ecosure

Grey-headed Flying-fox Construction Monitoring Program

Parramatta Light Rail - Stage 1

June 2022

TRANSPORT FOR NSW

ecology / vegetation / wildlife / aquatic ecology / GIS

Glossary, acronyms and abbreviations

ABLV	Australian Bat Lyssavirus
BC Act	New South Wales *Biodiversity Conservation Act 2016*
BFF	Black flying-fox
CBD	Central Business District
CoA	Conditions of Approval
CSSI	Critical State Significant Infrastructure
dBA	A-weighted decibels
DoEE	Commonwealth Department of Environment and Energy
DPE	New South Wales Department of Planning and Environment
DPE ESS	DPE, Environment, Energy and Science (EES) section, formerly the Office of Environment and Heritage (OEH)
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EPBC Act	Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*
EWMS	Environmental Work Method Statement
flying-fox expert	an assessor independent of the construction proponent (including Ecosure-endorsed TfNSW personnel) knowledgeable about flying-fox behaviour, stress indicators and able to identify different stages of the flying-fox reproductive cycle
GHFF	Grey-headed flying-fox
HeV	Hendra virus
LRV	Light Rail Vehicles
MNES	Matters of National Environmental Significance
NFFMP	National Flying-fox Monitoring Program
NSW	New South Wales
OEH	Former New South Wales Office of Environment and Heritage
PLR	Parramatta Light Rail
SaM	Stabling and Maintenance
SOM	Supply Operate Maintain
TfNSW	Transport for New South Wales
the Project	Parramatta Light Rail, Stage 1
WIRES	Wildlife Information, Rescue and Education Service

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1 Introduction

1.1 Purpose

Transport for New South Wales (TfNSW) requires a suitably qualified and experienced fauna ecologist to monitor the Parramatta Park grey-headed flying-fox (*Pteropus poliocephalus*) (GHFF) camp (the camp) and other nearby "control" camps during construction of the Parramatta Light Rail – Stage 1 (the project). Baseline behaviour has been established as part of this document through the use of historic data and project specific monitoring activities (refer to Section 5 for more detail).

The GHFF is listed as vulnerable under both the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the New South Wales (NSW) *Biodiversity Conservation Act 2016* (BC Act). Black flying-foxes (*Pteropus alecto*) (BFF), a protected but not listed threatened species, also occur at the Parramatta Park camp.

This document is the Grey-headed Flying-fox Monitoring Program, required in accordance with Condition C9 of the Infrastructure Approval (CSSI-8285) and identifies the monitoring requirements and mitigation measures for application during construction of the project.

1.2 Project overview

1.2.1 PLR project description

Parramatta Light Rail - Stage 1 (PLR) connects Westmead to Carlingford via Parramatta Central Business District (CBD) and Camellia. PLR is one of the NSW Government's major infrastructure projects being delivered to serve a growing Sydney and is anticipated to be operational in 2023.

In summary, the key features of PLR include:

- A new dual track light rail network of approximately twelve (12) kilometres in length, including approximately seven (7) kilometres within the existing road corridor and approximately five (5) kilometres within the existing Carlingford Line and Sandown Line, replacing current heavy rail services.
- Sixteen (16) stop precincts that are fully accessible and integrated into the urban environment including a terminus Stop at each end of Westmead and Carlingford.
- High frequency 'turn-up-and-go' services operating seven days a week from 5:00am to 1:00am. Weekday services will operate approximately every 7.5 minutes in the peak period between 7:00am and 7:00pm.
- Modern and comfortable air-conditioned Light Rail Vehicles (LRV), nominally 45 metres long and driver-operated, carrying up to 300 passengers.
- Intermodal interchanges with existing public transport services at Westmead terminus, Parramatta CBD, and the Carlingford terminus.

- Creation of two light rail and pedestrian zones (no general vehicle access) within the Parramatta CBD along Church Street (generally between Market Street and Macquarie Street) and along Macquarie Street (generally between Horwood Place and Smith Street).
- A Stabling and Maintenance Facility located in Camellia for LRVs to be stabled, cleaned and maintained.
- New bridge structures along the alignment including over James Ruse Drive and Clay Cliff Creek, Parramatta River (near the Cumberland Hospital), Kissing Point Road and Vineyard Creek, Rydalmere.
- Alterations to the existing road network including line marking, additional traffic lanes and turning lanes, new traffic signals, and changes to traffic flows.
- Relocation and protection of existing utilities.
- Public domain and urban design works along the corridor and at Stop precincts.
- Closure of the heavy rail line between Carlingford, Camellia and Clyde.
- Active transport corridors and additional urban design features along sections of the alignment and within Stop precincts.
- Integration with the Opal Electronic Ticketing System.
- Real time information in LRVs and at Stops via visual displays and audio.

An overview of the PLR Stage 1 route is shown in Figure 1.

Figure 1 PLR Stage 1 Route Overview

1.2.2 Statutory context

PLR is designated as Critical State Significant Infrastructure (CSSI) and was subject to an environmental impact assessment under the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Parramatta Light Rail Stage 1 Westmead to Carlingford via Parramatta CBD and Camellia Environmental Impact Statement (the EIS), as amended by the Parramatta Light Rail (Stage 1) Westmead to Carlingford via Parramatta CBD and Camellia Submissions Report (incorporating Preferred Infrastructure Report) (February 2018) (the SPIR), was approved by the Minister for Planning on 29 May 2018.

The planning approval (Infrastructure approval SSI-8285 and subsequent modifications) and related environmental assessment documents are located at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8285

1.3 Scope of works

PLR will take place across three stages (five different packages). These are:

- Enabling Stage (Stage 1)
  - Package 1: Road Enabling Works Contract: for design and construction of specific local road network improvements and adjustments to maintain performance of the local road network during the light rail construction period and during light rail operations. These works focus in particular on increasing the capacity of O'Connell Street and George Street to accommodate the loss of capacity on Church Street and Macquarie Street. The Road Enabling works project boundary is predominately outside the 300 m GHFF buffer area (Figures 2 and 3). These works are scheduled to being late 2018 / early 2019.
  - Package 2: PLR Westmead Precinct Works: this includes the following three activities that would be managed by NSW Health Infrastructure on behalf of Transport for NSW. These activities are required before Stage 2 commences in these particular areas.
    - Package 2A: Hawkesbury Road Widening Contract: for design and construction of local road network prior to the light rail construction period. These works are for the widening of the north-western side of Hawkesbury Road including piling to accommodate for future NSW Health development, within Westmead Hospital land. These works are located about 700 m from the GHFF camp.
    - Package 2B: Cumberland Hospital (East Campus) Demolition: This is at Cumberland Hospital (East Campus) and includes the demolition of five buildings.
    - Package 2C: Cumberland Hospital (West Campus) Demolition: This is at Cumberland Hospital (West Campus) and includes the demolition of six buildings.

  - Package 3: Early Works Portion 2: the remediation (capping) of the TfNSW owned site at 6-8 Grand Avenue, Rosehill. This is the allocated site for the SaM Facility. These works are located about 3 kilometres from the GHFF camp.

- Infrastructure Delivery Stage (Stage 2)
  - Package 4: Infrastructure Works includes the design and construction of civil works, public domain and light rail infrastructure up to road level / top of rail and to the top of the concrete slab at Stops, including provision of all Utility Services (excluding high-voltage power supply and cabling for rail systems), and decommissioning of the Carlingford T6 Line. These works occur along the PLR route (Figure 1).
- Supply, Operate & Maintain Stage (Stage 3)
  - Package 5: Supply, Operate and Maintain (SOM) works includes the design and construction light rail systems, high-voltage power supply and Stops above slab level, the supply of LRVs, the design and construction of the SaM Facility, including all light rail operations, customer service and asset management. These works occur along the PLR route (Figure 1).

1.4 Grey-headed flying-fox baseline monitoring program

Prior to construction and in accordance with Condition E101, the baseline behaviour of the camp has been determined using historic data available for the Parramatta Park camp along with project-specific baseline monitoring undertaken by Ecosure. Historic data includes monitoring carried out during other similar construction works which recently occurred in the vicinity of the camp (e.g. Western Sydney Stadium). This data supports the development of the baseline pre-construction monitoring for PLR.

Baseline monitoring (as outlined in Section 5):

- has considered available literature (Section 1.8) to understand the impacts of PLR enabling works and main construction works on the Parramatta Park camp
- provides the basis of a risk assessment of the camp in relation to the project boundary and summarises key threats and impacts to the camp from the project works and other externalities (Section 3)
- provides a review of GHFF ecology and camps in the region (Section 4)
- provides baseline behavioural characteristics to allow evaluation of change during construction monitoring (Section 6)
- has been used to identify construction phase management measures and emergency response protocols to avoid impacting the Parramatta Park camp (Section 7).

Figure 2: PLR construction monitoring boundary

Transport for NSW

Parramatta Light Rail GHFF monitoring program

300 m buffer
Parramatta park
PIR boundary
Camp extent (August 2018)

ecosure

Job number: PR4093
Revision: 0
Author: SR
Date: 15/07/2019

150 0 150 300 450 600 m

GDA 1994 MGA Zone 56
Projection: Tranverse Mercator
Datum: GDA 1994
Units: Meter

Figure 3: PLR construction monitoring boundary zoomed to the 300 m buffer

Transport for NSW

Parramatta Light Rail GHFF monitoring program

300 m buffer
Parramatta park
PIR boundary
Camp extent (August 2018)

ecosure

Job number: PR4093
Revision: 0
Author: SR
Date: 15/07/2019

50 0 50 100 150 200 m

GDA 1994 MGA Zone 56
Projection: Tranverse Mercator
Datum: GDA 1994
Units: Meter

1.5 Consultation

Preparation of this GHFF monitoring program has involved consultation with:

- TfNSW
- Department of Planning, Industry and Environment - Environment, Energy and Science (DPE EES) section (previously known as the Office of Environment and Heritage, OEH)
- Parramatta Park Trust
- Dr John Martin, Royal Sydney Botanic Gardens
- Construction contractors – road enabling works (Diona Ward Joint Venture), Infrastructure Works (CPB Contractors & Downer joint venture) and SOM works (Great River City Light Rail consortium).

Data provided by Dr John Martin is included in Section 5.

DPE EES reviewed and provided comments on the draft GHFF monitoring program (Rev.01). It was confirmed that comments were adequately addressed in the revised document (Rev.02). Following significant updates to the program, Rev.09 was provided to DPE EES for comment (July 2019). DPE EES confirmed that they had no comments on the revised program. Comments and responses provided in Appendix 1. Further consultation was carried out with DPE EES in Q4 2021 to discuss modifications to the scheduled monitoring frequency.

Minutes from stakeholder meetings and other correspondence are provided in a separate document, the *GHFF Monitoring Program Consultation Report* (TfNSW, 2019).

1.6 Conditions of Approval relevant to the program

This GHFF Monitoring Program has been prepared to address the Conditions of Approval and identifies how TfNSW and its Contractors will comply with Infrastructure Approval SSI-8285 (see Table 1). This document was prepared in consultation with relevant government agencies as outlined in Section 1.5.

In accordance with Condition C13, this Construction Monitoring Program has been endorsed by the Environmental Representative (see Appendix 9). Following this endorsement, the GHFF Construction Monitoring Program (Rev.04) was submitted to the DPE for information on 28 November 2018. The revised monitoring program (Rev.10) was submitted for information on 16 August 2019. The Program was submitted to the Department at least one month prior to construction (within the 300 metre GHFF buffer area).

In accordance with Condition C14, construction must not commence until the Secretary has received all of the required Construction Monitoring Programs and relevant baseline data (refer to Appendix 8 for Secretary's approval of using historical baseline data).

Table 1 Conditions of Approval relevant to the GHFF Construction Monitoring Program

CoA No	Condition	Document Reference	How Addressed
C9	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies for each to compare actual performance of construction of the CSSI against performance predicted in the documents listed in Condition A1 or in the CEMP: c) Grey-headed flying fox. Consultation with OEH	This document	The Grey-headed flying fox (GHFF) Monitoring Program (this document) has been prepared to manage work activities associated with Parramatta Light Rail - Stage 1. Consultation has been conducted with DPE EES (former OEH) and is documented in Section 1.5. A detailed response to consultation comments is provided in Appendix 1.
C10	Each Construction Monitoring Program must provide: (a) details of baseline data available;	Section 1.3.1 Section 1.6 Section 5 Appendix 5	As there is a large amount of historic data available for the Parramatta Park camp, this historic data has been used to support establishment of the baseline behaviours of the camp along with project-specific monitoring. Section 1.8 includes documents that were referenced in this monitoring program. Section 5.1.3 provides a description of the camp's history. Section 5 provides the baseline monitoring data. Appendix 9 includes a Letter of Agreement from DPE endorsing the use of historic baseline monitoring data for this GHFF Monitoring Program.
C10	(b) details of baseline data to be obtained and when;	Section 5	Section 5 provides details of the available baseline data for Parramatta Park camp and when this was obtained, including project-specific baseline monitoring carried out for Parramatta Light Rail.
C10	(c) details of all monitoring of the project to be undertaken;	Section 6 Section 7	Section 5 provides details of the baseline monitoring carried out. Section 6 outlines the scheduled camp monitoring events which will be carried out to monitor change in trends of the camp. Section 7 outlines the GHFF Mitigation Application Protocol which requires construction contractors to undertake visual inspections of the camp at identified times to provide more frequent checks of camp behaviour in response to PLR construction activities.
C10	(d) the parameters of the project to be monitored;	Section 6 Section 7 Appendix 4 Appendix 11	The parameters to be monitored during the scheduled GHFF camp monitoring events are described in Section 6. Appendix 4 includes a proforma of the information to be collected during these monitoring events. The parameters for the visual inspections are provided in the GHFF Visual Inspection Checklist, Appendix 11.

CoA No	Condition	Document Reference	How Addressed
C10	(e) the frequency of monitoring to be undertaken;	Section 5 Section 6 Section 7	Section 5 provides details of the baseline monitoring carried out. Section 6 outlines the scheduled camp monitoring events which will be carried out by Ecosure on a quarterly basis. Supplementary monthly monitoring to be carried out by trained TfNSW staff until June 2022 following substantial completion of construction. Section 7 outlines the GHFF Mitigation Application Protocol which requires construction contractors to undertake visual inspections of the camp at identified times to provide more frequent checks of camp behaviour in response to PLR construction activities.
C10	(f) the location of monitoring;	Section 6 Appendix 4	Monitoring locations are provided in maps within Appendix 4. Section 6 identifies the locations of monitoring camps and Table 3 includes centroid data. Note seasonal monitoring will also include two control camps.
C10	(g) the reporting of monitoring results against relevant criteria;	Section 6 Section 7	Reporting requirements for scheduled camp monitoring events are described in Section 6.3 and Table 3. Appendix 4 includes a proforma for scheduled camp monitoring events. Appendix 11 includes a proforma for the visual inspections to be undertaken by construction contractors.
C10	(h) procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory; and	Section 7	Section 7 provides mitigation measures to be implemented if monitoring of the camp identifies changes in GHFF behaviours. Consultation would be conducted with DPE EES and Parramatta Park Trust as required to determine whether additional measures are needed as a result of identifying unsatisfactory results.
C10	(i) any consultation to be undertaken in relation to the monitoring programs.	Section 6.3 Appendix 1	The GHFF monitoring program has been developed in consultation with DPE EES. After each monitoring event the monitoring report will be submitted to DPE EES. In addition, Section 7.3.1 identifies that if monitoring identifies changes in GHFF behaviours in the camp, consultation will be conducted with DPE EES and Parramatta Park Trust to determine whether additional measures are required.

CoA No	Condition	Document Reference	How Addressed
C12	The Construction Monitoring Programs must be developed in consultation with relevant government agencies and Relevant Council(s) as identified in Condition C9 of this approval and must include, information requested by an agency to be included in a Construction Monitoring Programs during such consultation. Details of all information requested by an agency, including copies of all correspondence from those agencies, must be provided with the relevant Construction Monitoring Program.	Section 1.4 Consultation provided in Appendix 1	Consultation with DPE EES has been documented in the Program (Appendix 1). Copies of the correspondence has been provided in a separate document.
C13	The Construction Monitoring Programs must be endorsed by the ER and submitted to the Secretary for information at least one month before the commencement of construction.	Section 1.5	This Program has been endorsed by the ER and is included in Appendix 9. The Program was previously submitted to DPE one month before the commencement of construction.
C14	Construction must not commence until the Secretary has received all of the required Construction Monitoring Programs, and all relevant baseline data for the specific construction activity has been collected.	Section 1.5	Appendix 8 includes a Letter of Agreement from the DPE accepting the request that historic monitoring data can be used to supplement the seven months of project-specific monitoring prior to construction.
C15	The Construction Monitoring Programs, as submitted to the Secretary including any minor amendments approved by the ER must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Secretary, whichever is the greater.	Section 6, Table 3	Section 6, Table 3 identifies the duration of GHFF monitoring for PLR.
C16	The results of the Construction Monitoring Programs must be submitted to the Secretary, and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.	Section 6, Table 3	The Proponent will submit the results in the form of a Construction Monitoring Report to the Secretary and DPE EES in accordance with timeframes identified in Section 6, Table 3.

