (comprising permanent and contract staff) would be required to operate the stadium to provide catering, security, cleaning and customer service functions. However, up to 12,000 staff may be required during concert events. Security, police and first aid officers would also be located throughout the stadium on event days.

On non-event days, staffing requirements may vary between five and 100 employees depending on the amount of preparation required for any upcoming events and ongoing maintenance requirements.

Hours of Operation

The hours of operation would be consistent with the existing NRL and A-League game times. However, additional games and the potential for music and other entertainment events would be associated with the stadiums increased capacity.

Event Schedule

Once operational (projected early 2019), the Proposal would primarily be used for major sporting events, as well as a range of other non-sporting commercial and community events such as music concerts and fairs. (VenuesNSW 2016).

The new stadium is expected to operate as a competition site catering fixtures such as the Parramatta Eels (National Rugby League (NRL)), the Western Sydney Wanderers (A-League soccer) and two additional NRL franchises under the NSW Stadia Strategy objectives for the consolidation of venues. The number of event days are therefore, projected to increase substantially under the Project (refer to **Table 1**). An increase in patron attendance to the events is also projected, based on ten-year historical growth periods of each sport.

Table 1: Event calendar and attendees

Events	Current event calendar	Projected event calendar under the Project
Parramatta Eels	9	10
NRL Team 2	0	10
NRL Team 3	0	10
WS Wanderers	13-14	11-12
Other (e.g. Final Series, concerts)	0	1
Total events	22-23	42-43
Attendances		
Parramatta Eels	13,300, no growth	10% uplift, no growth
NRL Team 2	15,900, no growth	10% uplift, no growth
NRL Team 3	11,800, no growth	10% uplift, no growth
WS Wanderers	13,500, 0.7% growth	10% uplift, 0.7%growth
Other (e.g. Final Series, concerts)	n/a – no current events	30,000

2.2.2 Demolition works

Demolition activities

The demolition works (i.e. Stage 1 works) would be carried out by specialist subcontractors and will involve the following activities within the demolition works area shown in Error! Reference source not found.:

- Site establishment to enable the commencement of demolition activities (e.g. closing of existing facilities, installation of perimeter hoardings, fencing and signage and establishment of office compound, installation of sediment and erosion controls)
- decommissioning, demolition, dismantling landscaping and/or removal of the existing stadium (Pirtek Stadium), related structures and hard and soft landscaping treatments
- waste management activities including the removal of classified waste for offsite disposal and recycling
- associated civil works
- 'make safe' activities including returning all areas to ground level including establishment and maintenance of environmental management controls and revegetating as required.

Exclusion areas

Three exclusion areas have been identified within the Site. This includes vegetated areas to the northwest and west, and part of the training field to the south.

The two vegetated areas are owned by Venues NSW. It is intended that in the future this land would be dedicated to Parramatta Park Trust. This land therefore does not form part of Stage 1 of the Project.

The training field is on land with known contamination issues. As a result the Project would minimise disturbance to the area as far as practical. However part of the training field has been incorporated into the Concept Proposal as it would be required for site access and circulation. The remainder would be fenced off and excluded from the Project.

No activities or impacts are proposed in the three exclusion areas.

2.2.3 Plant and equipment

The demolition works would be undertaken in several stages, requiring the following plant/equipment:

- stripping fitout followed by the dismantling of steel structures using two 30 tonne long reach excavators. Works would initially focus on the removal of the internal fitout (including plasterboard walls, ceilings, services and joinery) followed by the roof structure
- demolition of concrete components and stands using up to two 40 tonne excavators with jackhammers, and one long reach excavator or crane. Concrete would be crushed before being transported off site for recycling
- removing stadium lighting poles using one 250-400 tonne crane and boom lifts
- removing swimming centre, in-ground pools and associated structures.

In addition to the above, the following equipment would be used as required:

- up to five small bob-cats
- up to five excavator loading trucks
- up to three water tanks
- re-fuelling tanks

2.2.4 Traffic management

During demolition, the majority of vehicles would access directly to the Site from the main access on O'Connell Street. Dismantling of the stadium light towers, demolishing and removing large structures from the stands would require mobile crane access and truck movements around the Site.

2.2.5 Hours and duration

Standard construction working hours would apply for the duration of the demolition works. The hours for demolition would therefore, be confined to:

- 7:00 am to 6:00 pm Monday to Friday
- 8:00 am to 1:00 pm on Saturdays
- No work on Sundays or public holidays.

Some night work may be required and would be considered where it may reduce impacts to the public and local community. Work outside standard hours may also occur to complete tasks safely or more efficiently.

If work is required outside standard construction hours, it would be carried out according to the Interim Construction Noise Guideline (DECC 2009). This would include notifying the local community in advance of any work planned to be carried out outside of standard hours.

2.2.6 Workforce

The contractor for the demolition works would determine the size of the workforce, however it is estimated that a maximum of 45 construction and site management personnel would be on Site at any one time.

2.2.7 Program and schedule

The demolition works are planned to commence during late 2016 / early 2017 and would take four to six months to complete. Particular focus will be placed on minimising impact to the operation of the adjoining Parramatta Swimming Centre over the 2016-2017 summer months. To achieve this requirement, demolition would generally commence on the west stand and progress to the east stand area. This would allow progressive commencement of construction works on the west side of the Site once demolition is complete. The demolition works for the existing stadium, swimming centre and ancillary infrastructure are planned to be completed by mid-2017.

3 Existing environment

3.1 Vegetation mapping of the study area

A review of the Native Vegetation of the Sydney Metropolitan Area (OEH 2013) mapping identified four vegetation types within the study area:

- Cumberland Riverflat Forest
- Plantation (native and/or exotic)
- Urban Exotic/Native
- Weeds and Exotics

The field survey confirmed the presence of Cumberland Riverflat Forest. It was also noted that Urban Exotic/Native, Plantation (native and/or exotic) and Weeds and Exotics were very similar and have been amalgamated into Planted Native/Exotic (**Figure 3**). Cumberland Riverflat Forest is a component of the Endangered Ecological Community (EEC) *River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* (RFEF), listed under the *Threatened Species Conservation Act 1995* (TSC Act).

3.1.1 River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

RFEF is the name given to the ecological community associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. The composition of RFEF is primarily determined by the frequency and duration of waterlogging and the texture, nutrient and moisture content of the soil. The community is characterised by a canopy of *Casuarina cunninghamiana* subsp. *cunninghamiana* (River She-oak), *Casuarina glauca* (Swamp Oak), *Angophora floribunda* (Rough-barked Apple), *Eucalyptus amplifolia* (Cabbage Gum), *E. tereticornis* (Forest Red Gum) and *E. moluccana* (Grey Box). The midstorey consists of a small tree stratum of *Melaleuca decora* (White Feather Honey-myrtle), *Melaleuca styphelioides* (Prickly-leaved Paperbark), *Ozothamnus diosmifolius* (Rice Flower) and *Bursaria spinosa* (Sweet Bursaria). The ground cover is diverse consisting of native soft leaved herbs and grasses (OEH 2016c).

The RFEF identified within the study area consisted of a dense canopy of *Casuarina cunninghamiana* subsp. *cunninghamiana*, *Casuarina glauca*, *Angophora floribunda*, *Eucalyptus moluccana* and *E. tereticornis*. The native midstorey and ground cover were sparse consisting of *Bursaria spinosa*, *Indigofera australis* (Austral indigo), *Acacia falcata* (Hickory Wattle), *Acacia decurrens* (Black Wattle), *Lomandra longifolia* (Spiny-headed Mat-rush), *Entolasia stricta* (Wiry Panic) and *Microlaena stipoides* var. *stipoides* (Weeping Grass). Exotic vines and forbs dominated the ground cover including *Cardiospermum grandiflorum* (Balloon Vine), *Lantana camara* (Lantana), *Setaria gracilis* (Pigeon Grass), *Sida rhombifolia* (Paddy's Lucerne) and *Bidens pilosa* (Farmer's Friend).



Figure 3: Vegetation communities and threatened fauna within the study area



Plate 1: River-flat Eucalypt Forest within the study area

3.1.1 Planted native/exotic

The area of planted native/exotic vegetation across the study area consisted of a scattered canopy of *Melaleuca quinquinervia* (Broad-leaved Paperbark), *Eucalyptus citriodora* (Lemon Scented Gum), *Eucalyptus microcorys* (Tallowwood), *Eucalyptus robusta* (Swamp Mahogany), *Eucalyptus nicholii* (New England Peppermint), *Ficus microphylla* (Moreton Bay Fig), *Lophostemon confertus* (Brush Box), *Grevillea robusta* (Silky Oak), *Jacaranda mimosifolia* (Jacaranda), *Brachychiton populneus* (Kurrajong), *Pinus radiata* (Radiata Pine) and *Cinnamomum camphora* (Camphor Laurel). The ground cover was dominated by exotic species, including *Pennisetum clandestinum* (Kikuyu), *Paspalum dilatatum* (Paspalum), *Lantana camara*, *Sida rhombifolia*, *Verbena bonariensis* (Purple Top), *Senecio madagascariensis* (Fire Weed) and *Cardiospermum grandiflorum*, *Setaria gracilis* and *Bidens pilosa*.

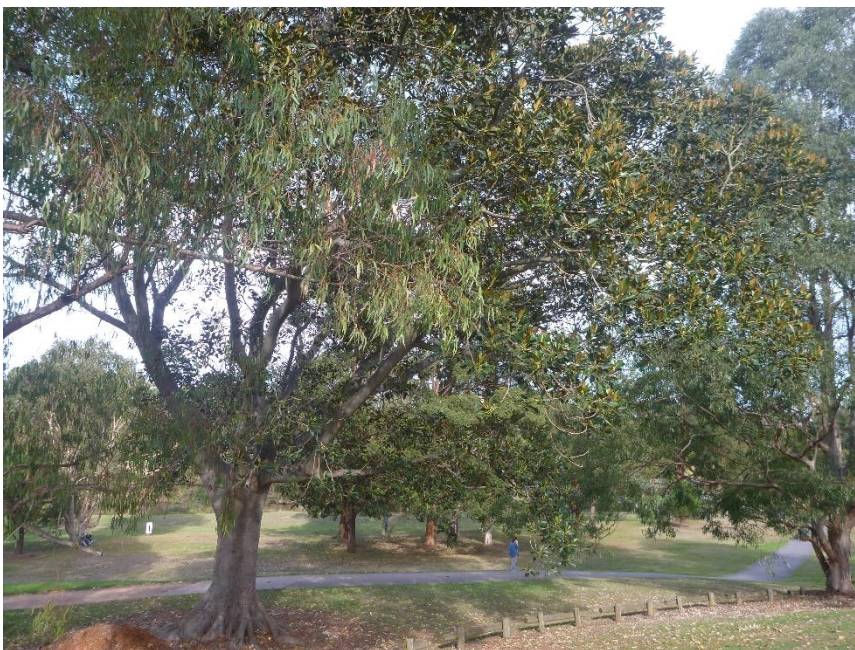


Plate 2: Planted native exotic vegetation within the study area

3.2 Flora species

Eighteen threatened flora species listed under either the TSC Act and/or EPBC Act were identified by the data audit as known, or with the potential, to occur within a 5 km radius of the study area. The likelihood of these species occurring on Site is presented in **Appendix A**.

A total of 54 flora species were identified within the study area during field investigations, of which 21 are exotic species and three are non-indigenous to the Sydney region (**Appendix B**).

No threatened flora species were recorded within the study area during the survey.

3.3 Fauna species and habitat

Thirty seven threatened fauna species and seven migratory species listed under either the TSC Act and/or EPBC Act were identified by the data review as known, or with the potential, to occur within a 5 km radius of the study area. The likelihood of these species occurring on Site is presented in **Appendix A**.

Despite the current and historical disturbance, the study area provides habitat for a variety of fauna common to urban environments. Habitat features include foraging and refuge habitat for birds, hollow-bearing trees and hollow fallen logs. A variety of bird species including the *Manorina melanocephala* (Noisy Miner), *Eolophus roseicapillus* (Galah), *Cacatua sanguinea* (Little Corella) and *Trichoglossus haematodus* (Rainbow Lorikeet) were recorded utilising the Site during field surveys. *Ficus* sp., *Eucalyptus tereticornis*, *Eucalyptus moluccana* and *Corymbia maculata* when in flower would also provide foraging habitat for birds and bats including GHFF from the Parramatta River camp along the northern boundary of the Site (**Figure 3**). The hollow-bearing trees also provide potential habitat for microchiropteran bats and more marginal habitat for owls.