CoA No	Condition	Document Reference	How Addressed
E101	During construction near the Parramatta River and Cumberland Hospital East and West, the Proponent must engage a suitably qualified and experienced fauna specialist to monitor the behaviour of the Grey-headed Flying-fox camp that resides in Parramatta Park in accordance with the Grey-headed Flying Fox Monitoring Program required by Condition C9 and implement mitigation measures, as required to minimise potential impacts to the camp.	Section 6, Table 3 Section 7	A suitably qualified and experienced fauna specialist (Ecosure – refer to Table 3) has been engaged to monitor camp behaviour and extents quarterly in accordance with this Program. In addition, supplementary monthly monitoring of camp behaviour and extents will be undertaken by trained TfNSW staff until the end of substantial construction (i.e. Jun-22). Construction contractors are responsible for undertaking visual inspections of the camp, in accordance with the GHFF Mitigation Application Procedure in Section 7, such as at the commencement of new construction activities within 300 metres of the camp. Mitigation measures to be implemented for the project are described in Section 7.
E101	Monitoring must commence at least 12 months before the commencement of construction within 300 m, unless otherwise agreed with the Secretary, of the camp to establish baseline behaviour.	Section 5 Appendix 8	Baseline monitoring data is outlined in Section 5. Appendix 8 includes a Letter of Agreement from DPE accepting the request that historic monitoring data can be used to supplement the seven months of project-specific monitoring prior to construction.
E101	Monitoring must be undertaken regularly during construction (in consultation with OEH) with the results compiled in a monitoring report submitted to OEH following each month.	Section 6, Table 3	Monitoring frequency and reporting submission frequency is detailed in Section 6, Table 3.
E101	Monitoring should include species present, numbers, a map of the extent of the camp, breeding status, and condition of animals.	Appendix 4	A proforma for scheduled monitoring events is included in Appendix 4 which includes these parameters.
E101	If monitoring suggests that construction associated with the CSSI is changing the behaviour of the camp, the Proponent must consult with OEH to determine whether additional mitigation measures are required.	Section 7	In accordance with Section 7, if monitoring suggests a change in behaviour, consultation will be undertaken with DPE EES to determine if additional mitigation measures are required.

1.7 Permit to enter

In order to authorise access to Parramatta Park for GHFF monitoring, five (5) days' notice to Parramatta Trust is required prior to monitoring events (Appendix 2).

1.8 Reference documents

This monitoring program is informed by the following key references:

- Parramatta Light Rail (Stage 1) Infrastructure Approval SSI 8285 Department of Planning, Industry and Environment (May 2018) and subsequent modifications (see Section 1.2.2).
- Critical State Significant Infrastructure Assessment: Parramatta Light Rail (Stage 1) Westmead to Carlingford via Parramatta CBD and Camellia, Environmental Assessment Report SSI 8285 (May 2018).
- Parramatta Light Rail (Stage 1) Westmead to Carlingford via Parramatta CBD and Camellia Environmental Impact Statement, prepared for Transport for NSW, WSP Australia Pty Ltd and Jacobs Group (Australia) Pty Ltd (August 2017).
- Biodiversity Assessment Report, Parramatta Light Rail (WSP; Parsons Brinkerhoff 2017).
- Parramatta Light Rail (Stage 1) Westmead to Carlingford via Parramatta CBD and Camellia - Submissions Report (incorporating Preferred Infrastructure Report).
- Australian Government National flying-fox Monitoring Program.
- Parramatta River Grey-headed Flying-fox Camp Management Plan (Eco Logical 2008).
- Western Sydney Stadium, Parramatta Biodiversity Assessment (Eco Logical 2016).
- Western Sydney Stadium Stage 2: Biodiversity Assessment (AMBS Ecology & Heritage Pty Ltd 2017).
- DA/310/2015 Multi storey car park and associated works report, Joint Regional Planning Panel (Sydney West Region) (May 2015).

2 Relevant legislation

The following legislation applies to flying-foxes at the Parramatta Park camp.

2.1 Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

The Commonwealth's EPBC Act provides protection for the environment, specifically matters of national environmental significance (MNES). A referral to the Commonwealth Department of Environment and Energy (DoEE) is required under the EPBC Act for any action that is likely to significantly impact on an MNES.

MNES under the EPBC Act that relate to flying-foxes include nationally threatened species and ecological communities. The GHFF is listed as a vulnerable species under the EPBC Act, meaning it is an MNES. It is also considered to have a single national population. DoEE has developed the Referral guideline for management actions in GHFF and spectacled flying-fox (*Pteropus conspicillatus*) camps (Department of the Environment [DoE] 2015) (the Guideline) to guide whether referral is required for actions pertaining to the GHFF.

The Guideline defines a nationally important GHFF camp as one that has either:

- contained ≥10,000 GHFF in more than one year in the last 10 years, or
- been occupied by more than 2,500 GHFF permanently or seasonally every year for the last 10 years.

Parramatta Park camp is a nationally important camp, because it has fulfilled both these criteria.

Provided that management at nationally important camps follows the mitigation standards below, DoEE has determined that a significant impact to the population is unlikely, and referral is not likely to be required. Referral will be required if a significant impact to any other MNES is considered likely as a result of management actions outlined in the Plan. Self-assessable criteria are available in the Significant Impact Guidelines 1.1 (DoE 2013) to assist in determining whether a significant impact is likely; otherwise consultation with DoEE will be required.

TfNSW made a referral to the Australian Government under the EPBC Act identifying the proposal as a not a controlled action due to the low likelihood of potential significant impacts on identified MNES. The DoEE confirmed on 17 July 2017 that the proposal is not a controlled action (Stage 1 Assessment Report 2018).

2.1.1 Draft National Recovery Plan for the Grey-headed Flying-fox (Jan 2017)

This plan sets out the management and research actions necessary to stop the decline of and support the recovery of the GHFF over the next ten years.

2.2 *Environmental Planning and Assessment Act 1979*

Development control plans under the EP&A Act should consider flying-fox camps so that planning, design and construction of future developments is appropriate to avoid future conflict.

The project is CSSI pursuant to Section 5.13 of the EP&A Act. The Minister for Planning is the approval authority for the project.

2.3 *Biodiversity Conservation Act 2016*

The GHFF is listed as a threatened species under the BC Act.

Development given consent under Part 4 or activities assessed under Part 5 of the EP&A Act do not require licensing under the BC Act. Consent and determining authorities are required to consider the impacts of such proposals on threatened species, threatened ecological communities, and their habitats in accordance with Part 7 of the BC Act.

2.3.1 Draft Code of Practice Authorising Flying-fox Camp Management Actions 2018

The objectives of this draft code aim to enable camp management actions on public land near human settlements in a way that has minimal impact on biodiversity values and avoids harm to flying-foxes or their habitat, while streamlining the approvals process.

2.4 *National Parks and Wildlife Act 1974*

The *National Parks and Wildlife Act 1974* (NPW Act) provides for the conservation of nature (including non-threatened species such as the BFF), objects, places or features of cultural value and the management of land reserved under this Act. The Act protects Aboriginal objects and declared Aboriginal Places. An Aboriginal Heritage Impact Permit (AHIP) under the Act is not required in the project corridor under the CSSI.

2.5 *Prevention of Cruelty to Animals Act 1979*

It may be an offence under this Act if there is evidence of unreasonable/unnecessary torment associated with management activities.

3 Risk assessment

Parramatta is a highly urbanised area and the Parramatta Park flying-fox camp is surrounded by multiple land uses, including development. The camp has shown to have some level of resilience to disturbances from regular urban activities and previous significant development activities (e.g. Western Sydney Stadium) within 300 metres of the camp. However, the risk of camp abandonment cannot be dismissed, associated either with construction (or operation) of the PLR, or concurrent construction activities within the vicinity which may have additional or cumulative impacts. Implementation of this monitoring program and mitigation measures during construction (detailed in Section 7) will minimise the risk of the camp being abandoned or otherwise impacted as much as is possible.

3.1 Key threats

Key direct and indirect threats to the GHFF from PLR include:

- loss of foraging habitat
- construction noise
- light pollution
- bridge demolition & construction
- infrastructure-related mortality
- splintering of the camp
- impacts to pregnant females
- impacts to crècheing young.

It is important to note that impacts to the camp during the baseline monitoring period may also come from non-project related activities including:

- nearby construction at the Western Sydney Stadium and Parramatta Leagues Club multi storey carpark (completion 2019)
- café re-development within Parramatta Park
- Parramatta Park events such as Australia Day, New Year's Day and concerts.

3.2 Direct project impacts to flying-foxes

3.2.1 Loss of foraging vegetation

The PLR project (construction phase) seeks to remove 0.62 hectares of native vegetation. Some of this may include valuable winter foraging habitat in the locality including *Eucalyptus robusta*, *Corymbia citriodora*, *C. maculata* and *E. sideroxylon*. This loss will be offset through the vegetation offset program that would include species that are wintering flowering

vegetation.

The project will not directly impact roosting habitat associated with the Parramatta Park camp (Vol 3 EIS section 8.6.1.2). These impacts have been deemed 'Not significant impact' according to the Biodiversity Assessment report (WSP 2017).

3.3 Indirect impacts to flying-foxes

3.3.1 Construction noise

There is potential for elevated noise above levels the camp is accustomed to, particularly increased construction noise levels in the northern portion of the camp during the main construction phase, around 150 m from the camp extent. The type of noise emitted from different construction activities may affect the Parramatta Park camp, including:

- pitch of metal on metal
- concrete cutting
- impulse noise versus lower frequency noise
- pylon driving.

Ambient noise monitoring results of Cumberland Hospital, approximately 280 m away from the camp, identifies noise levels between 43 and 72 dBA have the potential to occur in the area. This includes noise from light vehicle activity (ignition, door slamming, idling engines etc) aeroplanes and helicopters (including those associated with Westmead Health Precinct). As such it may be assumed the camp is accustomed to noise levels within this range as a result of existing environment and nearby redevelopments (submissions report, incorporating Preferred Infrastructure Report C-115 table C3).

The Balgowlah GHFF camp situated adjacent to Burnt Bridge Creek Deviation, in Sydney's north, and the Burdekin Park camp in Singleton, have also persisted with ambient noise from 61-72 dBA (SLR Consulting 2017 in WSP & Parsons Brinckerhoff 2017 (BAR)).

Studies of the conditions and outcomes of five construction projects conducted in close proximity to flying-fox camps shows that abandonment occurred (SKM 2017 in Appendix 3). This may have been a direct result of construction disturbance, but also may have been associated with other environment conditions such as drought and food shortage (SKM 2017). These abandoned camps were generally not as urbanised / habituated to high ambient noise and construction noise as the Parramatta Park camp. Regardless, it must be recognised that despite all practicable measures to avoid impacts, the PLR construction and operation has the potential to result in the temporary or permanent abandonment of the camp. The risk of this will be minimised through implementation of this plan. Contingencies are also detailed herein.

Any bridge or culvert reconstruction may also impact on threatened microchiropteran bats (e.g. *Myotis macropus* and *Miniopterus schreibersii oceanensis*) that could roost in these structures and should be assessed prior to disturbance and impacts managed appropriately.

3.3.2 Light pollution

There is potential for increased lighting from spotlights and light vehicle flashing beacons. The Bridge Street section of the project alignment, which occurs to the northwest of the camp's northern extremity, has a small section that may be within line of sight from the camp along the Parramatta River corridor. This may temporarily (or permanently with operation) elevate levels of lighting in the area. Given the built environment surrounding the camp, this is not anticipated to have significant impact, however any lighting associated with the project should be designed to minimise spill into the camp.

3.3.3 Infrastructure-related injury and mortality

Flying-fox collision with construction plant or new infrastructure, or electrocution on new overhead wiring, is a potential impact. While the project exists in a highly urbanised setting where these hazards are already present, where possible, additional powerline infrastructure should be made highly visible to flying-foxes (e.g. bundling or spacing of overhead wires). Note that there are no overhead wires planned in Cumberland hospital precinct.

Construction activities are unlikely to inhibit the daily dispersal of or movement pathways of flying-foxes at sunset and pre-dawn.

3.4 Non-project related disturbance activities

3.4.1 Nearby construction projects

A number of ongoing and proposed construction activities are or have occurred nearby.

The new Western Sydney Stadium located at O'Connell Street is approximately 150 m to the south of the Parramatta Park flying-fox camp. The Biodiversity Impact Assessment for the stadium stated:

> *Assessments of significance (7 Part Test and EPBC Act assessment) were undertaken in relation to impacts on the Grey-headed Flying-fox and concluded that, if noise is properly managed and noise reaching the camp is minimised, both from construction work and during events, the proposed stadium is unlikely to have a significant impact on the Grey-headed Flying-fox* (AMBS 2017).

Construction at Western Sydney Stadium was completed in early 2019 and is operational. Construction activities here, did not have a significant impact on the camp, as the camp's numbers remained stable and the camp extent remained much the same (see Section 5). During the site assessment in August 2018, loud metal drilling and hammering sounds associated with steel framing works were observed regularly at the camp. Normally metal on metal sounds would be highly disturbing to roosting flying-foxes, however flying-foxes at the Parramatta Park camp showed no visible behavioural change or impact. This highlights a level of tolerance of this camp to nearby construction noise.

The recently completed multi-level car park for Parramatta Leagues Club is within 80 m of the

camp. With regard to impacts on the GHFF, the assessor deemed the applicant's technical report for 'DA 310/2015 Multi storey car park and associated works' considered the range of potential impacts on the camp and that the report:

- Concludes the proposal is unlikely to have a significant impact on the GHFF colony;
- Identifies various measures to manage risks to the colony during the construction and post-construction phases; and
- Confirms that no Species Impact Statement or EPBC Act referral is required (Section 4.1 of DA Report No 310/2015 by Executive Planner).

This was a significant development in closer proximity to the camp than works planned for the PLR, and while the camp extent may have shifted slightly to the north in response to this disturbance, it persisted in the same general area during and following construction. Comparatively, PLR enabling works are expected to be significantly less disruptive, and further away from the camp. PLR construction works, especially bridge piling, are likely to be as disruptive as construction of the car park development, however piling works are substantially further away from the camp than the car park development.

Although the camp has persisted through both these construction projects, there is potential for cumulative impacts to occur despite implementation of this plan.

3.4.2 Park activities

Parramatta Park provides a number of activities for the community including regular concerts and New Year's Eve and Australia Day fireworks. Although fireworks occur at night when most of the camp is away foraging, crèching young are likely to be present at the camp during summer. There have been no reports of negative impacts on crèching young during these events. It is also likely that the flying-foxes are accustomed to regular maintenance at Parramatta Park such as mowing.

3.4.3 Café development

Due to a recent fire, the café at Parramatta Park is due to be redeveloped within the next 12 months. The café is approximately 150 m south of the camp. Consultation with the Parramatta Trust is required to avoid concurrent disturbance at either end of the camp.

There are also flying-fox exclusion zones around the café and in the vegetation to the south of the stadium. In order to deter flying-foxes from accessing these sites, canopy-mounted sprinklers may be utilised. Measures to deter flying-fox roosting in these sensitive areas are subject to DPE EES approval. It is the responsibility of the Parramatta Trust to obtain a licence from DPE EES to install canopy-mounted sprinklers for the purpose of deterring flying-foxes from these areas during construction.

3.5 Disease risk

Flying-foxes may carry pathogens that have the potential to cause disease in humans.

Australian Bat Lyssavirus (ABLV) is a rabies-like virus that may be transmitted to humans through exposure to saliva of an infected flying-fox (or other bat). All known cases have been through a bite or scratch, however exposure to mucous membranes (eyes, mouth) could potentially also lead to infection. The disease in humans can easily be prevented by avoiding direct contact with bats. Pre- and post-exposure vaccinations are also available that will prevent the disease.

Flying-foxes are also the natural host for Hendra Virus (HeV), which can be transmitted from flying-foxes to horses. Infected horses sometimes amplify the virus and can then transmit it to other horses and humans. There is no evidence that the virus can be passed directly from flying-foxes to humans (or dogs) (AVA 2015).

3.6 Sensitive receiver

The GHFF Mitigation Application Procedure requires the camp to be identified as a sensitive receiver in the Construction Noise and Vibration Impact Statement if works are planned within 300 metres of the camp. The noise levels at the camp will be used to assist in determining the appropriate mitigation measures to be applied. The mitigation measures outlined in the procedure include monitoring of the colony (through visual inspection) to see if the construction activity changes the behaviour of the GHFF. Due to the difficulty in selecting appropriate trigger points (considering the colony itself is very noisy) visual inspection is considered more appropriate to identify behavioural changes if they occur as a result of the construction. If changes in flying-fox behaviour are identified, TfNSW will consult with the flying-fox expert (Ecosure) to determine specific controls.