Table 2 outlines the key fauna habitat features present within the study area.

Table 2: Fauna habitat at the Site

Habitat Features	Guild	Presence in survey Site
Remnant vegetation	Birds, microchiropteran bats (microbats), megachiropteran bats (fruit bats), arboreal mammals, reptiles	River-flat Eucalypt Forest vegetation remnants
Hollow-bearing trees (HBT)	Birds and arboreal mammals (possums and microbats)	Two mature HBT's present within the study area
Coarse woody debris	Terrestrial mammals, reptiles, invertebrates	Hollow logs and leaf litter in remnant River-flat Eucalypt Forest

3.3.1 Threatened fauna species

The Site provides potential habitat for a small number of threatened fauna although it is likely that most of these species utilise the Site in a transitory nature and it is unlikely to provide key breeding habitat. However, the HBTs recorded within the study area provide potential roosting habitat for some microchiropteran bat (microbat) species. Threatened fauna that are known or have the potential to utilise the Site include:

- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Mormopterus norfolkensis* (Eastern Free-tail Bat)
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
- *Myotis macropus* (Large-footed Myotis)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)
- *Ninox strenua* (Powerful Owl)

3.3.2 Parramatta River Grey-headed Flying-fox camp

The Parramatta River camp is a permanent Grey-headed Flying-fox (GHFF) camp site located in the north eastern corner of the study area along the banks of the Parramatta River, with 80% of the camp on Sydney West Area Health Services land (core camp) on the eastern side of Parramatta River directly adjacent to the Site boundary (**Figure 3**) and the remaining within the Parramatta Park land (satellite camp). The camp currently contains between 10,000 and 16,000 individuals (National Flying-fox Monitoring Program, 2015). It occupies approximately 1 hectare in area (**Figure 4**).

Recent targeted surveys of the Parramatta River Flying-fox camp undertaken by ELA in June 2016 found that 80 to 90 % of the camp flew out in a north-west direction towards Parramatta Park and 10 – 20% of the camp fly south along the river. In addition, previous monitoring of the camp by ELA in October 2015 found that the main flight paths out of the camp were south along Parramatta River and to the east towards the Parramatta Leagues Club. During both surveys no GHFF individuals flew over the Site.

Flight heights are generally at or just above canopy height for several hundred metres. GHFF may alter the direction of fly-out at any time in response to a range of factors including direction of travel to seasonally fluctuating food resources.

ELA note that there have been a number of studies and plans prepared for the Parramatta River GHFF Camp, on behalf of the Parramatta Park Trust and Sydney West Area Health Services (ELA 2008), and as part of the Parramatta North Urban Transformation project on behalf of UrbanGrowth NSW (ELA 2016). This Biodiversity Assessment has been prepared to be consistent with these documents, where possible.

Parramatta River GHFF Camp Management Plan (ELA 2008), outlines the status, objectives and actions required for effective management and protection of the camp in situ. The management objectives relevant to the Project are outlined below.

Objective 8.2 Protection and management of known habitat.

This objective discusses measures to ensure the current camp location remains viable for GHFF occupation in the long-term. GHFF camp population and demography monitoring is one of the actions required. The Proposal has the potential to disturb the GHFF camp as a result of noise and light from demolition works and proposed future events at the Western Sydney Stadium complex. An Assessment of Significance in accordance with the EP&A Act, and impact assessment under the EPBC Act have been applied to the GHFF as part of this assessment (refer to **Appendix C** and **D** respectively).

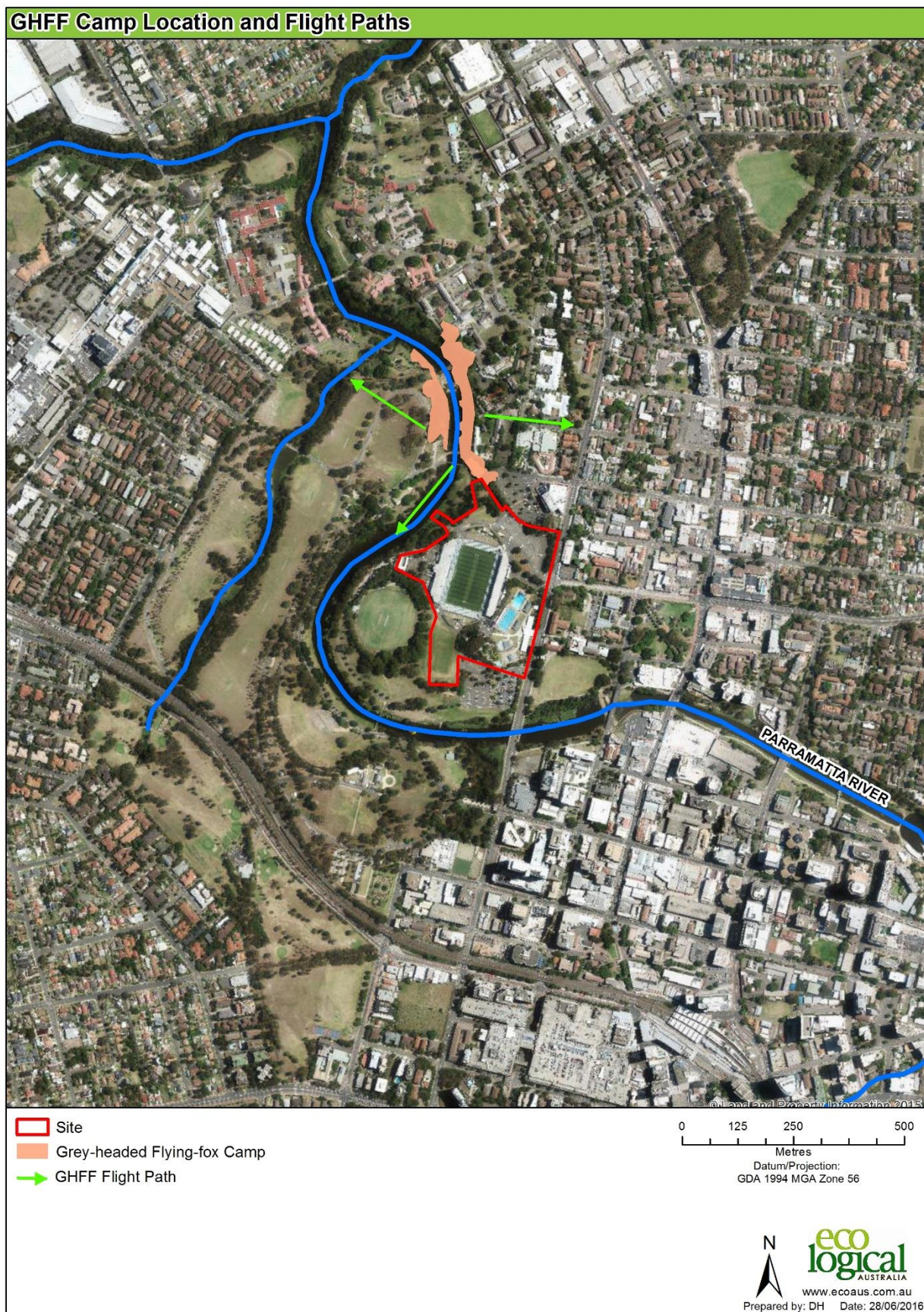


Figure 4: Parramatta GHFF camp location and flight paths

Objective 8.3 Management of Potential Habitat

There is potential for the camp to shift south over time into the River-flat Eucalypt Forest located along the western boundary of the Site, and has the potential to increase the risk of future conflict between people and the camp (e.g. noise, odour, faecal drop). Management actions to reduce the risk of this area being inhabited by GHFF include use of deterrents (such as sonic disturbance, olfactory signals and physical obstruction). The periodic low level disturbance created by events at the Western Sydney Stadium Complex may assist in deterring GHFF from roosting in this area.

Objective 8.7 Disease

In the mid-1990's three viruses were identified in Australian flying-foxes; Hendra virus (HV), Australian bat lyssavirus (ABL) and Menangle virus (MV). ABL is the only disease that is known to cause direct infection of humans, with HV and MV infecting indirectly through horses or pigs. High levels of stress may cause GHFF to become infected and / or show symptoms of infection with these diseases. Disturbance caused by the proposed demolition works and future events at the Western Sydney Stadium Complex, have the potential to elevate stress levels of individual GHFF.

3.4 Legislative context

Commonwealth and State legislation and policies, as well as local policies apply to the assessment, planning and management of ecological issues within the study area. A brief outline of the relevant Commonwealth and State Acts and Policies, and local policies, are provided below.

Table 3: Legislative context

Name	Relevance to the project	Section in this report
Commonwealth		
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	The primary objective of the EPBC Act is to 'provide for the protection of the environment, especially those aspects of the environment that are Matters of National Environmental Significance.' Environmental approvals under the EPBC Act are required for an 'action' that is likely to have a significant impact on Matters of National Environmental Significance (known as 'MNES') including: • World Heritage Areas • National Heritage Places • Ramsar wetlands of international importance • Nationally listed threatened species and ecological communities • Listed migratory species • Commonwealth marine areas • Nuclear actions • Great Barrier Reef Marine Park MNES relevant to the study area are nationally threatened species and ecological communities and listed migratory species. Matters of NES that were recorded or have the potential to occur within the study area are listed in Appendix A.	Section 5

Name	Relevance to the project	Section in this report
State		
<i>Environmental Planning and Assessment Act 1979</i>	The EP&A Act is the principal planning legislation for NSW. It provides a framework for land use control and assessment, determination and management of development. Various legislation and instruments, such as the TSC Act, are integrated with the EP&A Act and have been reviewed separately. This project was declared to be State Significant Development (SSD). The proposed works are being assessed under Part 4 of the EP&A Act.	Section 5
<i>Threatened Species Conservation Act 1995</i>	The TSC Act aims to protect and encourage the recovery of threatened species, populations and communities listed under the Act. The Act is integrated with the NSW EP&A Act and requires consideration of whether a development (Part 4 of the EP&A Act) or an activity (Part 5 of the EP&A Act), is likely to significantly affect threatened species, populations and ecological communities or their habitats.	Section 3 and 5
<i>Noxious Weeds Act 1993</i>	The Noxious Weeds Act 1993 (NW Act) defines the roles of government, councils, private landholders and public authorities in the management of noxious weeds. The Act sets up categorisation and control actions for the various noxious weeds, according to their potential to cause harm to our local environment. The objectives of the NW Act include: • To identify noxious weeds in respect of which particular control measures need to be taken. • To specify those control measures. • To specify the duties of public and private landholders as to the control of those noxious weeds. • To provide a framework for the State-wide control of those noxious weeds by the Minister and local control authorities. Under this Act, noxious weeds have been identified for Local Government Areas (LGAs) and assigned Control Classes. Part 3 provides that occupiers of land (this includes owners of land) have responsibility for controlling noxious weeds on the land they occupy.	Section 3

4 Methodology

4.1 Desktop review

The following information and databases were reviewed prior to field survey:

- OEH Atlas of NSW Wildlife Database (OEH 2016)
- EPBC Act Protected Matters Search Tool (DotE 2016)
- The Native Vegetation of the Sydney Metropolitan Area (OEH 2013)
- Parramatta River Grey-headed Flying-fox Camp Management Plan (ELA 2008)
- Parramatta Stadium Noise Management Plan (PCCD 2008)
- Aerial photographs
- Site plans.

A search of the Atlas of NSW Wildlife and the EPBC Protected Matters Search Tool was performed on 20 May 2016, using a radius of 5 km around the coordinates -33.808156, 151.999671 (Datum GDA94). Species from the database searches were combined to produce a list of threatened fauna and flora species that may potentially utilise the study area, with an assessment of the likelihood of occurrence for each species included in **Appendix A**. The likely occurrence of each species was determined by reviewing records in the area, considering the habitat available and using expert knowledge of the ecology of each species.

Five terms for the likelihood of occurrence of species are used in this report, as defined below:

- “known” = the species was or has been observed on the site
- “likely” = a medium to high probability that a species uses the site
- “potential” = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely, or unlikely to occur
- “unlikely” = a very low to low probability that a species uses the site
- “no” = habitat on site and in the vicinity is unsuitable for the species.