4 Flying-fox ecology

Flying-foxes are considered ‘keystone’ species. Long-distance seed dispersal and pollination makes flying-foxes critical to the long-term persistence of many plant communities (Westcott et al. 2008; McConkey et al. 2012), including eucalypt forests, rainforests, woodlands and wetlands (Roberts et al. 2006). It is estimated that a single flying-fox can disperse up to 60,000 seeds in one night (ELW&P 2015). Both the BFF and GHFF are migratory. Individuals move long distances in response to variations in the abundance of food, primarily nectar from eucalypts (Eucalyptus, Corymbia, Angophora) but also fleshy fruits (Eby 1991; Hall and Richards 2000; Roberts et al. 2012).

4.1 Species profiles

4.1.1 Grey-headed flying-fox (*Pteropus poliocephalus*)

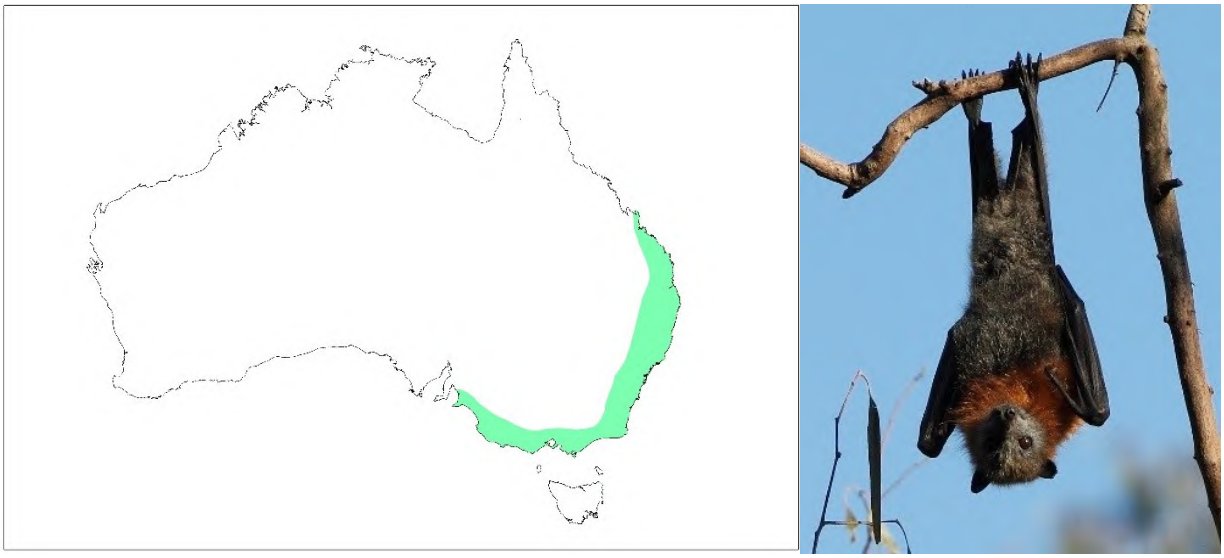

Figure 4 Grey-headed flying-fox indicative species distribution, adapted from OEH 2015a

The GHFF (Figure 4) is found throughout eastern Australia, generally within 200 kilometres of the coast, from Finch Hatton in Queensland to Melbourne, Victoria (OEH 2015d). This species now ranges into South Australia and has been observed in Tasmania (DoE 2016a). It requires foraging resources and camp sites within rainforests, open forests, closed and open woodlands (including melaleuca swamps and banksia woodlands). This species is also found throughout urban and agricultural areas where food trees exist and will raid orchards at times, especially when other food is scarce (OEH 2015a).

There is evidence the GHFF population declined by up to 30% between 1989 and 2000 (Birt 2000; Richards 2000 cited in OEH 2011a). There is a wide range of ongoing threats to the survival of the GHFF, including habitat loss and degradation, deliberate destruction associated with the commercial horticulture industry, conflict with humans, infrastructure-related mortality (e.g. entanglement in barbed wire fencing and fruit netting, power line electrocution, etc.) and competition and hybridisation with the BFF (DECCW 2009). For these reasons it is listed as

vulnerable to extinction under NSW and federal legislation.

All the GHFF in Australia are regarded as one population that moves around freely within its entire national range (Webb & Tidemann 1996; DoE 2015). GHFF may travel up to 100 kilometres in a single night with a foraging radius of up to 50 kilometres from their camp (McConkey et al. 2012). They have been recorded travelling over 500 kilometres over 48 hours when moving from one camp to another (Roberts et al. 2012). GHFF generally show a high level of fidelity to camp sites, returning year after year to the same site, and have been recorded returning to the same branch of a particular tree (SEQ Catchments 2012). This may be one of the reasons flying-foxes continue to return to small urban bushland blocks that may be remnants of historically-used larger tracts of vegetation.

The GHFF population has a generally annual southerly movement in spring and summer, with their return to the coastal forests of north-east NSW and south-east Queensland in winter (Ratcliffe 1932; Eby 1991; Parry-Jones & Augee 1992; Roberts et al. 2012). This results in large fluctuations in the number of GHFF in NSW, ranging from as few as 20% of the total population in winter up to around 75% of the total population in summer (Eby 2000). They are widespread throughout their range during summer, but in spring and winter are uncommon in the south. In autumn they occupy primarily coastal lowland camps and are uncommon inland and on the south coast of NSW (DECCW 2009).

4.1.2 Black flying-fox (*Pteropus alecto*)

Figure 5 Black flying-fox indicative species distribution, adapted from OEH 2015a

The BFF (Figure 5) has traditionally occurred throughout coastal areas from Shark Bay in Western Australia, across Northern Australia, down through Queensland and into NSW (Churchill 2008; OEH 2015a). Since it was first described there has been a substantial southerly shift by the BFF (Webb & Tidemann 1995). This shift has consequently led to an increase in indirect competition with the threatened GHFF, which appears to be favouring the BFF (DoE 2016a).

They forage on the fruit and blossoms of native and introduced plants (Churchill 2008; OEH 2015a), including orchard species at times. BFF are largely nomadic animals with movement and local distribution influenced by climatic variability and the flowering and fruiting patterns of their preferred food plants. Feeding commonly occurs within 20 kilometres of the camp site (Markus & Hall 2004).

BFF usually roost beside a creek or river in a wide range of warm and moist habitats, including lowland rainforest gullies, coastal stringybark forests and mangroves. During the breeding season camp sizes can change significantly in response to the availability of food and the arrival of animals from other areas.

4.1.3 Flying-fox breeding season

The mating season (March to April) represents the period of peak camp occupancy (Markus 2002). GHFF are born from September to November (Churchill 2008) after a six month gestation, although out of season breeding is common (Figure 6). Young are highly dependent on their mother for food and thermoregulation. Young are suckled and carried by the mother until approximately four weeks of age (Markus & Blackshaw 2002). At this time they are left at the camp during the night in a crèche until they begin foraging with their mother between January and March (Churchill 2008) and are usually weaned by six months of age. Sexual maturity is reached at two years of age with a life expectancy up to 20 years in the wild (Pierson & Rainey 1992).

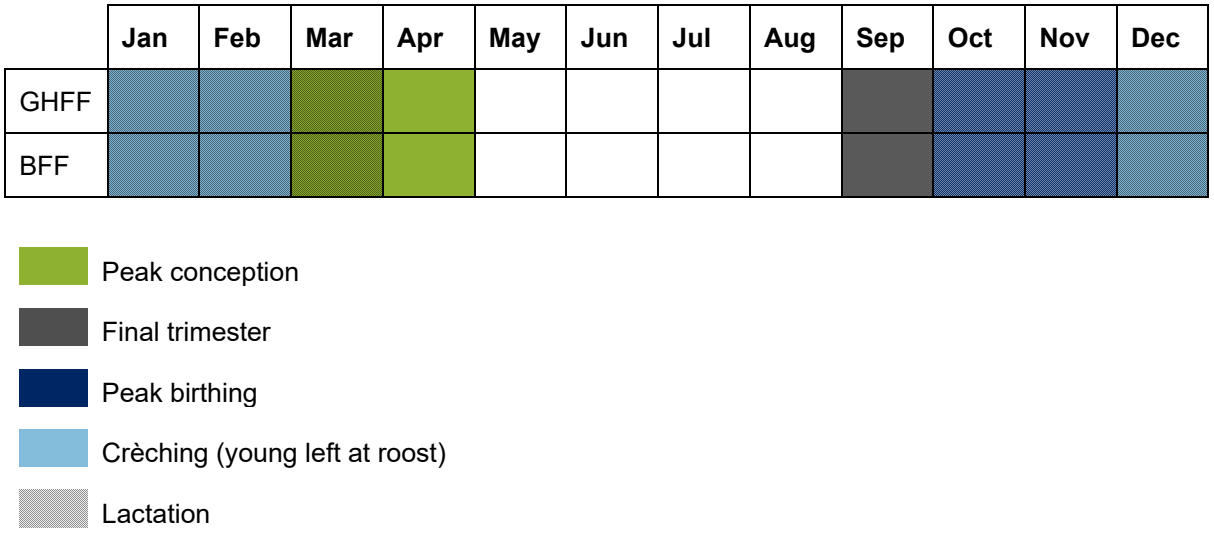

Figure 6 Indicative flying-fox reproductive cycle

5 Baseline monitoring data

To monitor the impacts on GHFF from construction of Parramatta Light Rail, it is important as a first step to establish the baseline behaviour of GHFF. There is a large amount of historic data available for the Parramatta Park camp, including temporally around other similar construction works in the vicinity of the camp. Historic data has been analysed and additional pre-construction baseline monitoring has been carried out to provide a baseline of typical flying-fox behaviour at the Parramatta camp with a comparison of two "control sites" (i.e. GHFF camps at Clyde and Gladesville). Control sites provide a benchmark of typical regional flying-fox behaviour. Baseline data allows establishment of:

- patterns of occupation (population size)
- demographic composition (sex and age class)
- species composition
- key behaviours (including reproductive status)
- area of occupancy (location and extent of roosting flying-foxes).

This information is used as a benchmark for construction monitoring and identifying when additional mitigation measures are to be implemented.

5.1 Parramatta Park Camp characteristics

Parramatta Park camp is a nationally important camp which lies approximately 150 m from the project boundary at the nearest point. Two species of flying-fox occur in Parramatta Park (GHFF and BFF).

5.1.1 Tenure

Parramatta Park camp is located on land owned by Parramatta Park Trust and Sydney West Area Health Services. The camp is primarily located on land zoned as RE1 Public Recreation.

5.1.2 Ecological

The camp occupies both eastern and western banks of the Parramatta River (Figure 8), which is a 4th order stream. The vegetation within the camp is considered to represent River-flat Eucalypt Forest on coastal floodplain in the Sydney basin, a listed Endangered Ecological Community (EEC) (Eco Logical 2008).

5.1.3 Camp history

Flying-foxes have continuously occupied the camp for 11 years of monitoring, suggesting high roost site fidelity (Figure 7). Maximum flying-fox numbers peaked around 35,000 in winter 2015, average number is around 9,500 (Martin J 2018 [NB: no count Sept 2015]). BFF occurs in consistently lower numbers than the GHFF (NFFMP 2018) of up to 700 individuals.

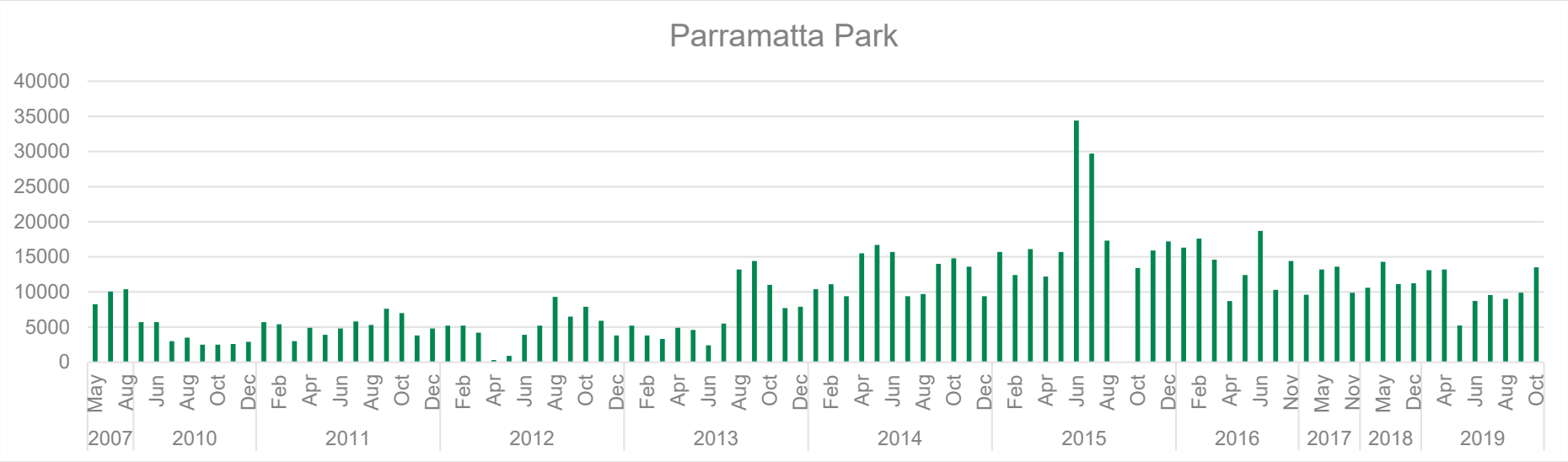

Figure 7 Numbers of flying-foxes at Parramatta Park camp (Source: Royal Botanical Gardens Martin J 2018 & Smith A 2018; NFFMP; Ecosure 2019)

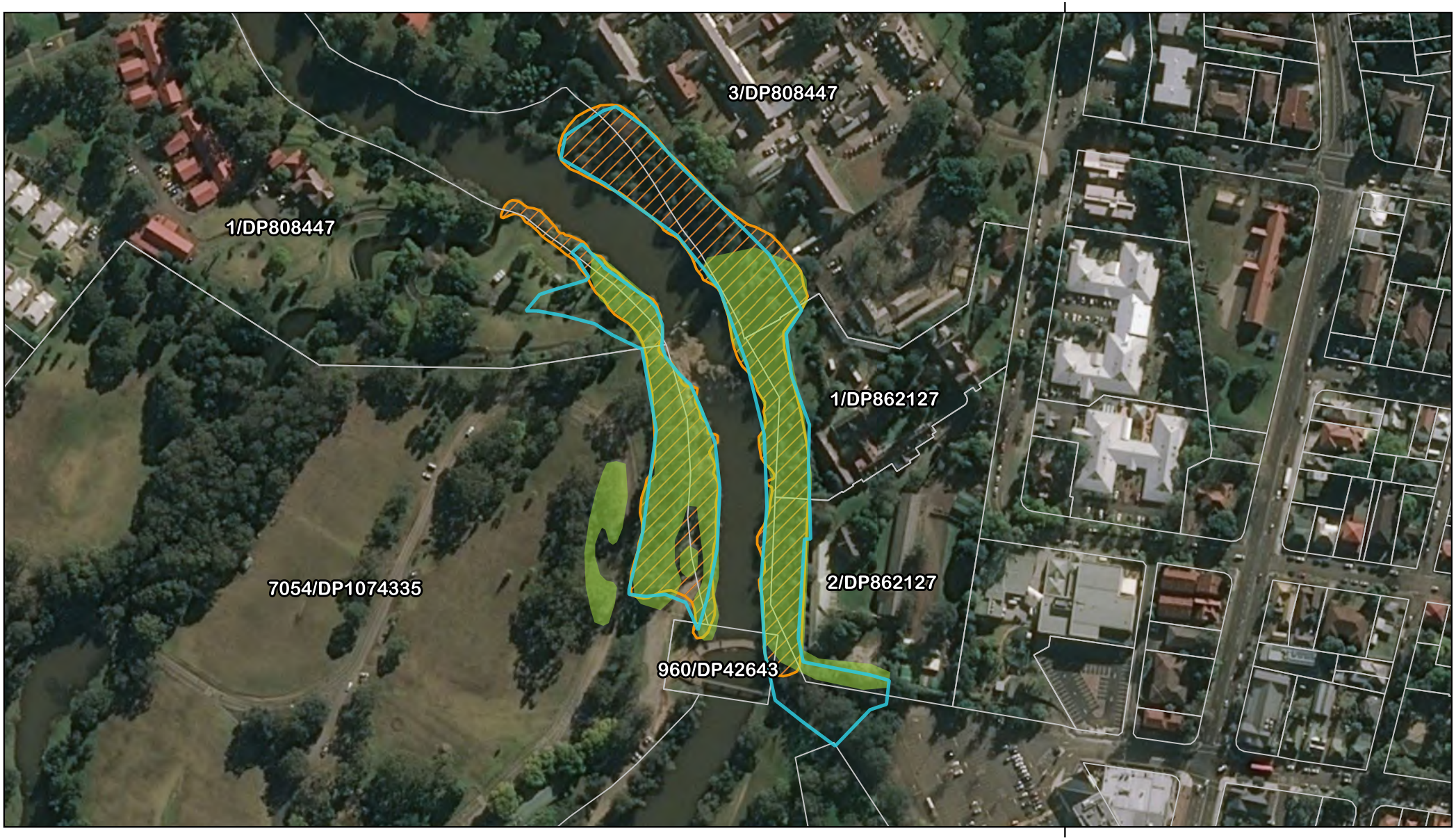

Figure 8: Parramatta park camp extent

Transport for NSW

Parramatta Light Rail GHFF monitoring program

Camp extent (February 2017)
Camp extent (August 2018)
Camp extent (June 2017)
Property boundary

ecosure

Job number: PR3691
Revision: 0
Author: KF, SR
Date: 28/09/2018

25 0 25 50 75 100 m

GDA 1994 MGA Zone 56
Projection: Tranverse Mercator
Datum: GDA 1994
Units: Meter

The core of the camp has moved progressively south along the eastern bank, presumably in response to canopy senescence and deterioration, machinery disturbance and loss of understorey due to clearance (Eco Logical 2008). Previous field surveys found that GHFF exited the camp in all directions at dusk, but that the main fly-out paths for the camp in summer were north along the Parramatta River, south along the Parramatta River and east over the Cumberland Hospital area (AMBS Ecology & Heritage 2017). During the August 2018 visit (Ecosure), all flying-foxes exited the camp either north or south along the Parramatta River (78% north and 22% south). These fly-outs will change seasonally depending on the location of available foraging resources.

5.1.4 Project-specific baseline monitoring

Baseline monitoring has occurred seasonally before construction began, totalling three monitoring events between August 2018 and March 2019 (Table 2). Monitoring within each season was timed around potentially disturbing Parramatta Light Rail pre-construction works where possible.

Table 2 Project-specific Baseline Monitoring

Monitoring event	Project phase	Location	Monitoring period	Task	Date
1	enabling works phase	Parramatta	Winter (Initial)	Species present, numbers, mapped camp extent, breeding status, condition of animals	August 2018
2		Parramatta Clyde & Gladesville	Spring (Appendix 6)	Species present, numbers, mapped camp extent, breeding status, condition of animals	4 December 2018 (note delayed due to rain events in November)
3		Parramatta Clyde & Gladesville	Summer (Appendix 7)	Species present, numbers, mapped camp extent, breeding status, condition of animals, age of young to determine crèching	27 February 2019
4	Construction commencement (March 2019)	Parramatta Clyde & Gladesville	Autumn Construction	Species present, numbers, mapped camp extent, breeding status, condition of animals, age of young	8 April 2019

The methods used in the baseline monitoring program are to continue throughout the construction monitoring period for consistency and comparison.

The results of the project-specific baseline monitoring is provided in Appendix 6 (Spring survey) and Appendix 7 (Summer survey).

5.2 Nearby camps

Seven flying-fox camps exist within 20 km of Parramatta Park camp: Clyde, Gladesville, Gordon, Ropes Creek, Wetherill Park, Cabramatta and Wolli Creek (Figure 9). Two comparable control camps will be monitored during subsequent visits. It is proposed that these are Clyde and Gladesville camps (as determined in consultation with DPE EES; pers. comm. S. Burke OEH 3 September 2018). Data from the National Flying-fox Monitoring Program will also be collated for all camps within the 20 km radius.

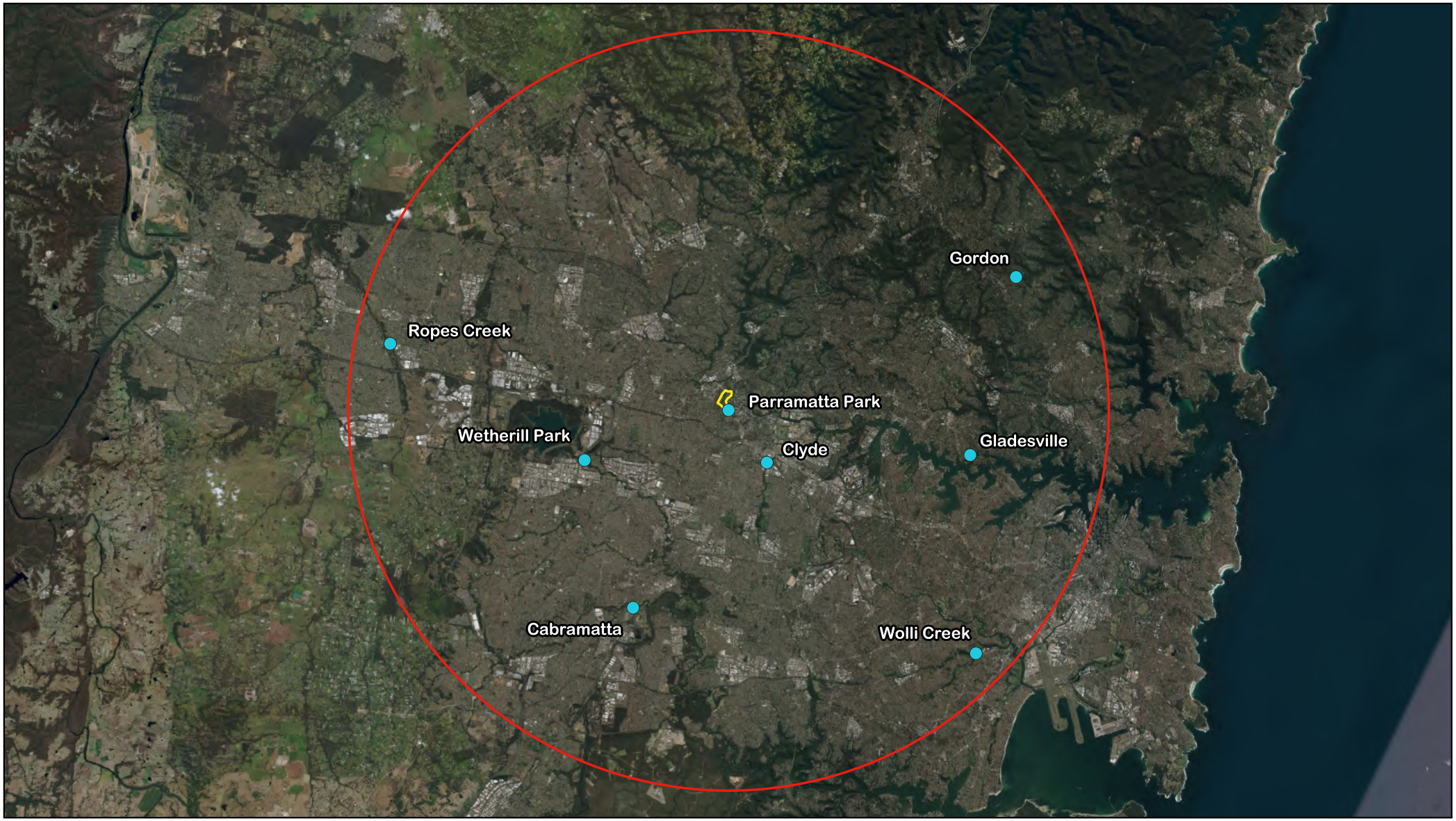

Figure 9: Camps within 20 km of Parramatta Park

Transport for NSW

Parramatta Light Rail GHFF monitoring program

Camp

20 km buffer

Parramatta Park

ecosure

Job number: PR3691
Revision: 0
Author: KF, SR
Date: 28/09/2018

2.5 0 2.5 5 7.5 10 km

GDA 1994 MGA Zone 56
Projection: Tranverse Mercator
Datum: GDA 1994
Units: Meter

5.3 Control site 1: Clyde camp characteristics

5.3.1 Tenure

Land upon which the Clyde camp is located is zoned as a Railway Corridor and Natural Waterway within the Cumberland Local Government area.

5.3.2 Ecological

The Clyde flying-fox camp is located along Duck River in riparian vegetation.

5.3.3 Camp history

Flying-foxes have continuously occupied Clyde camp over the last six years of monitoring, with a maximum of approximately 6,300 GHFF in April of 2013 (Figure 10). According to the National Flying-fox Monitoring Program, no BFF have utilised this camp since 2012.

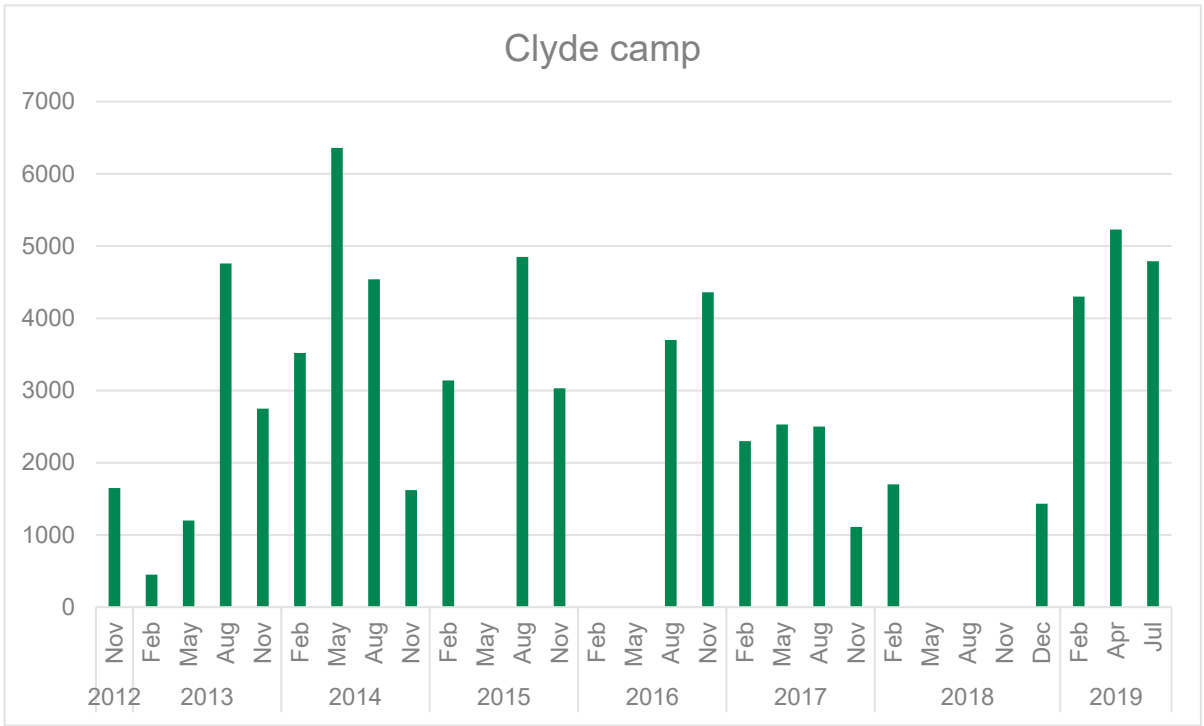

Figure 10 Numbers of GHFF at Clyde camp since 2012 (Source: NFFMP 2018, Ecosure 2019)

5.4 Control site 2: Gladesville

5.4.1 Tenure

The Gladesville camp is located at the western end of Riverglade Reserve within Hunters Hill Local Government Area. The reserve is zoned for Public Recreation.

5.4.2 Ecological

The camp is situated in riparian vegetation within the lower portion of Tarban Creek. The reserve is a large modified area of public open space and stream environment with significant remnant coastal vegetation communities and harbour estuarine environments (Hunters Hill Council 2013).

5.4.3 Camp history

Flying-foxes have continuously occupied Gladesville camp since August 2016, and consistently occupied the site most months prior since 2012 (Figure 11). Since monitoring began the maximum count was 11,300 GHFF in April of 2019 (Figure 11). 10 BFF were recorded in August 2014.

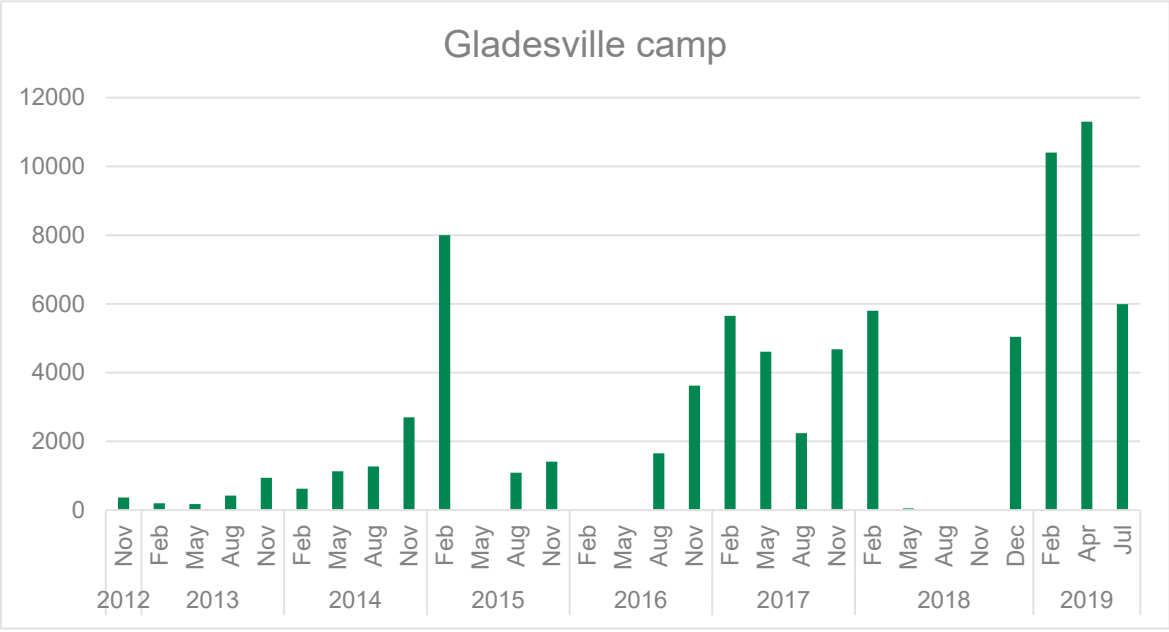

Figure 11 Numbers of flying-foxes at Gladesville camp since 2012 (Source: NFFMP 2018, Ecosure 2019)

6 Construction monitoring: Scheduled events

6.1 Goals and objectives

A suitably qualified and experienced fauna specialist (Ecosure) has been engaged to carry out scheduled monitoring events of camp behaviour, including identifying species present, numbers, mapping of the extent of the camp, breeding status, and condition of animals. Monitoring events will be carried out quarterly until construction is complete.

During the more intensive scope of works with the potentially greater risks to the camp (i.e. from Q4 2018 to Q2 2022) quarterly monitoring will be supplemented by monthly monitoring (in the 'off-months') by trained TfNSW staff under the direction of Ecosure. From June 2022, the supplemental monthly monitoring by trained TfNSW staff is not required noting that quarterly monitoring by Ecosure and targeted monitoring by contractors would continue. Key monitoring parameters are outlined in Table 3.

Table 3 Scheduled construction monitoring parameters

Monitoring	Construction monitoring program	Additional Secretary conditions
Locations (See Figures 8 and 9)	Within maximum extents (area occupied by flying-foxes) of: · Parramatta Park camp (centroid -33.804759, 150.999248) · Clyde camp (centroid -33.837988, 151.018284) · Gladesville camp (centroid -33.835417, 151.135435).	
Method	Daytime static count	
Duration	2019 - 2023	The monitoring program will be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Secretary.
Frequency	Quarterly – Ecosure (Parramatta Park and two control sites at Clyde and Gladesville) Supplementary monthly monitoring of Parramatta Park camp (during 'off-months') by trained TfNSW under direction of Ecosure until June 2022 once the more intensive scope of works has been completed.	
Data	As per Proforma in Appendix 4	
Flying-fox expert	Ecosure personnel: Ben Gunston (Wildlife Field Team Leader) Ellie Kirke (Wildlife Biologist) Jess Bracks (Principal Wildlife Biologist)	
Flying-fox camp monitors	Suitably trained TfNSW staff under direction of flying-fox expert	
Reporting frequency	Quarterly –- DPE EES and Relevant Councils	

6.2 Method

The monitoring methods used in the baseline monitoring program are to continue into the construction monitoring period for consistency and comparison.

Day time static count will be used to estimate abundance at the camp. Given good access and visibility to the camp, along with the camp's tolerance to disturbance, static counts will be done primarily by direct count, supplemented by the point count method where access/ visibility is restricted (Westcott *et al*. 2011). Control sites will also use either the direct and/or point count method. Detailed methodology can be found in "A monitoring method for the grey-headed flying-fox" (Westcott *et al*. 2011).