4.2 Field survey

Diurnal survey

The study area was surveyed by ecologists Rebecca Dwyer and Alex Gorey on the 23 May 2016 for a total period of approximately 14 person hours. Temperature ranged from 12.5 – 27.2°C during the survey period and conditions were fine with little cloud cover (BOM 2016).

The entire study area was traversed slowly on foot, with all visible flora species identified. Each traverse included an assessment of all vegetation communities and their condition, floristic structure, and various microhabitats on Site (e.g. hollow bearing trees). This assessment was to validate vegetation communities against the mapped vegetation (OEH 2013) and ensure that all potential habitat niches were examined. Potential habitat for threatened flora and fauna species were assessed. The extent of the GHFF camp was also mapped.

Nocturnal fauna survey

A nocturnal fauna survey was undertaken by three ELA ecologists, Rodney Armistead, Suzanne Eacott and Stacey Wilson, on the 8 June 2016. The surveys targeted the GHFF camp at Parramatta River, and

were undertaken in accordance with the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC 2004).

The ecologists conducted one night of spotlighting and stag watching surveys at the camp. This involved three ecologists being present on site watching the camp for 30 minutes prior to sunset and 60 minute after sunset to identify the flight path of GHFF dispersing from the camp.

4.3 Assessment of significance

An evaluation of the impacts from the proposed works on threatened biodiversity detected during field survey or considered likely to occur and listed under the TSC Act or EPBC Act was undertaken.

The Assessment of Significance sets out seven factors, which when considered, allow proponents to undertake a qualitative analysis of the likely impacts of an action and to determine whether further assessment is required via a Species Impact Statement (SIS). All factors must be considered and an overall conclusion made based on all factors in combination. An SIS is required if, through application of the Assessment of Significance (7-part test), an action is considered likely to have a significant impact on a threatened species, population or ecological community.

5 Impact assessment

5.1 Summary of impacts

5.1.1 Threatened Ecological Communities

One threatened ecological community, RFEF, was recorded within the study area. The Proposal will result in the removal of 1.60 ha of planted native / exotic vegetation. However, no vegetation consistent with the EEC RFEF will be directly impacted by the proposed works as they would be contained within an exclusion zone. Mitigation measures have been implemented to avoid indirect impacts, such as sediment and erosion, on the EEC.

5.1.2 Threatened flora

No threatened flora species were recorded or likely to occur within the study area.

5.1.3 Threatened fauna

Six threatened fauna species, are known or have the potential to occur within the study area:

- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Mormopterus norfolkensis* (Eastern Free-tail Bat)
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
- *Myotis macropus* (Large-footed Myotis)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)
- *Ninox strenua* (Powerful Owl)

The following direct impacts on threatened fauna *may* occur as a result of Proposal:

- Construction and demolition noise levels of between 52 - 57 dB(A)
- Periodic elevated noise levels during events of between –52 - 73 dB(A)
- Elevated and sustained light levels
- Increased stress (as evidenced by a greater parasite loads, lower body condition, greater number of vocalisations, diurnal fly outs / emergence, abandonment of habitat / GHFF camp) as a result of disturbance to fauna species and their habitats during events

It is important to note that events are regularly held at the existing stadium, established in 1986, less than 150 m from the GHFF camp. It is assumed that some of the above direct impacts may already be occurring as a result of current events held at the stadium. ELA is not aware of any associated GHFF camp monitoring to assess the impacts of current events associated with the stadium.

5.1.4 Noise

Animals rely on meaningful sounds for communication, navigation, avoiding danger and finding food against a background of noise. The effects of noise on most species are poorly understood and fauna will perceive noise impacts differently (AMEC Americas Ltd 2005). Some fauna become stressed by noise, which can affect foraging or breeding, or they may leave an area, whereas other species or populations do not seem to be affected or may adjust to noise over time.

As far as determining impacts to fauna, the nature of the noise (e.g. high or low pitch; sudden or continuous) needs to be considered as well as the 'loudness' (measured in dB(A)) because some animals perceive noise differently to humans (however, it is noted that GHFF perceive noise in a similar way to

humans). For example, microbats are more attuned to the high frequency band (e.g. metal on metal sounds), so may not be concerned by steady low pitch traffic noise (e.g. microbats often inhabit road culverts). However, loud constant noise may make it difficult for microbats to hear prey, which can adversely affect foraging (Siemers & Schaub 2011). As another example, many bird species and GHFF are more sensitive to sudden loud noises (e.g. explosion or air horn) rather than continuous noise or noise that builds and fades away (e.g. aircraft or vehicle).

The acoustic assessment (AECOM 2016) for the project measured existing background noise levels, and likely noise levels during construction and events, at various sensitive receivers. The recorded noise levels at the nearest receiver (1 Fleet Street, North Parramatta), which was approximately 180 m from the existing stadium, are shown in **Table 4**.

Table 4: Projected noise levels at nearest sensitive receiver

Noise type	LAeq,15min, dB(A)
Existing background noise	45 - 54
Demolition noise management levels	52 - 57
Sporting events	52 - 64
Music events (indicatively one per year)	57 - 73

The Parramatta River GHFF camp is located approximately 150 m from the existing stadium. Noise levels predicted for large sporting events held at the proposed Western Sydney Stadium complex will be lower than proposed construction noise.

Existing noise levels during events at the stadium have not been measured as part of this report due to time constraints. However, it is understood that numerous sporting and entertainment events have been held at the stadium and also within Parramatta Park, with no obvious detrimental effect on the GHFF camp. The predicted noise levels for construction and events are assumed to be similar to existing event noise levels (AECOM 2016), and are not anticipated to increase and disturb the GHFF camp. The camp disperses at dusk when existing and proposed noise is at its greatest. However, the frequency of events is predicted to double, from 22-23 games per year to 42-43 games per year, which may have an impact on the GHFF camp.

It is uncertain if such an increase in background noise levels on a more frequent basis would cause stress to GHFF and other fauna potentially inhabiting the park. The greatest risk of impact occurs from sudden loud noises at sensitive times for fauna such as during emergence and return to roosts at dusk and dawn and during breeding and lactation (October – January for GHFF and microchiropteran bat species that may inhabit the site). Where possible, excessive noise should be minimised, particularly around dusk and dawn when fauna are emerging to feed or returning to rest and during breeding season.

It is understood that noise during events will be managed under the existing *Parramatta Stadium Noise Management Plan* (PCCD 2008). Further detailed recommendations for mitigating the effects of excessive noise on the GHFF camp and other fauna have been included in **Section 6**.

5.1.5 Light

There are potential ecological impacts associated with artificial lighting used during events at the Proposal. Artificial lighting that may have negative impacts upon fauna includes strobe effect or flash

lighting, and spotlighting directly upon refuges or roosting habitat. Microbats and GHFF may be affected by artificial lighting for the following reasons (Fure 2006, Jones 2000):

- Artificial lighting disrupts the normal 24-hour pattern of light and dark, which is likely to affect the natural behaviour of bats. Light near a roost may delay bats from emerging and shorten the amount of time available to them for foraging.
- Bright light may reduce social flight activity and cause bats to move away from the light area to an alternative dark area.
- Illuminating a bat roost creates disturbance and may cause the bats to abandon the roost.
- Artificial lighting can also affect the feeding behaviour of bats. In most microbat species there is an evening period of activity followed by another at dawn. These two flights correlate with the peak flight times of nocturnal insect prey. Insects are attracted to light particularly if it is a single light source in a dark area. Some microbat species will benefit from the increased opportunities to forage created by artificial lighting while others will avoid it.

The lighting concept design has not yet been finalised, however, ELA understand that lighting within the stadium will be consistent with the existing lighting, and there will not be any lighting directed at the GHFF camp or regular flight paths. It is also noted that the vegetation to the west of the Site would screen some of the light at or below canopy height.

The effect of artificial lights on bats has not been well studied in Australia. Bats are most sensitive to disturbance from artificial lighting at roost sites, around dusk and dawn when they are emerging to feed or returning to rest. A number of specific recommendations regarding the use of artificial lighting during events have been included in **Section 6** to mitigate against negative impacts from this action.

It is also likely that the camp will be dispersing at dusk when artificial lighting will be required. Artificial lighting is most likely to affect juvenile GHFF that may remain in the camp during the night.

5.2 Indirect impacts

An assessment of indirect impacts has been included as part of the impact assessment. Potential indirect impacts may include:

- Erosion and sediment impact on the adjacent EEC, RFEF, to the west.
- Reduced foraging opportunities for fauna as foraging area is limited.
- Reduced breeding success for fauna due to changes in behaviour associated with disturbance from demolition and proposed events occurring throughout the breeding and lactation season.

Indirect impacts can be mitigated through the implementation of appropriate control measures. A list of recommendations has been provided in **Section 6**.

5.3 Assessment of significance

5.3.1 Assessment of Significance (7-Part Test)

The EP&A Act states that if a species, population or ecological community is listed in Schedules 1, 1A and 2 of the TSC Act, then a review of the factors set out to establish if there is likely to be a significant impact on that species, population, ecological community or habitat, must be undertaken. Section 5A of the EP&A Act sets out seven factors that must be addressed as part of an Assessment of Significance (7-part test). This helps guide a decision as to whether there is likely to be a significant impact on the

species, population or ecological community and, hence, if a Species Impact Statement (SIS) is required.

The Assessment of Significance has been conducted where necessary with consideration to the 7-part test criteria (or assessment of significance) for one TEC and six threatened fauna species:

- River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Mormopterus norfolkensis* (Eastern Free-tailed Bat)
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
- *Myotis macropus* (Large-footed Myotis)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)
- *Ninox strenua* (Powerful Owl)

The Assessment of Significance completed for the TEC and six threatened fauna concluded that the Proposal is unlikely to constitute a significant impact (refer to **Appendix C**). Therefore, no Species Impact Statement is required.

5.3.2 Commonwealth Significant Impact Criteria (EPBC Act)

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where “Matters of National Environmental Significance” (MNES) may be affected. Under the Act, any action which “has, will have, or is likely to have a significant impact on a MNES” is defined as a “controlled action”, and requires approval from the Commonwealth Department of the Environment (DotE) which is responsible for administering the EPBC Act.

Specific ‘Significant Impact Criteria’ are provided for each MNES, except for threatened species and ecological communities, in which case separate criteria are provided for species listed as endangered and vulnerable under the EPBC Act.

MNES considered relevant to this assessment include:

- *Pteropus poliocephalus* (Grey-headed Flying-fox)

The relevant Significant Impact Criteria have been applied to these matters to determine the significance of impact of the Proposal, and are provided in **Appendix D**. The assessment of impact completed for each of these matters concluded the Proposal may constitute a significant impact to the Parramatta River GHFF camp. Therefore, a Referral to the Commonwealth is recommended.

6 Mitigation measures

Measures to avoid or reduce impacts to the Parramatta GHFF camp, and EEC RFEF, within the study area, have been provided below.

6.1 During demolition

- Strict erosion and sediment control measures must be implemented on Site to protect the retained vegetation, especially downslope towards the adjacent EEC, RFEF, to the west. Sediment control is to be routinely inspected after rainfall events and periodically inspected during normal conditions.
- No new or temporary buildings will be built within 50 m of the GHFF camp.
- All contractors are to be made aware of the presence of threatened fauna (GHFF) in adjacent habitats.
- Considerations of risk of disease to humans is to be included in all Occupational Health and Safety (OH&S) Safe Work Method Statements for all event related and/or recreational activities undertaken within proximity to the camp.
- Noise management strategies during demolition and construction must:
 - Ensure all plant and equipment is maintained to Australian Standards to minimise noise generation.
 - Position plant and equipment as far from the GHFF camp as possible.
 - Shield noise at its source, where possible.
 - Avoid demolition at dawn (before 7am) when the GHFF are returning to the camp to roost.
- Schedule building demolition and others Stage 1 works that are to be completed within 50 m of the camp outside the GHFF breeding season (i.e. when the ratio of lactating or late-pregnancy females and/or dependent young is greater than 5% of the population in the camp). If works are needed within 50 m of the camp during the GHFF breeding season, an ecologist would be required to closely monitor animal health and be authorised to temporarily stop work if needed.
- Commission an ecologist with suitable experience to monitor the health of the GHFF during the breeding season when demolition is between 50-100 m of the camp boundary. If GHFF become too stressed they can abort young. The ecologist would have authority to stop noisy construction work if the GHFF are stressed, as evidenced by greater number of vocalisations, diurnal fly outs / emergence or negative social interactions.
- The work would be allowed to resume at night when the camp is empty or when the ecologist determines that the GHFF are no longer stressed and at risk.
- Light spill management measures include not shining lights toward the GHFF camp or foraging habitat during construction or in the long term.
- Avoid landscape plantings that may encourage the increased use of GHFF within the Proposal.