6.2.1 Frequency

During construction, seasonal monitoring will continue by Ecosure at Parramatta Park and the two control camps on a quarterly basis. Data will be collected via electronic data capture form synced to an online cloud database or by using the Appendix 4 data sheet. The attributes in the electronic form are provided in Appendix 4 and described below.

6.2.2 Data

6.2.2.1 Weather conditions

Weather conditions including temperature, rainfall and wind will contribute to the flying-foxes well-being. Heat stress can occur during summer which may cause a change to regular roosting (resting) flying-fox behaviour including increased wing fanning, clustering, clumping, licking or even falling to the ground.

The community's use of park for events and detectable impacts from enabling works will be recorded to inform a complete understanding of the surrounding context.

6.2.2.2 Flying-fox demographics

Each monitoring event will record the number and species of flying-foxes present, approximate ratio or females to males, health condition, breeding activity or young present.

6.2.2.3 Flying-fox behaviour

The following flying-fox behaviours will be noted:

- resting
- grooming
- vocalising and interacting
- mating or breeding activity
- lifting in response to sudden noise
- signs of stress
- morbidity/mortality.

A suitably qualified person will have the following understanding of signs of stress in flying-fox behaviour (Table 4) and may call for works to temporarily cease (particularly if significant impacts such as injury, morality, young abandonment are considered likely).

Table 4 Signs of stress in flying-foxes

Potential impact	Signs
Initial signs of stress	flying-foxes are generally agitated and likely to take flight / taking flight
Unacceptable levels of stress	panting saliva spreading located on or within 2 m of the ground unusual vocalisations >50% of the roost take flight flying-foxes in flight for more than 20 minutes flying-foxes leave the roost during daylight hours
Dependent young at risk	adults moving away from dependent young adults carrying young being disturbed
Injury/death	a flying-fox appears to have been injured/killed on site (including aborted foetuses)

If a flying-fox appears to be injured or killed, notification to TfNSW and DPE EES is required. If it is likely that a negative interaction with a member of the public may have occurred (e.g. an injured flying-fox in a public area) NSW Health should also be notified.

6.2.2.4 Camp extent

The area of occupancy of the GHFF reflects the camp's response to surrounding disturbance over time. The camps spatial extent is to be recorded via electronic data capture at the edges of the camp.

6.2.3 Parameters

Unforeseen events (e.g. heat stress event, vandalism, fire) may trigger a change in flying-fox behaviour. Local support resources will be called upon for unscheduled or additional monitoring when required.

6.3 Reporting

After each monitoring event a suitably qualified and experienced flying-fox expert and supporting staff will provide a brief report to the TfNSW Project Manager within two weeks of the assessment. The report will include:

- demographics and population data as per Appendix 4
- map illustrating camp extent
- sources and location(s) of potential disturbance
- supporting notes.

In accordance with Condition E101, reports will be submitted quarterly to the Secretary, DPE, EES and Relevant Councils.

6.4 Evaluation of behaviour

Due to the unpredictable nature of flying-fox behaviour, the enabling works or construction phase activities may cause disturbance at the camp that could result in several outcomes:

- flying-fox numbers reduce on site
- flying-foxes splinter to nearby vegetation around Parramatta park
- flying-foxes splinter to neighbouring properties
- flying-foxes relocate to nearby camps within monitoring program
- flying-foxes relocate to another camp
- camp is abandoned altogether.

No discernible change in camp behaviour may also occur during monitoring events due to habituation.

6.4.1 Splintering of camp

Disturbance from enabling works or nearby non-project related construction could cause the camp to splinter to other location(s) within the park or to numerous sensitive receptors surrounding the camp including:

- mental health facilities
- Cumberland Hospital
- Children's Hospital
- Westmead Hospital (including Helipad)
- Parramatta Public School
- Parramatta North Public School
- St Patrick's Primary Parramatta.

Splintering of the camp may also have implications for aircraft accessing the hospital via the helipad. A contingency plan (Section 7.5) will need to be enacted by TfNSW if splinter groups settle in undesirable or sensitive locations.

Prior to any enabling works or construction commencing, TfNSW will communicate to all relevant sensitive receivers in the area the works schedule and the potential for construction to disturb the camp and the measures for what to do if a flying-fox is encountered in Section 7.5.

6.4.2 Impacts to pregnant females and crèching young

Reduced breeding success can be caused due to changes in behaviour associated with disturbance from demolition or proposed works that occur in the birthing and lactation season. Flying-foxes are known to abort foetuses and mass abortions and premature births are known to occur in the wild in response to environmental stress (Martin and McIlwee 2002). Mass abandoning of young has been observed at a number of camps in Queensland and New South Wales, particularly in summer. Avoiding highly disruptive activities during critical times of the breeding season will minimise this risk and monitoring during construction will ensure any event is identified and managed in a timely manner.

The project will not remove habitat known to support breeding individuals (BAR:116) however, the removal of nearby foraging habitat may be a valuable resource for pregnant females. Although foraging habitat represents 0.009 of potential foraging habitat within 10 km, pregnant females or those carrying pups may rely on these closer resources after nights of foraging. Monitoring of body condition will ensure this is not impacting flying-fox welfare, and intervention (e.g. rescue) can be considered if an individual is in very poor condition. Offset planting should consider using flying-fox foraging species to replace lost foraging habitat.

6.4.3 Relocating

Two other nearby camps (Clyde and Gladesville) in Sydney's western suburbs will be concurrently monitored during the program to allow comparisons with the Parramatta Park camp. It may be assumed that a decrease in Parramatta Park camp could lead to increases in these camps or other camps throughout Sydney but without tracking flying-foxes, this cannot be determined. However, if data suggest that this may be occurring, TfNSW (in consultation with DPE EES) will initiate additional monitoring to determine the potential need to provide support to landholders at other affected sites.

Changes to flying-fox numbers between camps will be part of regular annual fluctuations and are likely to be temporary. It is unlikely that the project will cause flying-foxes to abandon Parramatta Park camp altogether.

6.4.4 Habituation

The flying-foxes continual occupation of Parramatta Park camp during the construction of the Parramatta Leagues carpark, Western Sydney Stadium, and regular and numerous events at the Parklands, demonstrates a high level of habituation by the flying-foxes to disturbance. As such, it is considered unlikely that PLR construction works will cause the camp to abandon or be otherwise significantly impacted.

7 Impacts and mitigation measures

7.1 Potentially impacting activities

The work activities and location of potential impacts associated with each Package are identified in Table 5. A distance of 300 metres encompasses the distance for monitoring and recommended mitigation (note that Condition E101 requires monitoring during construction near the Parramatta River and Cumberland Hospital East and West).

Table 5 The PLR packages and indicative activities within 300 m of the GHFF camp

Package	Location	Summary	Indicative works within 300 m
Package 1: Road Enabling Work	O'Connell Street (from Barney Street to Victoria Road), North Parramatta George Street (from O'Connell Street to Harris / MacArthur Streets)	Modifying existing road network to increase capacity on O'Connell Street and allow for two way traffic on George Street. Works include day and night works for utility relocations, road widening and road modifications.	Victoria Road / O'Connell Street intersection (day and night) (within 300 m) Works along O'Connell Street (day and night) including intersections on Dunlop St, Factory St, Church St, Barney St and Board St)
Package 2A: Hawkesbury Road Widening	Hawkesbury Road, Westmead	Widening of Hawkesbury Road between Darcy Road and Jessie Street. Includes piling, utility relocations and road works	No work within 300 m of camp
Package 2B: Cumberland Hospital (East Campus) Demolition	Cumberland Hospital (east campus), North Parramatta	Demolition of five buildings at Cumberland Hospital (east). Refer to Appendix 10.	Demolition of five buildings to slab (within 300 m) Establishment and use of minor compound site
Package 2C: Cumberland Hospital (West Campus) Demolition	Cumberland Hospital (west campus), Westmead	Demolition of five Waratah/Willow cottages and Boronia building at Cumberland Hospital (west)	Demolition of six buildings to slab (Boronia building is within 300 m) Establishment and use of minor compound site
Package 3: Early Works Portion 2	6 Grand Avenue, Rosehill Over 3km from camp	Remediation (capping) of 6-8 Grand Avenue, Rosehill. Includes installing capillary break, vapour barrier, structural fill layer and geotechnical ground improvement work.	No work within 300 m of camp. Note about 250 metres south of Parramatta River

Package	Location	Summary	Indicative works within 300 m
Package 4: Infrastructure Works	Along PLR alignment (Figure 1)	Design and construction of civil works, public domain and light rail infrastructure up to road level / top of rail and to the top of the concrete slab at Stops, including provision of all Utility Services (excluding high-voltage power supply and cabling for rail systems).	Bridge construction (including piling) Utility relocations and drainage works Rail installation Civil engineering work (removal of existing road and replacement) Construction compound establishment and use Stop slabs Tree removals and landscaping
Package 5: SOM Works	Along PLR alignment (Figure 1)	Construction of components and systems relating to the operation of the light rail. Works include installation of stops, power supply systems, communication systems and signalling information.	Cumberland Hospital Stop Landscaping

7.2 Risk ratings

Mitigation procedures and measures identified in Section 7 are to be implemented in accordance with the associated risk factor. Highly intensive noise and impulse noise is considered to be a higher risk to GHFF than low frequency or continuous noise. Risk ratings are considered low, medium and high generally based on breeding cycle and the presence of dependent young. Implementation of general control measures is required for all work regardless of risk rating (Table 6).

Table 6 Risk ratings for specific time of year

Time of day	Inside/outside 300 m buffer	Time of year											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Day works	Inside buffer												
Night works	Inside buffer												
Day works	Outside buffer												
Night works	Outside buffer												

	Low risk - Dependent young unlikely to be present/impacted, low risk to adults. Works required to implement all mitigation measures to reduce impacts to flying-foxes. Flying-fox monitoring not required unless advised by flying-fox expert.
	Moderate risk - Dependent young may be present/impacted. Works required to implement all mitigation measures to reduce impacts to flying-foxes. Contingencies (Section 7.5) may be required. Assessment of camp and advice by flying-fox expert required weekly prior to works.
	High risk - If present, young may be impacted. Works required to implement all mitigation measures to reduce impacts to flying-foxes. Contingencies (Section 7.5) likely required. **Works to avoid these periods.** Assessment of camp and advice by flying-fox expert required prior to works if no option to post-pone outside of high risk period, and flying-fox monitoring required daily on days that works occur.

7.3 Mitigation procedures and measures

A mitigation procedure has been developed to determine the mitigation measures for activities based on risk level and noise type (refer to Figure 12).

It includes five levels of mitigation to be applied dependent on risk rating:

- Item 1 standard control measures
- Item 2 works within 100m of GHFF camp
- Item 3 low risk control measures within 300m of GHFF camp
- Item 4 medium risk control measures within 300m of GHFF camp
- Item 5 high risk control measures within 300m of GHFF camp.

Scheduled GHFF construction monitoring events will be carried out as per Table 3, Section 6.2 Method and include reporting details as per Section 6.3 Reporting.

Visual inspections to be undertaken by contractors are to be reported to TfNSW at least monthly unless any of the notification triggers are identified from these visual checks, which require immediate notification.

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ALL WORKS

Implement standard control measures as per **Item 1**.

If work is within 1km of camp, contact the Contractor's ecologist to confirm anticipated risk rating.

WORKS WITHIN 300 METRES

No

Yes

WORKS WITHIN 100 METRES OR PILING

Yes

HOLD POINT
Consult with **flying-fox expert** to determine appropriate control measures (see **Item 2**)

No

NOISE

Do the Works include the following noise characteristics:

- High frequency (e.g. cutting steel) or Impulsive (e.g. rock breaker)
- Highly Noise Intensive Works or activities with Special audible characteristics
- Construction noise audible at camp (as determined through noise assessment)

No

Yes

TIME OF YEAR

Works scheduled during **Low Risk** periods (as per **Table 1**)

Contractor mitigation:
- Implement control measures as per **Item 3.**

Works scheduled during **Medium Risk** periods (as per **Table 1**)

Contractor mitigation:
- Implement control measures as per **Item 3 and 4.**

Works scheduled during **High Risk** periods (as per **Table 1**)

Contractor mitigation:
- Implement control measures as per **Item 3, 4 and 5.**

Commence Works in accordance with the GHFF Stress Response Plan

Item 1 – Standard control measures applied during Construction

- Regular monitoring of GHFF camp (species present, numbers, map of extent, breeding status, conditions of animals).
- If regular GHFF monitoring suggests that construction associated with the CSSI is changing the behaviour of the camp, TfNSW must consult with DPE EES and the Parramatta Park Trust to determine whether additional mitigation measures are required.
- Lighting should be directed / designed to minimise light spill into the camp and ecologically sensitive river riparian corridor.
- Ensure all plant and equipment is maintained to Australian Standards to minimise noise generation.
- Relevant noise mitigation measures as identified in the package specific Noise and Vibration Management Plan should be implemented to ensure noise emissions are limited.
- Temporary plant and equipment should be made highly visible to flying-fox to avoid strike/infrastructure-related mortality
- Above-ground powerlines should be bundled/spaced to avoid electrocution
- Implement flying-fox welfare procedures as required (refer to Section 7.4 PLR-TFNSW-CBD-PE-PRG-000001).
- Implement contingency planning as required (refer to Section 7.5 PLR-TFNSW-CBD-PE-PRG-000001).

Item 2 – Works within 100 metres of GHFF camp or Works which includes piling (e.g. during bridge construction)

- Provide Environmental Work Method Statement to flying-fox expert for review and determination of specific control measures.
- Additional controls measures may include (but are not limited to):
  - Notification of DPE EES (biodiversity division)
  - Works specific monitoring of flying-foxes at camp.

Item 3 – Low risk control measures application within 300m of the GHFF camp

- On days predicted to be >38ºC, **STOP WORK** and consult with flying-fox expert
- Provide respite of at least one day per week for activities audible at camp.
- Where possible, position plant and equipment further away from the camp and shield noise at the source.
- Consider quieter methods of construction, i.e. avoid impulsive or high frequency noise (e.g. metal on metal), where practicable.

Item 4 – Medium risk control measures applied within 300m of the GHFF camp

- Review proposed activities and consider alternative (less noisy) construction methods.
- For each new activity (e.g. new scope of work or significant change in methodology) or a substantial reduction in the distance to the GHFF camp from a previously assessed activity, carry out a visual check of the GHFF camp at commencement of the noisy activities to identify changes in behaviour (monitoring requirements to be confirmed by the flying-fox expert).
- Identified changes in GHFF camp behaviour are to be reported to TfNSW immediately.
- Record details of the visual check within a register to be maintained and provided to TfNSW at least monthly.

Item 5 – High risk control measures application within 300m of the GHFF camp

- For each new activity (e.g. new scope of work) provide a copy of the Environmental Work Method Statement to flying-fox expert for review.
- Carry out additional control measures as determined by the flying-fox expert.
- Regular visual checks of the GHFF camp to identify changes in behaviour (at least weekly or more frequent as determined by the flying-fox expert).
- Identified changes in GHFF camp behaviour are to be reported to TfNSW immediately.
- Record details of the visual check within a register to be maintained and provided to TfNSW at least monthly.

Table 1: Risk matrix for Works within 300m of GHFF camp

Time of day	Inside/outside 300m buffer	J	F	M	A	M	J	J	A	S	O	N	D
Day works	Inside buffer												
Night works	Inside buffer												

(Red = high, Orange = medium and Green = low)

7.3.1 Item 1 standard control measures

Responsibility: Contractors and TfNSW

The following general measures will minimise the potential impacts to the camp and are to be implemented for all works:

TfNSW:

- if scheduled GHFF monitoring events (i.e. seasonal by flying-fox expert in accordance with Condition E101, or supplementary monitoring by trained TfNSW staff) suggests that construction associated with the CSSI is changing the behaviour of the camp, TfNSW must consult with DPE EES and the Parramatta Park Trust to determine whether additional mitigation measures are required.
- the selected TfNSW staff have been trained in both the theory of GHFF and practical monitoring experience. Any reports produced by TfNSW are to be reviewed by Ecosure prior to being finalised.

Contractors:

- lighting should be directed and designed to minimise light spill into the ecologically sensitive river riparian corridor to prevent disturbance of the camp.
- ensure all plant and equipment is maintained to Australian Standards to minimise noise generation.
- relevant noise mitigation measures as identified in the package specific Noise and Vibration Management Sub-Plan(s) and Construction Noise and Vibration Impact Statements (CNVIS) are be implemented to ensure noise emissions are limited.
- the Parramatta Park GHFF camp is to be included with Land Use surveys (required in accordance with E20) as a sensitive receiver which will inform development of CNVIS.
- temporary plant and equipment should be made highly visible to flying-fox to avoid strike/ infrastructure-related mortality (e.g. machinery used in bridge construction).
- above-ground powerlines should be bundled/spaced to avoid electrocution.
- mature suitable winter-flowering trees could be planted in landscaped areas of the site to provide a winter foraging resource for GHFF, and offset loss of this foraging habitat associated with clearing in the footprint.