6.2 During operation

- Commence noise generation at low levels during sound check and event, and work up to maximum volume gradually to allow GHFF and other fauna time to acclimatise to the noise.
- Light spill management measures include not shining lights toward the GHFF camp or foraging habitat during events.

- There is potential for the camp to shift south over time into the RFEF located along the western boundary of the Site, and has the potential to increase the risk of future conflict between people and the camp (e.g. noise, odour, faecal drop). Management actions to deter GHFF from roosting in this area should be considered. These include the use of deterrents, such as olfactory signals and physical obstruction.

7 Conclusion

The proposed works will involve the initial application for the Concept Proposal and demolition works to accommodate the Western Sydney Stadium (Stage 1).

The field survey confirmed the presence of the EEC RFEF listed under the TSC Act. The Site also provides potential habitat for six threatened fauna species. A known GHFF maternity camp is located directly adjacent to the northern boundary of the Site. Numbers in the camp fluctuate, but the camp has been growing in recent years with counts as high as 20,000 individuals recorded within River-flat Eucalypt Forest along Parramatta River (**Figure 4**). The vegetation within the study area provides important foraging habitat especially for lactating mothers and supplementary roosting habitat for some individuals.

The Parramatta River GHFF camp is located approximately 150 m from the existing stadium. The acoustic assessment (AECOM 2016) for the project measured existing background noise levels, and likely noise levels during construction and events, at various sensitive receivers. The recorded noise levels at the nearest receiver (1 Fleet Street, North Parramatta), which was approximately 180 m from the existing stadium. The assessment predicted construction and demolition noise levels of between 52 - 56 dB(A), and periodic elevated noise levels during events of between 52 - 73 dB(A). Noise levels predicted for large sporting events held at the proposed Western Sydney Stadium complex are in the order of magnitude higher than construction noise. The predicted noise levels for construction and events are assumed to be similar to existing event noise levels (AECOM 2016), and are not anticipated to increase and disturb the GHFF camp.

The frequency of events is predicted to double, from 22-23 games per year to 42-43 games per year, which may have an impact on the GHFF camp. Although, to date the GHFF camp has experienced similar levels of disturbance from events held at the current stadium, there is a possibility for the proposed increase in frequency of events to cause increased stress levels within the GHFF's at the Parramatta River camp. An Assessment of Significance consistent with s5A of the EP&A Act was undertaken for EEC RFEF and six threatened fauna, and concluded that the proposed activity is unlikely to constitute a significant impact (see **Appendix C**). No Species Impact Statement is required. An impact assessment consistent with EPBC Act was also undertaken for the GHFF, and concluded that the proposed works may have a significant impact on a population of GHFF. A referral to the Commonwealth Department of the Environment for assessment and approval by the Environment Minister is recommended.

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Appendix A: Threatened species and communities likelihood of occurrence

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
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FAUNA

BIRDS

<i>Anthochaera phrygia</i>	Regent Honeyeater	E4A	E	Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of <i>Casuarina cunninghamiana</i> (River Oak). Two of three known key breeding areas are in NSW: the Capertee Valley and Bundarra-Barraba region. The species breeds between July and January and usually nests in horizontal branches or forks in tall mature eucalypts and Sheoaks. The Regent Honeyeater primarily feeds on nectar from box and ironbark eucalypts and occasionally from banksias and mistletoes.	Potential, foraging habitat only	Yes
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1	E	Permanent freshwater wetlands with tall, dense vegetation, particularly <i>Typha</i> spp. (bullrushes) and <i>Eleocharis</i> spp. (spikerushes). Feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird. Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds.	Unlikely, lack of suitable habitat	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
<i>Calidris ferruginea</i>	Curlew Sandpiper	E1	C,J,K	Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores. Curlew Sandpipers are omnivorous, feeding on worms, molluscs, crustaceans, insects and some seeds.	Unlikely, lack of suitable habitat	No
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V		Inhabits eucalypt forests and woodlands, mallee and <i>Acacia</i> woodland. Feeds on arthropods gleaned from crevices in rough or decorticated bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	Unlikely, lack of suitable habitat	No
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E1	E	Central and southern populations inhabit heath and open woodland with a heathy understorey. In northern NSW, habitat comprises open forest with dense tussocky grass understorey. Feeds on a variety of insects, particularly ants. Nests are elliptical domes constructed on or near the ground amongst dense vegetation. Two eggs are laid during August to February.	Unlikely, lack of suitable habitat	No
<i>Epthianura albifrons</i>	White-fronted Chat population in the Sydney Metropolitan Catchment	E2		Two isolated sub-populations known from the Sydney Metropolitan Catchment Management Authority area; one at Newington Nature Reserve on the Parramatta River and one at Towra Point Nature Reserve in Botany Bay. Saltmarsh of Newington Nature Reserve and in grassland on the northern bank of the Parramatta River. Saltmarsh and on the sandy shoreline of a small island of Towra Point Nature Reserve.	Unlikely, lack of suitable habitat	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
	Management Area					
<i>Epthianura albifrons</i>	White-fronted Chat	V		Occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Saltmarsh vegetation, open grasslands and sometimes low shrubs bordering wetland areas.	Unlikely, lack of suitable habitat	No
<i>Grantiella picta</i>	Painted Honeyeater	V		Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas. Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	Unlikely, lack of suitable habitat	No
<i>Lathamus discolor</i>	Swift Parrot	E1	E	Box-ironbark forests and woodlands. Favoured feed trees include winter flowering species such as <i>Eucalyptus robusta</i> (Swamp Mahogany), <i>Corymbia maculata</i> (Spotted Gum), <i>C. gummifera</i> (Red Bloodwood), <i>E. sideroxylon</i> (Mugga Ironbark), and <i>E. albens</i> (White Box). Commonly used lerp infested trees include <i>E. microcarpa</i> (Inland Grey Box), <i>E. moluccana</i> (Grey Box) and <i>E. pilularis</i> (Blackbutt). Following winter they return to Tasmania where they breed from September to January.	Unlikely, lack of suitable habitat	No
<i>Macronectes giganteus</i>	Southern Giant Petrel	E1	E	Common visitor off the coast of NSW. Marine.	Unlikely, lack of suitable habitat	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
<i>Macronectes halli</i>	Northern Giant-Petrel	V	V	Common visitor in NSW waters, predominantly along the south-east coast during winter and autumn. Marine.	Unlikely, lack of suitable habitat	No
<i>Merops ornatus</i>	Rainbow Bee-eater	P	J	Distributed across much of mainland Australia, including NSW. Open forests and woodlands, shrublands, farmland, areas of human habitation, inland and coastal sand dune systems, heathland, sedgeland, vine forest and vine thicket.	Unlikely, lack of suitable habitat	No
<i>Monarcha trivirgatus</i>	Spectacled Monarch	P	Bonn, Mar	Coastal eastern Australia south to Port Stephens in NSW. Mountain/lowland rainforest, wooded gullies, riparian vegetation including mangroves.	Unlikely, lack of suitable habitat	No
<i>Motacilla flava</i>	Yellow Wagtail	P	C,J,K	Regular summer migrant to mostly coastal Australia. In NSW recorded Sydney to Newcastle, the Hawkesbury and inland in the Bogan LGA. Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns.	Unlikely, lack of suitable habitat	No
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	P	Bonn, Mar	In NSW, widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. Eucalypt-dominated forests, especially near wetlands, watercourses, and heavily-vegetated gullies.	Unlikely, lack of suitable habitat	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
<i>Ninox connivens</i>	Barking Owl	V		Wide but sparse distribution in NSW, avoiding the most central arid regions. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests. Woodland and open forest, including fragmented remnants and partly cleared farmland, wetland and riverine forest.	Unlikely, lack of suitable habitat	No
<i>Ninox strenua</i>	Powerful Owl	V		Woodland, open sclerophyll forest, tall open wet forest and rainforest. It roosts by day in dense vegetation comprising species such as <i>Syncarpia glomulifera</i> (Turpentine), <i>Allocasuarina littoralis</i> (Black She-oak), <i>Acacia melanoxylon</i> (Blackwood), <i>Angophora floribunda</i> (Rough-barked Apple), <i>Exocarpus cupressiformis</i> (Cherry Ballart) and eucalypt species. The main prey items are medium-sized arboreal marsupials. Powerful Owls nest in large tree hollows in large eucalypts that are at least 150 years old. Nesting occurs from late autumn to mid-winter.	Potential, foraging habitat only	Yes
<i>Petroica boodang</i>	Scarlet Robin	V		Dry eucalypt forests and woodlands, and occasionally in mallee, wet forest, wetlands and tea-tree swamps. Feed on small insects and other invertebrates which are taken from the ground, or off tree trunks and logs; they sometimes forage in the shrub or canopy layer. Mainly breed between July and January. This species' nest is an open cup made of plant fibres and cobwebs and is built in the fork of tree usually more than 2 metres above the ground; nests are often found in a dead branch in a live tree, or in a dead tree or shrub.	Unlikely, lack of suitable habitat	No
<i>Polytelis swainsonii</i>	Superb Parrot	V	V	In NSW, occurs on inland slopes of the Great Divide and on adjacent plains, especially along the major river-systems. Box-gum woodland, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	Unlikely, lack of suitable habitat	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
<i>Rhipidura rufifrons</i>	Rufous Fantail	P	Bonn, Mar	Coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW. Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	Unlikely, lack of suitable habitat	No
<i>Thalassarche melanophris</i>	Black-browed Albatross	V	V	Regularly recorded off the NSW coast during May-November. Marine.	Unlikely, lack of suitable habitat	No
<i>Rostratula australis</i>	Australian Painted Snipe	E1	E, Mar	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Swamps, dams and nearby marshy areas.	Unlikely, lack of suitable habitat	No

MAMMALS

<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country. Roosts in caves, rock overhangs and disused mine shafts and as such is usually associated with rock outcrops and cliff faces. It also possibly roosts in the hollows of trees. The species is thought to require roosting habitat that is adjacent to higher fertility sites which are used for foraging. This species probably forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring.	Unlikely, lack of suitable habitat	No
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld. Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Unlikely, lack of suitable habitat	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V		Tall (greater than 20m) moist habitats. Predominately roosts in Eucalypt tree hollows. It has also been found to roost under loose bark on trees and in man-made structures. It hunts beetles, moths, weevils and other flying insects above or just below the tree canopy, in open forests. Hibernates in winter. Females are pregnant in late spring to early summer.	Unlikely, lack of suitable habitat	No
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E1	E	Heath or open forest with a heathy understorey on sandy or friable soils. Largely crepuscular. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruited) fungi. Their searches for food often create distinctive conical holes in the soil. Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under <i>Xanthorrhoea</i> spp. (Grass trees), blackberry bushes and other shrubs, or in rabbit burrows. Mating occurs any time of the year, usually following heavy rain.	Unlikely, lack of suitable habitat	No
<i>Miniopterus australis</i>	Little Bentwing-bat	V		Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat. Maternity colonies form in spring. Males and juveniles disperse in summer.	Unlikely, lack of suitable habitat	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V		Rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland. It forages above and below the tree canopy on small insects, especially moths. The bats congregate at the same maternity roosts each year to give birth and rear young. In the southern part of the species' range this occurs during spring. Maternity roosts may be located in caves, abandoned mines, concrete bunkers and lava tubes. Over-wintering roosts used outside the breeding period include cooler caves, old mines, and stormwater channels, under bridges and occasionally buildings.	Potential	Yes
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V		Dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.	Potential	Yes
<i>Myotis macropus</i>	Southern Myotis	V		Foraging habitat is waterbodies (including streams, or lakes or reservoirs) and fringing areas of vegetation up to 20m. Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December.	Potential	Yes
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E1	V	Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night. Highly territorial and have strong site fidelity with an average home range size of about 15 ha. Breeding	Unlikely, lack of suitable habitat	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
				is likely to be continuous, at least in the southern populations, with no apparent seasonal trends in births.		
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	P	V	Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes. It is a social animal, living predominantly in burrows shared with other individuals. Distribution is patchy in time and space, with peaks in abundance during early to mid-stages of vegetation succession typically induced by fire.	Unlikely, lack of suitable habitat	No
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Annual mating commences in January and a single young is born in October or November. Can travel up to 50 km from the camp to forage. Feed on the nectar and pollen of <i>Eucalyptus</i> , <i>Melaleuca</i> and <i>Banksia</i> species, and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops.	Known	Yes
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V		Woodland, moist and dry eucalypt forest and rainforest. Usually roosts in tree hollows, but has also been found in buildings. Forages after sunset along creek and river corridors for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees.	Potential	Yes