As required:

- implement flying-fox welfare procedures as required (Section 7.4).
- contingency planning (Section 7.5) to be requested by the Proponent (and contractors as necessary) as required.

7.3.2 Item 2 works within 100 m of GHFF camp (includes bridge piling)

Responsibility: Relevant Contractors (Construction Manager and/or Environment and

Sustainability Manager)

The following control measures are to be applied within 100 m of the GHFF camp and/or for works which include piling during bridge construction.

- provide Environmental Work Method Statement (EWMS) to flying-fox expert for review and determination of specific control measures. The EWMS review time is a hold a point.
- additional control measures may include (but are not limited to):
    - notification of DPE EES
    - works specific monitoring of flying-foxes at camp.

7.3.3 Item 3 low risk control measures

Responsibility: Relevant Contractors (Construction Manager and/or Environment and Sustainability Manager

The following low risk control measures are to be in place for work occurring within 300 m of the GHFF camp.

- on days predicted to be >38°C, STOP WORK and consult with flying-fox expert.
- provide respite at least one day per week (e.g. Sunday), for activities audible at the camp to allow flying-foxes to rest.
- where possible, position plant and equipment further away from the camp and shield noise at the source.
- consider quieter methods of construction, i.e. avoid impulsive or high frequency noise (e.g. metal on metal) where practicable.

7.3.4 Item 4 medium risk control measures

Responsibility: Relevant Contractors (Construction Manager and/or Environment and Sustainability Manager

The following medium risk control measures are to be in place in addition to control measures in Section 7.3.1 and Section 7.3.3 for work occurring within 300 m of the GHFF camp.

- construction manager / environment/sustainability manager to review proposed activities and consider alternative (less noisy) construction methods.
- for each new activity (e.g. new scope of work or significant change in methodology) or a substantial reduction in the distance to the GHFF camp from a previously assessed activity, the relevant contractor is to carry out a visual inspection of the camp (see Appendix 11 for visual inspection checklist) at commencement of the noisy activity to identify changes in behaviour. Note that the contractor's assessor/s are to have completed GHFF training.

- unsatisfactory changes in GHFF camp behaviour are to be reported to TfNSW immediately as identified through visual inspections.
- record details of the visual check within a register to be maintained and provide to TfNSW at least monthly.

7.3.5 Item 5 high risk control measures

The following high risk control measures should be in place in addition to control measures in Section 7.3.1, Section 7.3.3 and Section 7.3.4 for work occurring within 300 m of the GHFF camp.

- for each new activity (e.g. new scope of work) provide a copy of the Environmental Work Method Statement to flying-fox expert for review (hold point).
- carry out additional control measures as determined by the flying-fox expert.
- regular visual checks (Appendix 11) of the GHFF camp to identify changes in behaviour (at least weekly or more frequent as determined by flying-fox expert). Note that the contractor's assessor/s are to have completed GHFF training.
- identified changes in GHFF camp behaviour are to be reported to TfNSW immediately.
- record details of the visual check within a register to be maintained and provided to TfNSW at least monthly.

7.4 Flying-fox welfare

The following mitigation measures will minimise the potential for animal welfare impacts:

- a wildlife carer (e.g. WIRES) should be on stand-by to accept injured or orphaned flying-foxes and take to a vet if required (the Contractor will consult with wildlife carers should the treatment and care of any wildlife injured/orphaned as a result of PLR construction, and will facilitate a donation if possible).
- all personnel inducted and briefed on flying-fox threatened status, welfare and health, and disease risk management prior to commencing work on site.
- under no circumstances should any personnel attempt to touch or handle a flying-fox. If a flying-fox needs to be rescued, a flying-fox expert must be contacted immediately. If a flying-fox is on or near the ground, an exclusion area should be established and clearly demarcated to prevent human interaction.
- in the unlikely event that someone is bitten or scratched by a flying-fox, the wound should immediately be washed (not scrubbed) with soap and water for at least five minutes, followed by application of an antiseptic with anti-viral action (e.g. Betadine) and immediate medical attention sought (post-exposure vaccinations may be required).
- medical attention should also be immediately sought if a person is exposed to an animals' saliva or excreta through the eyes, nose or mouth.

- residents should be encouraged to report any unusual flying-fox sightings to project site supervisor.
- information should be provided on what to do if a flying-fox is encountered and requires veterinary treatment or rescue, including safety precautions and relevant contact details.

7.4.1 Responsible person

Table 7 Contacts for flying-fox related incidents

Role	Authority and role	Organisation	Contact
Flying-fox expert	Notify flying-fox carer/veterinarian of injured flying-fox Notifies authorities of injured or dead flying-fox Can call for temporary stop work	Ecosure	07 5508 2046
Flying-fox rescuer (ABLV vaccinated) (on-site during works within 300 m or as advised by flying-fox expert)	Rescues injured flying-foxes	Ecosure WIRES	07 5508 2046 1300 094 737
Flying-fox camp monitor	Observes flying-fox welfare Seasonal count of camp	Ecosure Avisure Sydney Botanic Gardens	07 5508 2046
Civil contractor – PLR road enabling works	Site supervisor / OHS Reports unusual sightings of flying-fox to Ecosure Stop work orders (as per company procedures)	Rowan Grace	0420 822 116
Civil contractor – PLR Westmead Precinct	Project Manager – HAC Reports unusual sightings of flying-fox to Ecosure Stop work orders (as per company procedures)	Kemal Ozsayin Swan Htet	9959 2634 0415 537 008
Civil contractor – Infrastructure Works	Site supervisor / OHS Reports unusual sightings of flying-fox to Ecosure Stop work orders (as per company procedures)	Denise Corish	0448 039 552
Civil contractor – SOM Works	Site supervisor / OHS Reports unusual sightings of flying-fox to Ecosure Stop work orders (as per company procedures)	Mike Watts	0451 415 610
Contingency response	Extricate flying-foxes from sensitive locations	Ecosure WIRES Sydney Botanic Gardens Representative	07 5508 2046

Table 8 Enabling works schedule (Source: Environmental Risk Workshop presentation. R. Grace Diona Ward Joint Venture 28 August 2018). A suitably qualified person and DPE EES must be consulted regarding any deviation from the planned works schedule to ensure additional mitigation measures are not required.

Project phase	Activity/ location	Inside/outside 300 m buffer	Action and Responsible	2018					2019												2020
				Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Enabling works	Parramatta Park camp + 300 m	All areas	Site assessment (Ecosure)																		
	No works, buildings, materials or skips within 50 m of camp	Inside buffer	Identify exclusion zones via fencing or marking (Civil Contractor)																		
O'Connell Street Stage 1	Night works (Dunlop St & Factory St intersections)	Outside buffer	Monitoring (Ecosure/ suitably qualified person)																		
O'Connell Street Stage 2	Day & night works (Dunlop, Factory and Church, Barney & Broad)	Outside buffer																			
O'Connell Street Stage 3	Day & night works (Dunlop, Factory and Church, Barney & Broad)	Outside buffer																			

Project phase	Activity/ location	Inside/outside 300 m buffer	Action and Responsible	2018					2019												2020
				Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
O'Connell Street Stage 4	Day and night works O'Connell and Barney	Outside buffer																			
O'Connell Street Stage 5	Day works	Outside buffer																			
O'Connell Street Stage 6	Night works (Barney & Church)	Outside buffer																			
O'Connell Street Stage 7	Night works (Barney, Dunlop, Factory and Church)	Outside buffer																			
Victoria Road inter-section	Victoria Rd/O'Connell St intersection day works	Inside buffer																			
Victoria Road inter-section Stage 2	Victoria Rd/O'Connell St intersection night works (if required)	Inside buffer																			

7.4.2 Enabling works (Cumberland demolition) schedule

Table 9 below provides the schedule for Cumberland Hospital east campus demolitions and actions used to avoid impacting roosting flying-foxes. Refer to Appendix 10 for location of buildings identified for demolition at Cumberland Hospital (east campus).

Table 9 Cumberland East Demolition works. See also Appendix 10.

Project phase	Activity/ location	Inside/outside 300 m buffer	Action and Responsible Person	2019												2020
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Cumberland East Demolition works Cumberland East Hospital Campus (assumes day works only)	Day works B71 Demo (8)	Inside buffer	Given scope of works, monitoring and advice by flying-fox expert required at beginning of works (and for subsequent works if advised by flying-fox expert)													
	Day works B73 Demo (6)	Inside buffer														
	Day works B52A Demo (3)	Inside buffer														
	Day works B67 Demo (4)	Inside buffer														
	Day works B72 Demo (5)	Inside buffer														

	Low risk - Dependent young unlikely to be present/impacted, low risk to adults. Works required to implement all mitigation measures to reduce impacts to flying-foxes. Flying-fox monitoring not required unless advised by flying-fox expert.
	Moderate risk - Dependent young may be present/impacted. Works required to implement all mitigation measures to reduce impacts to flying-foxes. Contingencies (Section 7.5) may be required. Assessment of camp and advice by flying-fox expert required weekly prior to works.
	High risk - If present, young may be impacted. Works required to implement all mitigation measures to reduce impacts to flying-foxes. Contingencies (Section 7.5) likely required. **Works to avoid these periods.** Assessment of camp and advice by flying-fox expert required prior to works if no option to post-pone outside of high risk period, and flying-fox monitoring required daily on day that works occur.
	Works tentatively scheduled. Scheduling changes must be done in consultation with a flying-fox expert and DPE EES to determine the need for additional controls to avoid impacts.

7.5 Contingency planning

This monitoring program will generally allow for flying-foxes to make temporary and short-lived responses to adjust to project activities. These daily responses may include flying-foxes lifting (i.e. flying around the camp) for short periods (i.e. up to 10 minutes) or moving around the known camp extent.

If flying-foxes move into other trees within Parramatta Park:

- seek flying-fox expert advice if required. Contact Parramatta Part Trust and erect temporary exclusion fencing if flying-foxes settle during the day in low trees within reach of the public.

If flying-foxes land in the exclusion area (i.e. location around the café and in the vegetation to the south of the stadium):

- contact flying-fox expert and Parramatta Park Trust to enact emergency dispersal plan.

If flying-foxes arrive in sensitive locations (Figure 13):

- alert flying-fox expert who may need to trigger GHFF stress response plan including either or both stop works to flush bats back to camp.

TfNSW will need to provide assistance to land managers/property owners if flying-foxes relocate to undesirable locations.

If a flying-fox appears to have been injured or killed in association with works:

- alert flying-fox expert and WIRES to collect flying-fox. Do not touch any flying-fox
- apply GHFF stress response plan (see Section 7.5.1) and follow advice of flying-fox expert
- notify DPE EES of work changes to avoid further impacts.

Figure 13: Locations of sensitive receptors and 500 m temporary stop works zone

Transport for NSW

Parramatta Light Rail GHFF monitoring program

Sensitive receptors
Camp extent (August 2018)
500 m buffer
PIR boundary

ecosure

Job number: PR3691
Revision: 0
Author: KF, SR
Date: 28/09/2018

0 150 300 450 600 m

GDA 1994 MGA Zone 56
Projection: Tranverse Mercator
Datum: GDA 1994
Units: Meter

7.5.1 GHFF Stress Response Plan

A Responsible Person (7.4.1) would need to have authority to temporarily stop construction work in the stop work zone if the GHFF are highly stressed (as determined by the flying-fox expert), as evidenced by:

- diurnal fly-outs leading to splintered camps in sensitive locations (Figure 13)
- welfare impacts
- multiple negative interactions with public (e.g. flying-fox on ground, flying-fox scratch or contact with humans)
- Significant changes in GHFF behaviour as per Table 4 stress identifiers.

Works would be allowed to resume when the flying-fox expert determines that the GHFF are no longer stressed and at risk to themselves or people.

Construction activities may need to temporarily stop between the camp and splinter group. A contingency response team consisting of two (preferably ABLV vaccinated) people, contactable by radio or mobile, will be required to flush the bats back to the camp by safe and agreed methods.

A GHFF Stress Response Plans will require notification to TfNSW.

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Appendix 1 Comment tracker

Environment & Planning Comment Register

Key																	
	0	Contractor to respond & incorporate	Total Comments	0						Confirm closure in	<Date>	Closed				
	0	Contractor to check respond & incorporate	B - Observation	0											Pending	0
	0	No action	A - Must be addressed	0											Open	0
	5	Complete	N/A	0											Closed	5

Ref No.	Document Title	Doc Revision	Doc No	Company	Comments	Comment Date	TfNSW Response	Response Date	Status	Comment Classification	Contractor Response (No1)	Response By	Response Date	Stakeholder Response	Response Date	Status
PLR GHFF BMP 33	Grey-headed Flying-fox Baseline Monitoring Program	Rev 0 (August 2018)	PR3691	DPIE (EES) (formerly OEH)	I had note in my copy of the minutes that monitoring was to include fly-out direction (ie at dusk). However, section 6.2 of the report states that monitoring will be via a day time static count and there's no mention of determining fly-out direction. I can't remember the discussion around fly-out direction and why it needed to be part of the monitoring. I can imagine including it will add to the cost. So while I think it may be useful to include, I'm not concerned if it doesn't happen (unless perhaps Ecosure can remember the discussion of why it was significant).	03/09/18	Ecosure to respond to comments prior to next submission	11/09/18	Complete	N/A	We did a fly-out count and a static count the first visit to get a correction factor between the two given static counts are normally underestimated. e.g. our static count was 9565 and fly out 11126. I have updated the graph to 9565 so the data is comparable with other static count data. This gives us a correction factor if we need it. The other note around fly-out counts were to monitor for infrastructure strike. We then clarified with engineers and for this part of the project there won't be any infrastructure/cranes etc over the river. We may want to consider this during bridge construction but not needed for enabling works.	Ecosure	28/09/2018	The responses to the comments are adequate, though I would suggest that the display extent of the 'Parramatta Park camp extent template' map is amended. See attached data from Parramatta Park Trust. The yellow hatched area north of the main camp extent along the Parramatta River is occasionally used/potential habitat. Therefore, I suggest the extent template include this area and also that the core camp area is at the centre of the map. Other than this suggestion, I consider the comments closed.	8/10/18	Closed
PLR GHFF BMP 34	Grey-headed Flying-fox Baseline Monitoring Program	Rev 0 (August 2018)	PR3691	DPIE (EES) (formerly OEH)	The plan suggests monitoring Clyde camp and either Gladesville or Wolli Creek. I think either Gladesville or Wolli Creek as a third site will be fine, noting that Gladesville is very easy to access, I'm unaware of access at Wolli Creek.	03/09/18	Ecosure to respond to comments prior to next submission	11/09/18	No action	N/A	Thanks, we have gone with Gladesville.	Ecosure	28/09/2018		8/10/18	Closed
PLR GHFF BMP 35	Grey-headed Flying-fox Baseline Monitoring Program	Rev 0 (August 2018)	PR3691	DPIE (EES) (formerly OEH)	Section 6.3 says that the monitoring event will include a map illustrating camp extent, but there is no map attached to the monitoring sheet (Appendix 3). I suggest a template map is prepared as part of Appendix 3, with an aerial photo as the base layer, so that any shifts over time will be easy to observe.	03/09/18	Ecosure to respond to comments prior to next submission	11/09/18	Complete	N/A	Maps added.	Ecosure	28/09/2018		8/10/18	Closed
PLR GHFF BMP 35	Grey-headed Flying-fox Baseline Monitoring Program	Rev 1 (September 2018)	PR3691	DPIE (EES) (formerly OEH)	The responses to the comments are adequate, though I would suggest that the display extent of the 'Parramatta Park camp extent template' map is amended. See attached data from Parramatta Park Trust. The yellow hatched area north of the main camp extent along the Parramatta River is occasionally used/potential habitat. Therefore, I suggest the extent template include this area and also that the core camp area is at the centre of the map. Other than this suggestion, I consider the comments closed.	08/10/18	Ecosure to respond to comments prior to next submission	8/10/18	Complete	N/A	Map extent in Appendix 4 amended.	Ecosure	12/10/2018		8/10/18	Closed
PLR GHFF BMP 36	Grey-headed Flying-fox Construction Monitoring Program	Rev 9 (July 2019)	PR4093	DPIE (EES)	No further comments	25/07/19	N/A	N/A	No Action	N/A	N/A					Closed

Appendix 2 Permit to Enter (Parramatta Park) form

PERMIT TO ENTER

PARRAMATTA PARK

Between the Parramatta Park Trust (the Trust)
(LAND OWNER) and

_____

(ENTRANT)

DEED made the day of ,

over land at / known as:

Address	**Parramatta Park**
Certificate of Title	

LAND OWNER **Parramatta Park Trust** PO Box 3064 PARRAMATTA NSW 2124 ABN: 90 811 557 152		
Operational Issues Peter Kapocius Senior Program Officer, Operations & Assets PH: 02 9895 7519 E: peter.kapocius@wspt.nsw.gov.au	**Property / Leasing Issues** Robert Hird Manager, Leasing & Property PH 02 9895 7547 robert.hird@wspt.nsw.gov.au	**Visitor Services / Staff & Security – After Hours** Duty Ranger – 0419 122 763 For EMERGENCY purposes only. Operates 8:30am – 4:30pm Saturday, Sunday & P/H. Security – 1300 133 456

ENTRANT	
Company Name:	
ABN:	
Contact Persons Name:	
Contact Persons Position:	
PH:	
Mobile	
Email:	

Land Area Description *Provide address and DP of area/s of work*	
Period of Access From *[day/ month /year]*	
To *[day/ month /year]*	
Permitted Purpose *Provide summary of what entry is required.*	
Permitted Works *Provide thorough description of the works to be undertaken* *Attach additional details if required*	
Insurance *Attach current insurance certificates for each policy*	Public Liability Insurance ☐ **Mandatory $20 Million**: Contractor's All Risk (CAR) Insurance: ☐ Worker's Compensation Insurance: ☐
Mandatory Documents *Note if attached*	Description of Works ☐ Maps, Plans and Drawings ☐ Safe Work Method Statements ☐
Project Dependant Documents *Note if attached*	Detailed Program of Work ☐ Detailed Schedule of Tasks ☐ Site Specific Safety (WHS) Plan ☐ Environmental Management Plan ☐ Review of Environmental Factors ☐ Risk Assessment Plan ☐ Emergency Response Procedure ☐ Communications Procedure ☐ Vehicle Access Permit ☐
Administration and Access Fee:	Fee: $ **[tbc]**
Bond and Other Fees: *To be advised by the Trust on submission of application.*	Bond: $ **[tbc]** Type: $ **[tbc]**

Between Parramatta Park Trust (the Land Owner) and

the party described below in this document as Entrant (the Entrant)

Background

The Land Owner has agreed at the request of the Entrant to allow the Entrant to have access to the licensed area specified in the Schedule for the permitted purpose specified in the Schedule, on the terms set out in this document.

Operative Part

1. **Access, Access Period & Permitted Use** The Land Owner grants to the Entrant the right to have access to the licensed area for the period specified in the Schedule but solely for the permitted purpose specified in the Schedule.
2. **Access Fee**
   The Entrant must pay to the Land Owner the access fee or any other fee provided for in the Schedule A, in the manner specified in Schedule A.
3. **License**
   The license granted under this document is personal to the Entrant. Nothing in this document confers on the Entrant any rights as tenant of the licensed area or creates the relationship of landlord and tenant between the parties.
4. **Permitted Works**
   The Entrant may carry out the works specified in Schedule A and as set out in documents attached or referred to in an approved Permit to Enter. The Entrant must not carry out any other works in relation to the Land.
   Damage to Trust land and any items therein including paved surfaces, grasslands, garden beds or park infrastructure must not occur.
   If any damage does occur, Parramatta Park Trust will restore the site to a condition acceptable to the Trust. All restoration works will be at a cost to Entrant.
5. **Heritage**
   The entirety of the Park is on the National and State Heritage Lists and parts of the park are World Heritage listed. The park is subject to the provisions of the NSW Heritage Act 1977, Parramatta Park Trust Act 2001 and Regulation 2012.

   All works that break ground or have potential to disturb ground surfaces, historic assets or fabric must have specific approval by the NSW Heritage Council. Significant penalties exist for disturbance without approval.

6. **Fire Awareness and Safety**
   The Entrant must be aware of fire safety issues while in the Park particularly in regard to bushfires.

   All hot works (such as grinding or welding) must have approval from PPT prior to commencement. All hot works are prohibited on Total Fire Ban days.

   Depending on the type of access or work being undertaken, entry may be prohibited during Total Fire Ban days. If this is the case it will nominated as a special condition to the Permit to Enter.

7. **Work Health and Safety**
   The Entrant must carry out all necessary tasks, risk assessments, document preparation, training, induction, consultation and management of Work Health and Safety in accordance with their responsibilities within the Work Health and Safety Act 2011 and Work Health and Safety Regulation 2011. The Entrant must initiate appropriate consultation with the Land Owner or other parties where such consultation is deemed necessary by the Entrant to manage Work Health and Safety issues adequately.

8. **Vehicles and Entry Points**
   All vehicles traveling on or over the land are to do so in a safe manner suitable for the conditions and not exceed 30 km per hour. Vehicles fitted with flashing lights are to have them activated whilst moving. Vehicles not fitted with flashing lights are to activate ‘hazard lights’ whilst moving on or over the land. This Permit to Enter does not allow the Entrant to interfere with or obstruct access to and from existing park entry points.

Vehicles are not permitted to park on the grass at any time. Apart from vehicles that are essential to the Works, no other vehicles may be parked on the site. All vehicles must be parked in accordance with parking regulations of the park.

Vehicles over 3 tonnes tare weight or in excess of 4m height must not use the Macquarie St entry. Access to the site for these vehicles is via Queen St gates only. Approval is required to access the Park for vehicles in excess of these limits.

9. **Pedestrian and cyclists**
   Pedestrians and cyclists have right of way at all times.

   If interference to pedestrian or cycle access will occur during the carrying out of the works detailed in the Schedule A attached or referred to herein, the Entrant is to advise the Land Owner and manage the access conditions to ensure access is safe, fit for purpose and continuous.
10. **Keys**
    If made available, any keys / locks issued for access are to be returned to the Land Owner at their Offices in Parramatta, no later than 1 working day after the expiration of the Period of Access.
11. **Security, Gates & Fences**
    All gates and locks are to be secured at all times and if appropriate, sign posted to indicate that public access is denied.
    If means of access to or egress from the licensed area are specified on a plan attached to this document, then the Entrant may only enter and leave the licensed area as specified on that plan.

    The Entrant must take reasonable steps to prevent vandalism and dumping on the licensed area. The Entrant must not remove damage or cut through any fencing unless approved as part of the Permit to Enter.

    If damage does occur then the Entrant is to restore any fencing damaged by it or its officers, employees, contractors or agents to the satisfaction of the Land Owner at the Entrants cost.
12. **Services**
    The Entrant shall take every precaution necessary to secure from damage all assets and services in, or adjacent to the Site.

    Services will remain live during the Works and suitable controls must be implemented by the Entrant prior to commencement of Works to reduce the associated risks in locating, exposing and managing live services.

Controls are required to meet the requirements of Part 6.3 - Division 3 of the WHS Regulations 2011 and are to include, but are not limited to

- Receiving of up to date drawings and surveys from the Trust and Authorities;
- Dial Before You Dig;
- Permit to dig procedures;
- Hand digging near live services;
- Electronic services scan; and
- Providing permanent support for existing services if trenching or excavation crosses the line of the service.

Advice and drawings provided by the Trust does not reduce the Entrant's responsibility to locate services.

The Entrant shall notify the Trust's Representative immediately upon the discovery of services obstructing the Works. The appropriate Authority shall also be contacted by the Entrant if the service is not shown on the underground location plans obtained from the Authority, or if they are shown at an incorrect location or depth. The obstructing service may need to be diverted, relocated, removed or abandoned, depending on whether it is live or disconnected. If the existing service is to be abandoned, the Entrant is to remove redundant material, cap and make safe.

The Entrant shall liaise with the Trust Representative and the appropriate Authority to determine treatment of services. The removal, diversion, or relaying of services shall be performed by Authorities, unless the Entrant is directed by the Land Owners Representative that the work be performed by them under the supervision and to the satisfaction of the Authority. Existing services may not be used as temporary services for the performance of the Works unless approved by the Trusts Representative and relevant Authorities.

Any services affected by works carried out by the Entrant are to be restored and / or made good, to the satisfaction of the service agencies concerned and to the satisfaction of the Land Owner.

13. **Ground Disturbance**
The Entrant must take reasonable steps to avoid causing any damage to the ground surface, other than damage reasonably required for the purpose of carrying out works permitted under this document, and must take reasonable steps to avoid or control erosion and must restore the ground surface on completion of relevant works to the satisfaction of the Land Owner.
The Entrant may need to vary planned entry dates to avoid conditions where wet or moist soil or track conditions will result in damage to surfaces, whether repairable or not.

Where truck and other vehicle movements are involved on or over the land, remediation of ground and vegetation to pre-existing condition/s is required and a remediation plan is to be prepared and submitted for approval by the Land Owner, prior to implementation of remediation.
Remediation is to be carried out to the satisfaction of the Land Owner and likely remediation actions include aeration, top dressing and hydro-seeding with native grass species. The Land owner will provide contact details for preferred native grass seed suppliers.

Where truck and other vehicles are also involved, wash down of all vehicles, machinery and tools is to occur prior to bringing such plant unto or over the land each day to minimise the likelihood of transference of soil borne disease pathogens and weed seeds.

The Entrant must gain approval where import of material is necessary to provide a stable access point to the land. The material must be placed on geotechnical cloth or similar to provide a barrier between the material and soils to minimise incorporation of the material into existing soil profile.

Upon completion of the works, the Entrant is to notify the Land Owner that the works are complete and to make arrangements for a joint inspection to be carried out to determine the need for and/or type of remediation works and other actions required by the Land Owner.

14. **Land Owner Representative Access** The Entrant is required to provide safe access to the licenced area for the Land Owners Representative, Authority Representatives and other authorised persons as notified to the Entrant by the Land Owners Representative.

15. Reinstatement and Repair of Damage to Property and Services
The Entrant is to immediately rectify any damage to property within or adjacent to the Site including roadways, footpaths, drains, services, assets, trees or infrastructure. The Entrant shall also take all due care to avoid damage and to protect existing assets (Refer also to Tree Protection).

All damage caused in the execution of works shall be repaired immediately and the Entrant shall arrange for the necessary repairs to be executed at their expense, and to the satisfaction of the Land Owner's Representative and/or relevant Authority. The Entrant must clean and repair damage caused by the Work and restore the licenced area and surrounds to original condition.

Should any service be damaged the Entrant shall immediately:

- Notify the Land Owner's Representative of the damage to the service and arrange for turning off of the supply;
- Arrange repair of the service by a properly qualified and licensed contractor. All associated costs of the repairs shall be at the Entrant's expense; and
- Provide temporary services whilst repairs are carried out.

16. Waste Management and Clean up
The Entrant must maintain the work site in in a clean and tidy condition with all waste materials stored in an appropriate receptacle. Upon completion of works and vacating the land, the Entrant must leave the licensed area in a clean and tidy condition and remove any rubbish or debris.

The Protection of the Environment Operations Act 1997 (POEO Act) provides a tiered range of illegal dumping offence provisions/fines. They are:

- $750 on-the-spot fine for individuals for illegal dumping up to a maximum of $1500
- $1500 on-the-spot fines for corporations for illegal dumping up to a maximum of $5000

The entrant must repair the site to its pre-existing condition prior to the commencement of works. Any damage to park assets and structures must be properly repaired to the requirements of Trust at the Entrants cost.

17. Tree Protection

Before the commencement of Works, a Tree Protection Zone/s (TPZ) must be established around all tree/s to be retained within the site boundary. Tree protection must be maintained in accordance with the AS 4970-2009: Protection of Trees on Development Sites. The tree protection measures and zones offered by the Entrant must be approved by the Land Owners Representative prior to works commencing.

Each TPZ must have:

- Mulch installed and maintained to a depth of 75mm for the duration of Works; and

The following works shall be excluded from within any TPZ:

- Soil cut or fill including excavation and trenching;
- Soil cultivation, disturbance or compaction;
- Stockpiling or storage of bulk materials including soil, gravel, sand or similar materials;
- The movement and storage of plant, equipment and vehicles;
- The disposal of any toxic liquids including paint, solvents, cement slurry, fuel and oil;
- The disposal or storage of building materials;
- The erection of site offices or sheds; and
- Any action likely to the impact on tree health or structure.

The Entrant shall be responsible for notifying the Land Owners Representative prior to any Works within the Tree Protection Zone of any tree. The Entrant must obtain written approval from the Land Owners Representative prior to the removal or pruning of any tree.

Approval must be obtained from the Land Owners Representative before cutting any roots >50mm diameter. All roots to be cut are to be cut by hand and covered with topsoil, hessian or similar biodegradable matter to buffer drying and contamination. If, in the Land Owners Representative's opinion, the Entrant has cut the roots to the detriment of the tree, the Entrant will be required to replace the damaged tree with a new 500Lt tree approved by the Land Owners Representative.

A penalty of $15,000 shall apply in the event that:

- A penalty of $15,000 shall apply in the event that:
- The Entrant is responsible for the damage or removal of any existing trees;
- The Entrant is responsible for unauthorised root system damage or removal; and/or
- The Entrant fails to notify the Land Owners Representative of uncovered root systems.

18. **Vegetation**

The Entrant must not remove, disturb, damage or undertake any pruning of vegetation (including trees, shrubs, grasses or groundcovers) except with the prior written approval of the Land Owner.

19. **Use of chemicals and toxic materials**

No toxic materials are to be carried, stored or used on site without the prior written approval of the Land Owner.
The adjacent land is not to be sprayed with any chemical substance that may damage the environmental or vegetative quality of the site.

The Entrant shall advise the Land Owner within 24 hours of any pollution incident occurring on site or of any suspected ground or water contamination.

20. **Release**

The Entrant accesses and uses the licensed area solely at its own risk. To the extent permitted by law, the Entrant releases the Land Owner, the NSW State Government and their officers, employees, contractors and agents from any claims, actions, damages, losses, liabilities, costs or expenses that the Entrant suffers or incurs or is liable for, directly or indirectly, in relation to access to or use of the licensed area by the Entrant or its officers, employees, contractors or agents.

21. **Indemnity**

The Entrant indemnifies the Land Owner and the NSW State Government and their officers, employees, contractors and agents against any claims, actions, damages, losses, liabilities, costs or expenses which they may suffer or incur, directly or indirectly, in relation to access to or use of the licensed area by the Entrant or its officers, employees, contractors or agents.

22. **Insurance**

Prior to accessing the land the Entrant must provide a certificate of currency of public liability insurance policy which notesthe interest of the Land Owner as landowner for an amount not less than the amount specified in Schedule A.

The Entrant may also be requested by the Land Owner to procure other relevant insurance(s) which notes the interest of the Land Owner as landowner for an amount not less than the amount specified in the Schedule A, and must provide evidence acceptable to the Land Owner of such insurance. All insurances must be procured at the cost of the Entrant.

23. **Documents**

The Entrant may be requested to prepare and submit for assessment and approval by the Land Owner, whose approval shall be final and binding, various documents that clearly support the Permit to Enter request, as specified in the Schedule. The Land Owner reserves the right to request or make changes to the documents, as part of the approval process, in order to maintain consistency with the Land Owner Plan of Management and Operations Programs. All documents (and including all requested changes to the documents) shall be at the cost of the Entrant. The Entrant must comply with the provisions of any such documents.

24. Costs/ Fees and Bond

The Entrant must pay or reimburse the Land Owner all costs and expenses incurred in connection with preparation of this document as outlined in Schedule A.

Depending on the type of works the Trust may request a bond be submitted for the duration of the Permit to Enter. The bond will be returned at the completion of works follow an inspection from a Trust representative that there has been no damage to the park and that the site has been returned to its pre-existing condition.

25. Notice of commencement

Where commencement of works will not be within one week of commencement of the period of approved entry, the Entrant is to advise the Land Owner five (5) working days prior to commencement of on-site preparatory or actual works.

26. Default

If the Entrant breaches any of the provisions of this document or special conditions, the Land Owner may terminate this Permit to Enter access by notice in writing to the Entrant.

Any cost associated with the default of this agreement with be at the Entrants expense. This includes the enforcement, protection, waiver or attempted enforcement, protection or waiver of any right under this document by the Land Owner, including all legal expenses on a full indemnity basis, administration costs of the Land Owner and expenses incurred in engaging consultants.

Special Conditions:

27. To be Advised by Trust on submission of application

Attach Plans / Drawings / Site Plans

(if referred to in description of Licensed Area in Schedule)

EXECUTED AS A DEED:

The Authorised Officer(s) of <u>Entrant</u>

Print Name: _____

Position: _____

Signed: _____

Dated: _____

Witnessed by: _____

Print Name: _____

Dated: _____

The Authorised Officer(s) of <u>Land Owner</u>

Print Name: _____

Position: _____

Signed: _____

Dated: _____

Witnessed by: _____

Print Name: _____

Dated: _____

Appendix 3 Construction near flying-fox camps

Table 3-1 A summary of the conditions and outcomes of five construction projects of comparable magnitude to the WC2U Project and one smaller project, conducted in close proximity to flying-fox roosts. This information is provided to assist in predicting the potential for flying-foxes to abandon the Macksville roost as an outcome of construction.