AMPHIBIA

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Breeding habitat is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water. This species breeds mainly in autumn, but has been recorded calling throughout the year. Egg masses are foamy with an average of approximately 500-800 eggs and are laid in burrows or under vegetation in small pools. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter.	Unlikely, lack of suitable habitat	No
<i>Litoria raniformis</i>	Southern Bell Frog	E1	V	In NSW, only known to exist in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. A few recent unconfirmed records have also been made in the Murray Irrigation Area. Permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. Also found in irrigated rice crops.	Unlikely, lack of suitable habitat	No
<i>Litoria aurea</i>	Green and Golden Bell Frog	E1	V	Marshes, dams and stream-sides, particularly those containing Typha spp. (bullrushes) or <i>Eleocharis</i> spp. (spikerushes). Some populations occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet. Males call while floating in water and females produce a raft of eggs that initially float before settling to the bottom, often amongst vegetation. Tadpoles feed on algae and other plant-matter; adults eat mainly insects, but also other frogs.	Unlikely, lack of suitable habitat	No

MIGRATORY SPECIES

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
<i>Merops ornatus</i>	Rainbow Bee-eater	P	J	Open forests and woodlands, shrublands, farmland, areas of human habitation, inland and coastal sand dune systems, heathland, sedgeland, vine forest and vine thicket. The breeding season extends from August to January. The nest is constructed in an enlarged chamber at the end of long burrow that is excavated by both sexes. Populations that breed in southern Australia are migratory, birds moving north to northern Australia, Papua New Guinea and eastern Indonesia after breeding, and remaining there for the duration of the Australian winter. Its diet mainly consists of bees and wasps.	Unlikely, lack of suitable habitat	No
<i>Monarcha melanopsis</i>	Black-faced Monarch	P	Bonn, Mar	Rainforest, open eucalypt forests, dry sclerophyll forests and woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and gardens. The species spends summer and autumn in eastern Australia, and winters in southern and eastern Papua New Guinea from March to August. Breeds from October to March, in rainforest habitat.	Unlikely, lack of suitable habitat	No
<i>Monarcha trivirgatus</i>	Spectacled Monarch	P	Bonn, Mar	Mountain/lowland rainforest, wooded gullies, riparian vegetation including mangroves. Summer breeding migrant to north-east NSW and south-east QLD from September/October to May. Nests in a tree fork or in hanging vines, 1 m - 6 m above the ground, often near water.	Unlikely, lack of suitable habitat	No
<i>Motacilla flava</i>	Yellow Wagtail	P	C,J,K	Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns. Breeds Europe to Siberia and west Alaska. Regular summer migrant to Australia (November-April).	Unlikely, lack of suitable habitat	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	P	Bonn, Mar	This species occupies eucalypt-dominated forests, especially near wetlands, watercourses, and heavily-vegetated gullies. Satin Flycatchers move north in autumn to spend winter in northern Australia and New Guinea and returning south in spring. In NSW, they depart between February and March and return between September and October. In NSW, breeding occurs between November and March, with a nest usually built in the high, exposed outer branches of a tree.	Unlikely, lack of suitable habitat	No
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	E4A	CE	Winter habitat is mostly within 3 km of the coast in sheltered bays, lagoons, estuaries, coastal dunes and saltmarshes. Also small islands and peninsulas, saltworks, golf courses, low samphire herbland and taller coastal shrubland form part of its habitat. Diet mainly comprises seeds and fruits of sedges and salt-tolerant coastal and saltmarsh plants. Occasionally, flowers and stems are eaten. Recent records for this species occur from unexpected places, including Shellharbour and Maroubra suggest that the species may be expanding their selection of habitats and foraging plant species, or that they were blown off course during migration. Birds seen in NSW in 2003 were foraging on weed species several hundred metres from the coast.	Unlikely, lack of suitable habitat	No
<i>Rostratula australis</i>	Australian Painted Snipe	E1	E, Mar	Swamps, dams and nearby marshy areas. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves. Breeding is often in response to local conditions; generally occurs from September to December. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	Unlikely, lack of suitable habitat	No

FLORA

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
<i>Allocasuarina glareicola</i>		E1	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Castlereagh woodland on lateritic soil. Found in open woodland with <i>Eucalyptus parramattensis</i> , <i>Eucalyptus fibrosa</i> , <i>Angophora bakeri</i> , <i>Eucalyptus sclerophylla</i> and <i>Melaleuca decora</i> .	No, not recorded during field surveys	No
<i>Asterolasia elegans</i>		E1	E	Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby local government areas. Also likely to occur in the western part of Gosford local government area. Hawkesbury sandstone. Found in sheltered forests on mid- to lower slopes and valleys.	No, not recorded during field surveys	No
<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V	V	In NSW, recorded mainly on coastal and near coastal ranges north from Victoria to near Forster, with two isolated occurrences inland north-west of Grafton. Coastal heathlands, margins of coastal swamps and sedgeland, coastal forest, dry woodland, and lowland forest.	No, not recorded during field surveys	No
<i>Darwinia biflora</i>		V	V	Recorded in Ku-ring-gai, Hornsby, Baulkham Hills and Ryde local government areas, in an area bounded by Maroota, North Ryde, Cowan and Kellyville. Woodland, open forest or scrub-heath on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone.	No, not recorded during field surveys	No
<i>Epacris purpurascens</i> var. <i>purpurascens</i>		V		Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Sclerophyll forest, scrubs and swamps. Most habitats have a strong shale soil influence.	No, not recorded during field surveys	No
<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	New England Tablelands from Nundle to north of Tenterfield. Dry grassy woodland, on shallow soils of slopes and ridges.	No, not recorded	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
					during field surveys	
<i>Genoplesium baueri</i>	Bauer's Midge Orchid	E1	E	Has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. Dry sclerophyll forest and moss gardens over sandstone.	No, not recorded during field surveys	No
<i>Hibbertia superans</i>		E1		From Baulkham Hills to South Maroota in the northern outskirts of Sydney, and at one locality at Mount Boss, inland from Kempsey. Open woodland and heathland, and appears to prefer open disturbed areas.	No, not recorded during field surveys	No
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i>		E2		Razorback Range, also recorded at Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Vine thickets and open shale woodland.	No, not recorded during field surveys	No
<i>Melaleuca deanei</i>	Deane's Paperbark	V	V	Ku-ring-gai/Berowra area, Holsworthy/Wedderburn area, Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. Heath on sandstone.	No, not recorded during field surveys	No
<i>Persoonia nutans</i>	Nodding Geebung	E1	E	Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south. Northern populations: sclerophyll forest and woodland (Agnes Banks Woodland, Castlereagh Scribbly Gum Woodland and Cooks River / Castlereagh Ironbark Forest) on aeolian and alluvial sediments. Southern populations: tertiary alluvium, shale sandstone transition communities and Cooks River / Castlereagh Ironbark Forest.	No, not recorded during field surveys	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
<i>Pimelea curviflora</i> <i>var. curviflora</i>		V	V	Confined to the coastal area of the Sydney and Illawarra regions between northern Sydney and Maroota in the north-west and Croom Reserve near Albion Park in the south. Woodland, mostly on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes.	No, not recorded during field surveys	No
<i>Pimelea spicata</i>	Spiked Rice-flower	E1	E	Two disjunct areas; the Cumberland Plain (Marayong and Prospect Reservoir south to Narellan and Douglas Park) and the Illawarra (Landsdowne to Shellharbour to northern Kiama). Well-structured clay soils. <i>Eucalyptus moluccana</i> (Grey Box) communities and in areas of ironbark on the Cumberland Plain. Coast Banksia open woodland or coastal grassland in the Illawarra.	No, not recorded during field surveys	No
<i>Pomaderris prunifolia</i>		E2		Population is known from only three sites: at Rydalmere, within Rookwood Cemetery and at The Crest of Bankstown. At Rydalmere it occurs among grass species on sandstone near a creek. At Rookwood Cemetery it occurs in a small gully of degraded Cooks River / Castlereagh Ironbark Forest on shale soils.	No, not recorded during field surveys	No
<i>Pterostylis gibbosa</i>	Illawarra Greenhood	E1	E	Known from a small number of populations in the Hunter region (Milbrodale), the Illawarra region (Albion Park and Yallah) and the Shoalhaven region (near Nowra). Open forest or woodland, on flat or gently sloping land with poor drainage.	No, not recorded during field surveys	No
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	E1	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. Small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines, adjacent to sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	No, not recorded during field surveys	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat Associations	Likelihood of occurrence	Impact Assessment Required
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E1	V	Only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. Subtropical and littoral rainforest on gravels, sands, silts and clays.	No, not recorded during field surveys	No
<i>Wilsonia backhousei</i>	Narrow-leafed Wilsonia	V		In NSW, found on the coast between Mimosa Rocks National Park and Wamberal north of Sydney (Nelson's Lake, Potato Point, Sussex Inlet, Wowly Gully, Parramatta River at Ermington, Clovelly, Voyager Point, Wollongong and Royal National Park). Margins of salt marshes and lakes.	No, not recorded during field surveys	No

Appendix B: Flora species recorded within the study area

Family	Scientific name	Common name	Native/exotic
Alliaceae	<i>Agapanthus praecox</i>	Lily of the Nile	E
Altingiaceae	<i>Liquidambar styraciflua</i>	Liquid Ambar	E
Apocynaceae	<i>Gomphocarpus</i>	Balloon Cotton Bush	E
Asteraceae	<i>Bidens pilosa</i>	Cobblers Pegs	E
	<i>Senecio madagascariensis</i>	Fireweed	E
Basellaceae	<i>Anredera cordifolia</i>	Madeira Vine	E
Bignoniaceae	<i>Jacaranda mimosifolia</i>	Jacaranda	E
Casuarinaceae	<i>Allocasuarina littoralis</i>	Black She-oak	N
	<i>Allocasuarina torulosa</i>	Forest Oak	N
	<i>Casuarina glauca</i>	Swamp Oak	N
	<i>Acacia decurrens</i>	Black Wattle	N
Fabaceae	<i>Acacia elata</i>	Cedar Wattle	N
	<i>Acacia falcata</i>	Hickory Wattle	N
	<i>Erythrina x sykesii</i>	Coral Tree	E
	<i>Indigofera australis</i>	Australian Indigo	N
	<i>Senna pendula</i>	Easter Cassia	E
Lauraceae	<i>Cinnamomum camphora</i>	Camphor Laurel	E
Malvaceae	<i>Brachychiton populneus</i>	Kurrajong	N
	<i>Sida rhombifolia</i>	Paddy's Lucerne	E
Moraceae	<i>Ficus microcarpa</i> var. <i>hillii</i>	Hills' Fig	N
	<i>Ficus macrophylla</i>	Moreton Bay Fig	N
	<i>Ficus rubiginosa</i>	Port Jackson Fig	N
Myrtaceae	<i>Angophora floribunda</i>	Rough-barked Apple	N
	<i>Callistemon citrinus</i>	Crimson Bottlebrush	N
	<i>Corymbia citriodora</i>	Lemon-scented Gum	N, Ni
	<i>Corymbia maculata</i>	Spotted Gum	N
	<i>Eucalyptus moluccana</i>	Grey Box	N
	<i>Eucalyptus microcorys</i>	Tallowwood	N, Ni
	<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	N

Family	Scientific name	Common name	Native/exotic
	<i>Eucalyptus piperita</i>	Sydney Peppermint	N
	<i>Eucalyptus robusta</i>	Swamp Mahogany	N
	<i>Eucalyptus saligna</i>	Sydney Blue Gum	N
	<i>Eucalyptus tereticornis</i>	Forest Red Gum	N
	<i>Lophostemon confertus</i>	Brush Box	N
	<i>Melaleuca quinquenervia</i>	Broad-leaved Paper Bark	N
	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	N
Pinaceae	<i>Pinus pinea</i>	Stone Pine	E
	<i>Pinus radiata</i>	Radiata Pine	N
Pittosporaceae	<i>Bursaria spinosa</i>	Native Blackthorn	N
Poaceae	<i>Avena fatua</i>	Wild Oats	E
	<i>Cynodon dactylon</i>	Couch Grass	N
	<i>Entolasia stricta</i>	Wiry Panic	N
	<i>Microlaena stipoides</i> var.	Weeping Grass	N
	<i>Paspalum dilatatum</i>	Paspalum	E
	<i>Pennisetum clandestinum</i>	Kikuyu Grass	E
	<i>Setaria gracilis</i>	Pigeon Grass	E
	<i>Banksia serrata</i>	Old-man Banksia	N
	<i>Grevillea robusta</i>	Silky Oak	N, Ni
Sapindaceae	<i>Cardiospermum</i>	Balloon Vine	E
Solanaceae	<i>Solanum pseudocapsicum</i>	Madeira Winter Cherry	E
Theaceae	<i>Camellia</i> sp.	Camellia	E
Verbenaceae	<i>Lantana camara</i>	Lantana	E
	<i>Verbena bonariensis</i>	Purpletop	E
Xanthorrhoeaceae	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	N

Key: N = native, E = exotic, Ni = Non-indigenous to the Sydney region

Appendix C: Assessments of significance

EP&A Act Assessment of Significance (7-Part Test)

The Assessment of Significance (7-part test) is applied to species, populations and ecological communities listed on Schedules 1, 1A and 2 of the TSC Act and Schedules 4, 4A and 5 of the Fisheries Management Act. The assessment sets out seven factors, which when considered, allow proponents to undertake a qualitative analysis of the likely impacts of an action and to determine whether further assessment is required via a Species Impact Statement (SIS). All factors must be considered and an overall conclusion made based on all factors in combination. An SIS is required if, through application of the 7-part test, an action is considered likely to have a significant impact on a threatened species, population or ecological community.

Threatened species, populations and ecological communities which may be directly or indirectly affected by the current proposal include:

Threatened Ecological Communities

- River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

Megachiropteran bats

- *Pteropus poliocephalus* (Grey-headed Flying-fox)

Microchiropteran bats

- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
- *Mormopterus norfolkensis* (Eastern Free-tail Bat)
- *Myotis macropus* (Large-footed Myotis)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)

Large Forest Owls

- *Ninox strenua* (Powerful Owl)

Forest birds

- *Anthochaera phrygia* (Regent Honeyeater)

TEC- River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

River Flat Eucalypt Forest (RFEF) occurs on the river flats of the coastal floodplains of the NSW North Coast, the Sydney Basin, and the South East Corner Bioregions. It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. The composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity, and other disturbance, and may have a substantial component of exotic shrubs, grasses, vines and forbs (OEH 2015).

RFEF was recorded within the study area during field survey.

- a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at the risk of extinction.**

This is not a threatened species.

- b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction**

This is not an endangered population.

- c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- (i) Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

The local occurrence of the EEC within the study area consists of approximately 1 ha of remnant vegetation. The vegetation community was found to be dominated by exotic species in the mid and ground layers. The local occurrence of RFEF extends beyond the patch recorded within the study area to the south, and is one linear connected patch.

The proposed development will not directly impact vegetation consistent with the EEC RFEF, and mitigation measures have been provided to avoid indirect impacts, such as erosion and sediment, on the EEC. Therefore, it is considered unlikely that the proposal would place the local occurrence of RFEF at risk of extinction.

- (ii) Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

The proposed development will not directly impact vegetation consistent with the EEC RFEF, and mitigation measures have been provided to avoid indirect impacts, such as erosion and sediment, on the EEC. Therefore, the proposal is unlikely to substantially modify the composition of the EEC such that its local occurrence is likely to be placed at risk of extinction.

- d) In relation to the habitat of a threatened species, population or ecological community:**

- (i) the extent to which habitat is likely to be remove or modified as a result of the action proposed, and**

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposed development will not directly impact vegetation consistent with the EEC RFEF. Therefore, would not further isolate or fragment any areas of currently connecting RFEF.

(iii) The importance of the habitat to be removed, modified, fragmented or isolated to the long term survival of the species, population or ecological community in the locality,

One patch of RFEF was recorded within the study area. This patch contains moderate to good condition vegetation. The local occurrence of RFEF extends beyond the patch recorded within the study area to the south and is one linear connected patch. The proposed development will not directly impact vegetation consistent with the EEC RFEF, and mitigation measures have been provided to avoid indirect impacts, such as erosion and sediment, on the EEC. Therefore the habitat to be modified is not important to the long-term survival of the ecological community.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared for this community.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

There is currently no recovery plan or threat abatement plan for RFEF although priority actions have been identified. The proposal would not conflict with these actions.

g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

A number of Key Threatening Processes (KTP) are relevant to this proposal with respect to RFEF. These include:

- clearing of native vegetation
- invasion and establishment of exotic vines and scramblers
- invasion, establishment and spread of *Lantana camara*
- invasion of native plant communities by exotic perennial grasses
- removal of dead wood and dead trees.

The proposal would not increase these KTP operating on this EEC.

Conclusion

The proposal would not result in the removal of RFEF. Therefore, the proposal will not significantly impact the community. Consequently, a Species Impact Statement (SIS) is not required for the proposal with respect to this EEC.

MEGACHIROPTERAN BATS

Pteropus poliocephalus (Grey-headed Flying-fox)

GHFF is listed as a vulnerable species under Schedule 2 of the TSC Act. It is generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. It occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops, and has been recorded as travelling long distances on feeding forays (up to 50 km). Fruits and flowering plants of a wide variety of species are the main food source (OEH 2016).

The species roosts in large 'camps' of up to 200,000 individuals. Camps are usually formed within 20 km of a regular food source and are generally close to water and along gullies. However, the species has been known to form camps in urban areas (OEH 2016).

Key threats to the species are loss of roosting and foraging sites, electrocution on powerlines, entanglement in netting and on barbed-wire, heat stress, and conflict with humans (OEH 2016).

A known GHFF maternity camp is located directly adjacent to the northern boundary of the Site. Numbers in the camp fluctuate, but the camp has been growing in recent years with counts as high as 20,000 individuals recorded within River-flat Eucalypt Forest along Parramatta River. Site fidelity to camps is high with the same camp used for consecutive decades (OEH 2016b). The vegetation within the study area provides important foraging habitat especially for lactating mothers and supplementary roosting habitat for some individuals.

The acoustic assessment (AECOM, 2016) for the project measured existing background noise levels, and likely noise levels during construction and events, at various sensitive receivers. The recorded noise levels at the nearest receiver (1 Grose Street, Parramatta), which was approximately 200 m from the existing stadium.

The following direct impacts on threatened fauna *may* occur as a result of Proposal:

- Construction and demolition noise levels of between 50 - 64 dB(A)
- Periodic elevated noise levels during events of between 60 - 64 dB(A)
- Elevated and sustained light levels
- Increased stress (as evidenced by a greater parasite loads, lower body condition, greater number of vocalisations, diurnal fly outs / emergence, abandonment of habitat / GHFF camp) as a result of disturbance to GHFF during construction and events.

a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at the risk of extinction.

Impacts likely to have an adverse effect on the life cycle of GHFF would include impacts which resulted in the loss of significant areas of foraging habitat, increases in the mortality rate, and increases in conflicts with humans.

The proposal will result in the removal of 1.60 ha of planted native / exotic vegetation, including *Melaleuca quinquinervia* (Broad-leaved Paperbark), *Eucalyptus citriodora* (Lemon Scented Gum), *Eucalyptus microcorys* (Tallowwood), *Eucalyptus robusta* (Swamp Mahogany), *Eucalyptus nicholii* (New England Peppermint), *Ficus microphylla* (Moreton Bay Fig), representing potential foraging habitat for the GHFF. No roosting habitat would be impacted.

The species is highly mobile and has a large home range. GHFF can travel long distances on feeding forays (up to 50 km). The study area is adjacent to approximately 2 ha of good quality River-flat Eucalypt Forest to the south along Parramatta River, and several large fig trees within Parramatta Park providing high quality foraging habitat for the GHFF within the locality. Therefore the species is considered likely to use the vegetation proposed for removal on an occasional basis and would not be dependent on the foraging resources within the Site.

Noise is used to discourage GHFF from foraging and roosting in certain areas (NSW Scientific Committee 2011). An increase in background noise levels during construction and on a more frequent basis during events, has potential to cause stress to GHFF within the Parramatta River camp. The greatest risk of impact occurs from sudden loud noises at sensitive times for fauna such as during emergence and return to roosts at dusk and dawn and during breeding and lactation (Oct – January for GHFF).

The Parramatta River GHFF camp is located approximately 150 m from the existing stadium. The acoustic assessment (AECOM 2016) for the project measured existing background noise levels, and likely noise levels during construction and events, at various sensitive receivers. The recorded noise levels at the nearest receiver (1 Grose Street, Parramatta), which was approximately 200 m from the existing stadium. The assessment predicted construction and demolition noise levels of between 52 - 57 dB(A), and periodic elevated noise levels during events of between 52 - 73 dB(A). Noise levels predicted for large sporting and music events held at the Proposal are in the order of magnitude higher than construction noise.

Existing noise levels during events at the stadium have not been measured as part of this report due to time constraints. However, it is understood that numerous sporting and entertainment events have been held at the stadium and also within Parramatta Park, with no obvious detrimental effect on the GHFF camp. The predicted noise levels for construction and events are assumed to be similar to existing event noise levels, and are not anticipated to increase and disturb the GHFF camp. Mitigation measures will also be implemented to minimise excessive noise particularly around dusk and dawn when fauna are emerging to feed or returning to rest and during breeding season. Noise levels during events will also be managed under the existing Parramatta Stadium Noise Management Plan (PCCD 2008).

The frequency of events is predicted to double, from 22-23 games per year to 42-43 games per year, which may have an impact on the GHFF camp. However, to date the size of the GHFF camp has remained relatively consistent within normal annual fluctuations in the camp.

It is unlikely that the proposal would result in increases in conflicts with humans given that the camp will remain in situ, and considerations of risk of disease will be included in all OH&S Safe Work Method Statements for all event related and/or recreational activities undertaken within proximity to the camp. There is potential for the camp to shift south over time into the RFEF located along the western boundary of the Site, and has the potential to increase the risk of future conflict between people and the camp (e.g. noise, odour, faecal drop). Management actions to deter GHFF from roosting in this area include the use of deterrents, such as olfactory signals and physical obstruction. The periodic low level disturbance created by events at the Proposal may also assist in deterring GHFF from roosting in this area. In addition, recommendations have been provided to avoid landscape plantings that may encourage the increased use of GHFF within the Proposal.

Therefore, the proposed action is unlikely to have a significant impact on the life cycle of the GHFF such that a viable local population of the species would be placed at risk of extinction.

- b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.**

Not applicable. The GHFF is not an endangered population.

- c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Not applicable. The GHFF is not an endangered ecological community.

- d) in relation to the habitat of a threatened species, population or ecological community:**

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**

The proposal will result in the removal of 1.60 ha of planted native / exotic vegetation, including *Melaleuca quinquinervia* (Broad-leaved Paperbark), *Eucalyptus citriodora* (Lemon Scented Gum), *Eucalyptus microcorys* (Tallowwood), *Eucalyptus robusta* (Swamp Mahogany), *Eucalyptus nicholii* (New England Peppermint), *Ficus microphylla* (Moreton Bay Fig), representing potential foraging habitat for the GHFF. No roosting habitat would be impacted.

The Parramatta GHFF camp is located directly adjacent to the northern Site boundary. However, the camp will not be directly impacted. The species is likely to use the vegetation within the Site on an occasional basis and would not be dependent on the foraging resources proposed for removal.

- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The proposed works are unlikely to fragment or isolate areas of potential foraging habitat. The area of foraging habitat that would be impacted for the proposed development is already fragmented and surrounded by similar habitat and would not be fragmented into two or more patches. Removal of sparse patches of planted native/exotic vegetation would not fragment the habitat of such wide-ranging and mobile species. No roosting habitat will be impacted. Therefore, the proposal will not isolate any currently connecting areas of potential habitat.

- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long term survival of the species, population or ecological community in the locality,**

The GHFF is highly mobile in nature and the vegetation to be removed on site (i.e. planted native/exotic vegetation) does not represent primary roosting or foraging habitat. In addition, extensive areas of foraging habitat are present adjacent to the study area in Parramatta Park and the LGA. Therefore, the habitat to be removed is unlikely to be important to the long-term survival of this species.

e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No critical habitat has been declared for the GHFF.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

A draft National Recovery Plan exists for GHFF. The proposal will not conflict with any of the objectives within the recovery plan.

g) the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes of relevance to the GHFF include the clearing of native vegetation. The proposal would result in the removal of 1.60 ha of planted native / exotic vegetation, and would result in a small disturbance to an area of marginal foraging habitat. No roosting habitat will be impacted.

As discussed above this disturbance is considered minor due to the nature of the disturbance, the size of this habitat relative to the large home ranges of this species, and the areas of habitat in the surrounding landscape available to these highly mobile species.

Conclusion

The proposal is unlikely to constitute a significant impact on GHFF given that:

- Area of potential foraging habitat to be removed is very small
- The proposal will not directly impact on the Parramatta GHFF camp
- Mitigation measures will be implemented to minimise excessive noise particularly around dusk and dawn when fauna are emerging to feed or returning to rest and during breeding season.
- The species is highly mobile and forages widely.
- The proposal would not isolate or fragment habitat for this species

Consequently, a SIS is not required for the proposal with respect to this species.

MICROCHIROPTERAN BATS

The following four microchiropteran bat species are regarded as being known or having potential to occur within the study area and have been grouped together for this Assessment of Significance. This is because they have certain similarities in their foraging and/or roosting behaviours, habitat requirements and predicted impacts are considered to be the same or similar among these species. Where obvious differences are apparent between each species, they are discussed separately.

Miniopterus schreibersii oceanensis (Eastern Bentwing-bat)

Eastern Bentwing-bat is listed as a vulnerable species under the TSC Act. This species occupies a range of forested environments (including wet and dry sclerophyll forests), along the coastal portion of eastern Australia, and through the Northern Territory and Kimberley area (subject to subdivision of this species) (OEH 2016b). It forages from just above the tree canopy, to many times the canopy height in forested areas, and will utilise open areas where it is known to forage at lower levels. Though individuals often use numerous roosts, it congregates in large numbers at a small number of nursery caves to breed and hibernate. Although roosting primarily occurs in caves, it has also been recorded in mines, culverts, stormwater channels, buildings, and occasionally tree-hollows (OEH 2016b).

Eastern Bentwing-bat was not recorded within the study area during targeted surveys. However, there are known records of the species within a 5 km radius of the study area (OEH 2016a). There is potential for the study area to be used occasionally by this species for foraging only, although it is unlikely that individuals rely upon resources in the study area.

Mormopterus norfolkensis (Eastern Free-tail Bat)

Eastern Free-tail Bat is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. The species prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings (OEH 2016b).

Eastern Free-tail Bat was not recorded within the study area during targeted surveys. However, there are known records of the species within a 5 km radius of the study area (OEH 2016a). Potential foraging and roosting habitat for this species is present within the study area.

Myotis macropus (Southern Myotis)

Southern Myotis is listed as vulnerable under Schedule 2 of the TSC Act. The species will occupy most habitat types such as mangroves, paperbark swamps, riverine monsoon forest, rainforest, wet and dry sclerophyll forest, open woodland and River Red Gum woodland, as long as they are close to water. While roosting is most commonly associated with caves, this species has been observed to roost in tree hollows, amongst vegetation, in clumps of Pandanus, under bridges, in mines, tunnels and stormwater drains. However the species apparently has specific breeding requirements, and only a small percentage of available caves, mines, tunnels and culverts are used (OEH 2016b).

Southern Myotis was not recorded within the study area during targeted surveys. However, there are known records of the species within a 5 km radius of the study area (OEH 2016a). Potential foraging and roosting habitat for this species is present within the study area.

Scoteanax rueppellii (Greater Broad-nosed Bat)

The Greater Broad-nosed Bat is listed as vulnerable under Schedule 2 of the TSC Act. The Greater Broad-nosed Bat utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings (OEH 2014b).

Greater Broad-nosed Bat was not recorded within the study area during targeted surveys. However, there are known records of the species within a 5 km radius of the study area (OEH 2016a). Potential foraging and roosting habitat for this species is present within the study area.

a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at the risk of extinction.

Impacts likely to have an adverse effect on the life cycle of Eastern Bentwing-bat, Eastern Free-tail Bat, Southern Myotis and Greater Broad-nosed Bat include impacts that result in the loss of significant areas of foraging habitat, the loss of roosting habitat (hollow-bearing trees and buildings), and use of pesticides in or adjacent to foraging areas.

The proposal will result in the removal of 1.60 ha of planted native / exotic vegetation, including *Melaleuca quinquinervia* (Broad-leaved Paperbark), *Eucalyptus citriodora* (Lemon Scented Gum), *Eucalyptus microcorys* (Tallowwood), *Eucalyptus robusta* (Swamp Mahogany), *Eucalyptus nicholii* (New England Peppermint), *Ficus microphylla* (Moreton Bay Fig), representing potential foraging habitat for these microchiropteran bats. No roosting habitat would be impacted.

The removal of potential foraging habitat is unlikely to have a significant impact on life cycle of Eastern Bentwing-bat, Eastern Free-tail Bat, Southern Myotis and Greater Broad-nosed Bat such that a viable local population of these species would be placed at risk of extinction. The study area is adjacent to approximately 2 ha of good quality River-flat Eucalypt Forest to the south along Parramatta River, and several large fig trees within Parramatta Park, providing high quality foraging habitat for these species within the locality.

The amount of potential foraging habitat that would be lost is small relative to the amount of potential habitat in the locality. There is foraging habitat only within the Site. No roosting or breeding habitat would be impacted. There is higher quality habitat is available in the surrounding landscape, therefore, these species are considered likely to use the study area only on an occasional basis and would not be dependent on the foraging resources within the study area.

Therefore, the proposed development is unlikely to have an adverse effect on the life cycle of Eastern Bentwing-bat, Eastern Free-tail Bat, Southern Myotis and Greater Broad-nosed Bat such that a viable local population of these species is likely to be placed at the risk of extinction.

b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Eastern Bentwing-bat, Eastern Free-tail Bat, Southern Myotis and Greater Broad-nosed Bat are not an endangered population.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Eastern Bentwing-bat, Eastern Free-tail Bat, Southern Myotis and Greater Broad-nosed Bat include are not an endangered ecological community.

d) in relation to the habitat of a threatened species, population or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**

The proposal will result in the removal of 1.60 ha of planted native / exotic vegetation, including *Melaleuca quinquinervia* (Broad-leaved Paperbark), *Eucalyptus citriodora* (Lemon Scented Gum), *Eucalyptus microcorys* (Tallowwood), *Eucalyptus robusta* (Swamp Mahogany), *Eucalyptus nicholii* (New England Peppermint), *Ficus microphylla* (Moreton Bay Fig), representing potential foraging habitat for these microchiropteran bats. No roosting habitat would be impacted. These species are likely to use the study area on an occasional basis and would not be dependent on the foraging resources within the study area.

- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The proposed works are unlikely to fragment or isolate areas of potential foraging habitat. The area of habitat that would be impacted for the proposed development is already fragmented and surrounded by similar habitat and would not be fragmented into two or more patches. Removal of sparse patches of planted native / exotic vegetation would not fragment the habitat of such wide-ranging and mobile species. The proposal will not isolate any currently connecting areas of potential habitat.

- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long term survival of the species, population or ecological community in the locality,**

These species are highly mobile and the vegetation to be removed does not represent primary roosting habitat. There are extensive areas of foraging habitat adjacent to the study area and within the locality. These species are unlikely to solely rely on this foraging habitat for survival. Therefore, the habitat to be removed is unlikely to be important to the long-term survival of these species.

e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No critical habitat has been declared for Eastern Bentwing-bat, Eastern Free-tail Bat, Southern Myotis and Greater Broad-nosed Bat.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

No recovery plan or threat abatement plan of relevance to Eastern Bentwing-bat, Eastern Free-tail Bat, Southern Myotis and Greater Broad-nosed Bat has been prepared.

g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes of relevance to the Eastern Bentwing-bat, Eastern Free-tail Bat, Southern Myotis and Greater Broad-nosed Bat, include the clearing of native vegetation.

The proposal would result in the clearing of planted native/exotic vegetation only, therefore, the proposed works does not constitute part of a key threatening process.

Conclusion

The proposal is unlikely to constitute a significant impact on Eastern Bentwing-bat, Eastern Free-tail Bat, Southern Myotis and Greater Broad-nosed Bat given that:

- Area of vegetation to be removed consists of planted native/exotic vegetation and is small (less than 1.60 ha).
- No roosting/breeding habitat will be impacted.
- These species are highly mobile and forages widely.
- The proposal would not fragment or isolate habitat for these species.

Consequently, a SIS is not required for the proposal with respect to these species.

LARGE FOREST OWLS

Ninox strenua (Powerful Owl)

The *Ninox strenua* (Powerful Owl) is listed as a vulnerable species under Schedule 2 of the TSC Act. It is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria and occurs at low densities (OEH 2014b). In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered, mostly historical records on the western slopes and plains (OEH 2014b).

Powerful Owl occurs primarily in densely vegetated gullies of open and tall open forest, but they are also found in a wider range of habitats, including forests and woodlands within the metropolitan regions of cities (Cooke *et al.* 2002). However, optimal habitat requires large tracts of forest or woodland habitat, including a tall shrub layer and abundant hollows supporting high densities of arboreal marsupial prey species (OEH 2014b).

This species roosts in dense mid-canopy trees (such as Turpentines, She-oaks and rainforest trees), or tall shrubs in sheltered gullies, typically on wide creek flats and at the heads of minor drainage lines (OEH 2014b). Nesting occurs from late autumn to mid winter in large hollows (greater than 45 cm wide and greater than 100 cm deep) in eucalypts in unlogged, un-burnt gullies and lower slopes within 100 m of streams or minor drainage lines (OEH 2014b). Nest trees are typically emergent, and are often the largest and oldest in a stand (Debus & Chafer 1994). Powerful Owl are faithful to traditional nesting hollows but can also use other hollows within the nesting gully.

Pairs of birds occupy large home ranges (300-1500 ha; OEH 2014b), utilising various portions of this area at different times, depending on the local abundance of arboreal mammals as a food source (Debus & Chafer 1994). Powerful Owl prey particularly on the Greater Glider and Ringtail Possum although the relative importance of prey items appears to vary regionally, with other prey such as Sugar Gliders, Brushtail Possums, Grey-headed Flying-foxes, insects and birds also used (Debus & Chafer 1994; OEH 2014b).

This species is threatened by a number of processes including loss and fragmentation of suitable forest and woodland habitat from land clearing for residential and agricultural development, which also affects the populations of arboreal prey species (OEH 2014b). Other threats include loss of hollow-bearing trees suitable for nesting, disturbance around nest sites (particularly during pre-laying, laying and downy chick stages), high frequency hazard reduction burning (affecting prey availability), secondary poisoning, road kills, and predation of fledglings by foxes, dogs and cats (OEH 2014b).

The study area provides suitable foraging habitat, including reliable prey items (i.e. Grey-headed Flying-fox) known within the Site.

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Factors likely to have an adverse effect on the life cycle of the Powerful Owl include a substantial loss and/or fragmentation of foraging habitat and loss of suitable nesting and roosting habitat.

The vegetation within the study area is highly fragmented. In the broader locality, Parramatta Park contains scattered remnant trees and fringing vegetation is located along the Parramatta River providing a stepping-stone habitat to adjacent known habitats such as Lake Parramatta. The Powerful Owl may traverse through open areas; however, these areas are not considered preferred foraging habitat. The study area provides supplementary foraging habitat for the Powerful Owl. It is unlikely that the study area supports habitat resources for a local viable population. Suitable breeding habitat (i.e. large hollow-bearing trees) was not recorded within the study area. Given that no potential breeding habitat or roosting habitat for the Powerful Owl will be impacted under the proposal it is unlikely that a local population of the Powerful Owl will be placed at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Not applicable. The Powerful Owl is not an endangered population.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

- i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
- ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable. The Powerful Owl is not an endangered ecological community.

(d) in relation to the habitat of a threatened species, population or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The proposal will result in the removal of 1.60 ha of planted native / exotic vegetation, representing potential foraging habitat for the Powerful Owl. No roosting habitat would be impacted. The GHFF camp is expected to remain in situ with no permanent detrimental effects to the population as a result of proposed events. Nocturnal fauna such as possums which constitute other prey items for Powerful Owls are unlikely to be affected by proposal. Possums within the urban environment are adapted to the noises and artificial lighting associated with human occupation and will continue to inhabit the Park.

ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The Powerful Owl occupies a large home range (300-1500 ha) and is a highly mobile species. It is likely that it forages occasionally within the study area, or may use it as a stepping stone to more preferred foraging areas. This species would avoid the Site on evenings when construction occurs or when events are being held, as it would have difficulty hunting for prey with the levels of artificial light, noise and disturbance associated with construction/events. Avoidance of the Site will not cause an area of habitat to become fragmented or isolated because Powerful Owls are capable of travelling many kilometres each night in search of food. The construction and proposed events are temporary minor disturbances and will occur periodically throughout the year. The study area would be available for use by Powerful Owls for most of the year.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality

No breeding or roosting habitat (i.e. large tree hollows) was located within the study area for this species. It is possible that the Powerful Owl may utilise the study area as foraging habitat as the site contains a high proportion of its preferred prey items (GHFF and possums), or as a stepping stone to other areas of more suitable habitat such as Lake Parramatta.

Given that no direct impacts on breeding or roosting habitat will occur under the proposed works, and very minor temporary impact to prey items may occur, the habitat affected by the proposal is not considered important to the long-term survival of the species in the locality.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat.

No critical habitat has been declared by the OEH for the Powerful Owl.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

A recovery plan currently exists for the Large Forest Owls in NSW, which includes the Powerful Owl. The overall objective of this plan is to ensure that a viable population of the Powerful Owl continues in the wild in NSW in each region where it presently occurs (DEC 2006).

Objective 4 of the recovery plan aims to minimise the impacts on large forest owls and their habitat by adequately assessing impacts during the planning and assessment process (DEC 2006).

Objective 5 relates to the minimisation of habitat loss and fragmentation by protection and managing significant habitat, including protection of nesting sites (DEC 2006).

The study area (including the GHFF camp) represents potential foraging habitat for the Powerful Owl. Mitigation measures have been included to reduce impacts upon prey species and if these are enacted, the study area will remain a potential foraging site for this species.

No relevant threat abatement plans have been prepared for this species.

(g) The action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

There are no Key Threatening Processes (KTP) relevant to this proposal with respect to the Powerful Owl.

Conclusion

The proposal is unlikely to impose a significant effect on the Powerful Owl given that:

- this species is highly mobile and forages widely and free movement of this species will not be affected
- the proposed construction and events would constitute a minor temporary disturbance to an area of potential foraging habitat that is likely to be used on an occasional basis by this species
- breeding or nesting habitat for this species will not be impacted

Consequently, a Species Impact Statement is not required for the proposal with respect to this species.

Appendix D: EPBC Act Significance Impact Assessment

The EPBC Act Administrative Guidelines on Significance set out ‘Significant Impact Criteria’ that are to be used to assist in determining whether a proposed action is likely to have a significant impact on matters of national environmental significance. Matters listed under the EPBC Act as being of national environmental significance include:

- Listed threatened species and ecological communities
- Listed migratory species
- Wetlands of International Importance
- The Commonwealth marine environment
- World heritage properties
- National heritage places
- Nuclear actions

Specific ‘Significant Impact Criteria’ are provided for each matter of national environmental significance except for threatened species and ecological communities in which case separate criteria are provided for species listed as critically endangered, endangered and vulnerable under the EPBC Act.

Pteropus poliocephalus (Grey-headed Flying-fox)

Grey-headed Flying-fox (GHFF) is listed as a vulnerable threatened species under the EPBC Act.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

Criterion a: lead to a long-term decrease in the size of an important population of a species

The Parramatta River GHFF camp is located directly adjacent to the northern Site boundary. The proposal will result in the removal of 1.60 ha of planted native / exotic vegetation, including *Melaleuca quinquinervia* (Broad-leaved Paperbark), *Eucalyptus citriodora* (Lemon Scented Gum), *Eucalyptus microcorys* (Tallowwood), *Eucalyptus robusta* (Swamp Mahogany), *Eucalyptus nicholii* (New England Peppermint), *Ficus microphylla* (Moreton Bay Fig), representing potential foraging habitat for the GHFF. The GHFF camp will be left in situ and no roosting habitat would be impacted.

The species is highly mobile and has a large home range. GHFF can travel long distances on feeding forays (up to 50 km). The study area is adjacent to approximately 2 ha of good quality River-flat Eucalypt Forest to the south along Parramatta River, and several large fig trees within Parramatta Park providing high quality foraging habitat for the GHFF within the locality.

There is higher quality habitat available in the surrounding landscape, therefore, the species is considered likely to use the study area on an occasional basis and would not be dependent on the foraging resources within the study area.

Noise is used to discourage GHFF from foraging and roosting in certain areas (NSW Scientific Committee 2011). An increase in background noise levels during construction and on a more frequent basis during events, has potential to cause stress to GHFF within the Parramatta camp. The greatest risk of impact occurs from sudden loud noises at sensitive times for fauna such as during emergence and return to roosts at dusk and dawn and during breeding and lactation (Oct – January for GHFF).

The acoustic assessment (AECOM 2016) for the project measured existing background noise levels, and likely noise levels during construction and events, at various sensitive receivers. The recorded noise levels at the nearest receiver (1 Fleet Street, North Parramatta), which was approximately 180 m from the existing stadium. The assessment predicted construction and demolition noise levels of between 52 - 56 dB(A), and periodic elevated noise levels during events of between 52 - 73 dB(A).

The Parramatta River GHFF camp is located approximately 150 m from the existing stadium. Noise levels predicted for large sporting events held at the proposed Western Sydney Stadium complex are in the order of magnitude higher than construction noise.

Existing noise levels during events at the stadium, have not been measured as part of this report due to time constraints. However, it is understood that numerous sporting and entertainment events have been held at the stadium and also within Parramatta Park, with no obvious detrimental effect on the GHFF camp. The predicted noise levels for construction and events are assumed to be similar to existing event noise levels, and are not anticipated to increase and disturb the GHFF camp. Mitigation measures will also be implemented to minimise excessive noise particularly around dusk and dawn when fauna are emerging to feed or returning to rest and during breeding season. Noise levels during events will also be managed under the existing Parramatta Stadium Noise Management Plan (PCCD 2008).

The frequency of events is predicted to double, from 22-23 games per year to 42-43 games per year, which may have an impact on the GHFF camp. Although, to date the size of the GHFF camp has remained relatively consistent within normal annual fluctuations in the camp, there is a possibility for the proposed increase in frequency of events to cause increased stress levels within the GHFF's at the Parramatta River camp.

Therefore, it is considered that the proposal may lead to a long-term decrease in the size of an important population of a species.

Criterion b: reduce the area of occupancy of an important population

There is a single interbreeding population of GHFF in Australia, and as such, any colony or individual of the species is an important population of the species. There is a known camp located on the Parramatta River directly adjacent to the northern Site boundary. The proposal will result in the removal of 1.60 ha of planted native / exotic vegetation, representing potential foraging habitat for the GHFF. The GHFF camp will be left in situ and no roosting habitat would be impacted. There is extensive areas of higher quality foraging habitat adjacent to the study area in Parramatta Park and the LGA., therefore, the species is considered likely to use the vegetation proposed for removal on an occasional basis and would not be dependent on the foraging resources within the Site.

Criterion c: fragment an existing important population into two or more populations

There is a single interbreeding population of GHFF in Australia, and as such, any colony or individual of the species is part of an important population of the species. The proposed works are unlikely to fragment or isolate areas of potential foraging habitat. The area of foraging habitat that would be impacted for the proposed development is already fragmented and surrounded by similar habitat and would not be fragmented into two or more patches. Removal of sparse patches of planted native/exotic vegetation would not fragment the habitat of such wide-ranging and mobile species. No roosting habitat will be impacted. Therefore, the proposal will not fragment an existing important population into two or more populations.

Criterion d: adversely affect habitat critical to the survival of a species

Roosting habitat critical to the survival of the GHFF is roosting habitat that:

- is used as a camp either continuously or seasonally in > 50% of years
- has been used as a camp at least once in 10 years (beginning in 1995) and is known to have contained > 10,000 individuals, unless such habitat has been used only as a temporary refuge, and the use has been of limited duration (i.e. in the order of days rather than weeks or months)
- has been used as a camp at least once in 10 years (beginning in 1995) and is known to have contained > 2,500 individuals.

Foraging habitat within a 50 kilometre radius of a roost site with greater than 30,000 individuals is foraging habitat critical to the survival of this species.

There is a known camp located on the Parramatta River directly adjacent to the northern Site boundary. The Parramatta River camp is a permanent GHFF camp site located along the banks of the Parramatta River, with 80% of the camp on the eastern bank of the Parramatta River (core camp) and the remaining on Parramatta Park land. The core camp currently contains between 10,000 and 16,000 individuals. The satellite camp receives a limited but progressively increasing number of GHFF, ranging from between 300 to 1,200 individuals (ELA 2008).

The proposed works will not directly impact the camp, although will result in the removal of 1.60 ha of planted native / exotic vegetation, representing potential foraging habitat for the GHFF.

There is extensive areas of higher quality foraging habitat adjacent to the study area in Parramatta Park and the LGA, therefore, the species is considered likely to use the vegetation proposed for removal on an occasional basis and would not be dependent on the foraging resources within the Site.

Therefore, the proposed works is not considered to have an adverse impact of habitat critical to the survival of the species.

Criterion e: disrupt the breeding cycle of an important population

There is a known camp located on the Parramatta River directly adjacent to the northern Site boundary. Noise is used to discourage GHFF from foraging and roosting in certain areas (NSW Scientific Committee 2011). An increase in background noise levels during construction and on a more frequent basis during events, has potential to cause stress to GHFF within the Parramatta camp. The greatest risk of impact occurs from sudden loud noises at sensitive times for fauna such as during emergence and return to roosts at dusk and dawn and during

breeding and lactation (October – January for GHFF). GHFF females have been known to abort or abandon dependent young when stressed.

Due to the proximity of the study area to the Parramatta GHFF camp, mitigation measures will also be implemented to minimise excessive noise particularly around dusk and dawn when fauna are emerging to feed or returning to rest and during breeding season. Noise levels during events will also be managed under the existing Parramatta Stadium Noise Management Plan (PCCD 2008). Therefore, the proposed works will not disrupt the breeding cycle of an important population.

Criterion f: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

The proposal will result in the removal of 1.60 ha of planted native / exotic vegetation, representing marginal foraging habitat for the GHFF. There is extensive areas of higher quality foraging habitat adjacent to the study area in Parramatta Park and the LGA., therefore, the species is considered likely to use the vegetation proposed for removal on an occasional basis and would not be dependent on the foraging resources within the Site. In addition, the GHFF camp will be left in situ and no roosting habitat would be impacted.

The GHFF is highly mobile in nature and the vegetation to be removed on site does not represent primary roosting or foraging habitat. Therefore, the proposed works will not modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Criterion g: Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;

The proposal would not result in invasive species, such as weeds, that would be harmful to GHFF.

Criterion h: Introduce disease that may cause the species to decline;

GHFF are reservoirs for the Australian Bat Lyssavirus (ABL) which can cause clinical disease and mortality in GHFF (DECCW 2009). It has been suggested that elevated stress levels may play a role in the level of ABL infection and expression in individual Flying-foxes but there is no clear evidence for this at present.

Stress from disturbance is a significant issue when it is ongoing, occurs daily or more often than a species can recover from. Elevated and sustained stress may also be an issue during sensitive times in the lifecycle such as breeding or lactation. Although, to date the GHFF camp has experienced similar levels of disturbance from events held at the current stadium, there is a possibility for the proposed increase in frequency of events to cause increased stress levels within the GHFF's at the Parramatta River camp.

Therefore, it is considered that the proposal may introduce disease that may cause the species to decline.

Criterion i: Interfere substantially with the recovery of the species;

A Draft National Recovery Plan for the Grey-headed Flying-fox was developed in 2009. A Flying-fox Camp Management Policy was recently produced in 2015 by OEH. The proposed

works do not substantially interfere with the objectives stated in either document or impede the recovery of this species.

Conclusion

Based on the above assessment it is concluded that the proposed works may have a significant impact on a population of GHFF. A referral to the Commonwealth Department of the Environment for assessment and approval by the Environment Minister is recommended.

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