ROOST	PROJECT	WORKS NEAR ROOST SITE*	ROOST OCCUPANCY	APPROXIMATE DISTANCE ROOST TO WORKS	OUTCOME	NEW ROOST SITE & DIST
Kempsey Crescent Head Road	Pacific Highway Kempsey bypass	Crushing and screening facility, bridge piling	Annual - seasonal / long history of use	Around 200 metres from crushing plant and 500 metres from bridge piling activities	Roost present for the first two years of construction with ancillary facilities in operation as well as bridge piling activities. Roost abandoned after 2 years of construction commencing and has not re-established	Rudders Park, 2 km
Moorland	Pacific Highway Moorland to Herons Creek upgrade	Widen to 4 lane dual carriageway	Irregular / long history of use	Abuts: some roost site vegetation removed	Roost abandoned, not re-established	Lansdowne State Forest, 7 km
Kurnell**	Sydney Desalination Plant	Construction of extensive plant; 5 km pipeline; tunnelling; trenching	Annual – seasonal / long history of use	240 metres nearest above ground works, 450 metres nearest below ground works	Roost abandoned during construction, not re-established	Kareela, 10 km
Slacks Creek	Southeast Freeway (Qld)	Construct dual carriageway, interchange, bridge	Continuous / long history of use	175 metres to highway; 200 metres to the bridge	Roost abandoned during construction re-established after 20 years	Unknown
Tarcutta***	Hume Highway Tarcutta bypass	Construct 4 lane dual carriageway; bridge	Temporary (food shortage)	230 metres to highway; 250 metres to the bridge	Roost abandoned during construction, not re-established**	None, temporary site
Campbelltown	Access road	Construct 2 lane road; bridge piling	Annual – seasonal / new roost	80 metres to the road; 300 metres to the bridge	Roost remained through construction	Not applicable

* All construction works occurred whilst a flying-fox colony was in occupancy at the adjacent roost sites.

** Whilst substantial construction activities were occurring around 240 metres from the Kurnell roost, the timing of roost abandonment at that site was additionally associated with drawdown of surface waters during severe drought conditions. As such it is not conclusive that the abandonment of the Kurnell roost could be attributed to adjacent construction activities.

*** A temporary roost formed near the township of Tarcutta, NSW during a uniquely long and widespread food shortage for flying-foxes in south east Australia. The animals departed the site at a time when other temporary camps in the regional area also emptied. This also coincided with pile driving during construction of a bridge 250m from the roost. It is not clear whether departure from the site was associated with the pile driving.

Sources of information: http://www.rta.nsw.gov.au/roadProjects/index.html; A. Wyatt (OEH); C. Slade (Forests NSW); Eby (2009); Hall (2002); K. Whiting (EMM); A. Taylor (Campbelltown CC)

Source: SKM 2017 WC2N FFMP page 16

Appendix 4 Flying-fox monitoring data proforma

Below is an extract from Ecosure's electronic data form that can be used as a data sheet if required.

Camp (camp name, and extent drawn on map provided)	
Date	
Time	
Assessors	
Weather conditions	
Grey-headed flying-fox	
Count	
Females visibly pregnant	
Dependent young	
Body condition	
Morbidity/ mortality	
Stress indicators	
Behavioural observations	
Black flying-fox	
Count	
Females visibly pregnant	
Dependent young	
Body condition	
Morbidity/ mortality	
Stress indicators	
Behavioural observations	
Roost extent	
Add boundary points	
% currently occupied	
% available suitable habitat	
Vegetation condition	
Management	
Public use	
Impacts to camp	
Project works	
Non-project related disturbance	
Actions required	
Photos	
Notes	

Parramatta Park camp extent template

Clyde camp extent template

Gladesville camp extent template

Appendix 5 Parramatta historic data

	Year	Month	Parramatta Park	
24/05/2007		May	8254	
12/07/2007		Jul	10074	
14/08/2007	2007	Aug	10391	
19/03/2010	2010	Mar	5700	RBG
15/06/2010		Jun	5700	
22/07/2010		Jul	3000	
19/08/2010		Aug	3500	
16/09/2010		Sep	2500	
14/10/2010		Oct	2500	
25/11/2010		Nov	2600	
23/12/2010		Dec	2900	
19/01/2011		Jan	5700	
17/02/2011		Feb	5400	
17/03/2011		Mar	3000	
13/04/2011		Apr	4900	
12/05/2011		May	3900	
16/06/2011		Jun	4800	
21/07/2011		Jul	5800	
18/08/2011		Aug	5300	
21/09/2011		Sep	7600	
19/10/2011		Oct	7000	
16/11/2011		Nov	3800	
21/12/2011	2011	Dec	4800	
18/01/2012		Jan	5200	
15/02/2012		Feb	5200	
21/03/2012		Mar	4200	
18/04/2012		Apr	300	
17/05/2012		May	900	
14/06/2012		Jun	3900	
19/07/2012		Jul	5200	
16/08/2012		Aug	9300	
13/09/2012		Sep	6500	
11/10/2012		Oct	7900	
15/11/2012		Nov	5900	
20/12/2012	2012	Dec	3800	
23/01/2013		Jan	5200	
14/02/2013		Feb	3800	
14/03/2013		Mar	3300	
10/04/2013		Apr	4900	
15/05/2013		May	4600	
12/06/2013		Jun	2400	
24/07/2013		Jul	5500	
14/08/2013		Aug	13200	
11/09/2013		Sep	14400	
16/10/2013		Oct	11000	
13/11/2013		Nov	7700	
12/12/2013	2013	Dec	7900	
15/01/2014		Jan	10400	
20/02/2014		Feb	11100	

20/03/2014		Mar	9400
17/04/2014		Apr	15500
15/05/2014		May	16700
12/06/2014		Jun	15700
10/07/2014		Jul	9400
14/08/2014		Aug	9700
25/09/2014		Sep	14000
16/10/2014		Oct	14800
20/11/2014		Nov	13600
18/12/2014	2014	Dec	9400
22/01/2015		Jan	15700
19/02/2015		Feb	12400
19/03/2015		Mar	16100
30/04/2015		Apr	12200
21/05/2015		May	15700
18/06/2015		Jun	34400
7/07/2015		Jul	29700
20/08/2015		Aug	17300
15/09/2015		Sep	
21/10/2015		Oct	13400
19/11/2015		Nov	15900
16/12/2015	2015	Dec	17200
21/01/2016		Jan	16300
18/02/2016		Feb	17600
24/03/2016		Mar	14600
21/04/2016		Apr	8700
20/05/2016		May	12400
28/06/2016		Jun	18700
30/08/2016		Aug	10300
15/11/2016	2016	Nov	14400
16/02/2017		Feb	9600
12/05/2017		May	13200
18/08/2017		Aug	13600
21/11/2017	2017	Nov	9900
22/02/2018		Feb	10600
17/05/2018		May	14300
Ecosure	2018	Aug	11126

Appendix 6 Spring survey

ecosure

Improving Ecosystem Resilience

Baseline Monitoring Program

December 2018

TRANSPORT FOR NEW SOUTH WALES

Contents

List of figures

List of tables

1 Introduction

Transport for New South Wales (TfNSW) engaged Ecosure to undertake monitoring of the Parramatta Park grey-headed flying-fox (*Pteropus poliocephalus*; GHFF) camp along with two control camps, as part of the Parramatta Light Rail project (the project) Conditions of Approval.

1.1 Background

This monitoring program seeks to establish baseline behaviour in GHFF at:

- Parramatta Park
- two nearby control camps (Clyde and Gladesville).

The aim of pre-construction monitoring is to provide a baseline of normal flying-fox behaviour at the Parramatta camp with a comparison of the two control sites. Control sites will provide a benchmark of normal regional flying-fox behaviour.

This data will allow:

- assessment of potential impacts of the project's enabling-works and construction of the project on the Parramatta Park flying-fox camp, particularly:
  - patterns of occupation (population size)
  - demographic composition (sex and age class)
  - species composition
  - key behaviours (including reproductive status)
  - area of occupancy (location and extent of roosting flying-foxes).
- inform construction monitoring and additional mitigation measures if required.

An initial monitoring assessment was undertaken in August 2018 for the development of the Grey-headed Flying-fox Baseline Monitoring Program (Ecosure 2018). This report represents the second baseline monitoring event (Spring) for this monitoring period (Table 1).

Table 1 Baseline reporting schedule

Monitoring event	Scheduled	Completed
Winter		August 2018
Spring	27 November 2018	4 December 2018 (this report)
Summer	February 2019	
Autumn	April 2019	
Pre-construction	June 2019	
Construction commencement	July 2019	

2 Methods

Baseline monitoring was undertaken by Ecosure wildlife team members on the following dates:

- Monday 3 December 2018 (Parramatta and Gladesville)
- Tuesday 11 December 2018 (Clyde).

Data was collected via an electronic data capture form synced to an online cloud database.

2.1 Data

2.1.1 Weather conditions

Ambient weather conditions including temperature, rainfall and wind were recorded (BOM 2018).

2.1.2 Flying-fox demographics

The number and species of flying-foxes present, approximate ratio of females to males, health condition, breeding activity or young present were recorded for each camp. A day time static count was used to estimate abundance at the camps.

2.1.3 Flying-fox behaviour

The following flying-fox behaviours were recorded for each camp:

- resting
- grooming
- vocalising and interacting
- mating or breeding activity
- lifting in response to sudden noise
- signs of stress
- morbidity/mortality.

2.1.4 Camp extent

The camps' area of occupancy (spatial extent of the camp) were recorded.

2.1.5 Management and public use

The community's use of Parramatta Park for events and detectable impacts from enabling works were recorded to inform a complete understanding of the surrounding context.

3 Results

During the monitoring event on 3 December 2018, access to Clyde camp was problematic due to locked gates on TfNSW property. Access was therefore organised for 11 December 2018.

3.1 Weather conditions

In the week leading up to the monitoring, the City of Sydney had a significant rainfall event, totalling 56 mm at the closest BOM Station (No. 66124 Parramatta North) to Parramatta Park, postponing the scheduled November monitoring to December. No rain was recorded on the days of monitoring (Table 2).

Table 2 Weather conditions during Spring monitoring event (BOM station 66124)

Monitoring event	Max temp (ºC)	Min temp (ºC)	Rainfall (mm)	Wind Ave (km/h)	Wind Max (km/h)	Condition
3 December 2018 (Parramatta and Gladesville)	31.3	14.0	0	13.7	44.3	Fine
11 December (Clyde)	24.0	19.3	0	13.3	29.5	Overcast

3.2 Flying-fox demographics

Parramatta camp contained 11,245 GHFF with a ratio of (males:females:juveniles/young: M:F:JY) 36:26:38. Gladesville camp contained 5,040 GHFF at a ratio of 29:24:47. Clyde camp contained 1,433 GHFF at a ratio of 34:64:46 (Table 3).

The high number of juveniles and dependent young observed at all camps is indicative of the peak birthing season in October and November. A large number of pregnant females were still present at Parramatta.

Table 3 Flying-fox demographics

Camp	GHFF	Males	Females	Females visibly pregnant	Juveniles	Dependent young	Body condition	Morbidity/ mortality
Parramatta	11,245	4,010	2,925	2,575	3,425	885	Healthy overall, with a few that look underfed	None
Gladesville	5,040	1,455	1,230	985	2,329	26	Very fat and healthy	None
Clyde	1,433	493	916	30	24	634 (1-3 weeks old)	Good, 2 or 3 skinny females	None

3.3 Flying-fox behaviour and camp extent

Flying-foxes at all three camps demonstrated normal daily behaviours indicative of the breeding season. No signs of stress were observed. Roosting vegetation was generally in good condition.

Table 4 Flying-fox behaviour and camp extent

Camp	Stress indicators	Behavioural observations	% camp occupied	% available habitat	Vegetation condition
Parramatta	None	Resting, grooming, vocalising and interacting, mating or breeding activity. Very quiet and relaxed camp. At some parts they were observed asleep with no vocalizations at all.	85	15	Vegetation is sparse and trees are showing some signs of stress, loss of leaves
Gladesville	None	Resting, grooming, vocalising and interacting, mating or breeding activity	45	55	Healthy mangrove system. Lots of eucalypt trees, good condition mid story of mangroves. Weed infested ground cover, exotic coral trees
Clyde	None	Grooming, fanning, social interactions, mating Juveniles roosting in groups Disturbance when Ibis flying and people leaving through TfNSW gate	85-90	10	Good. Two stripped/ dead trees observed. Water level about 90%

3.4 Management actions and public use

No disturbance was recorded at any of the camps during the monitoring event.

Table 5 Management actions required

Camp	Public use	Impacts to camp	Project works	Non-project related disturbance	Actions required
Parramatta	High public use of bike and walkway	None	None	Setting up for concert. Low noise no effect on colony	None
Gladesville	Walkway along extent of colony	None if using path	N/A	None	None
Clyde	Walkway	None	N/A	None	None

The area occupied by the flying-foxes at each camp can be seen in Figures 1-3.

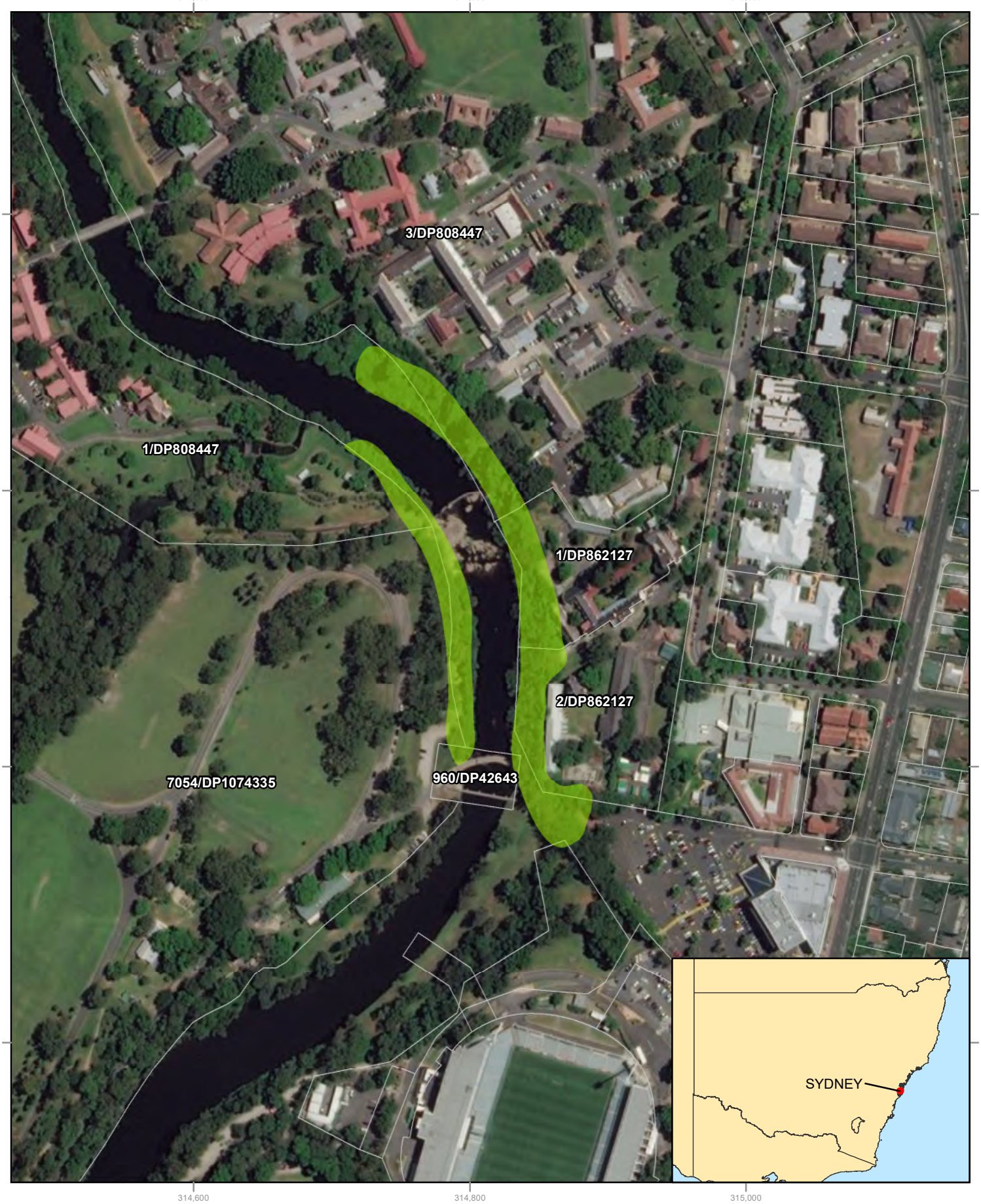

Figure 1: Parramatta Park camp extent

Transport for New South Wales

Baseline Monitoring Program

Camp extent (December 2018)

Property boundary

ecosure

Job number: PR3691
Revision: 0
Author: KF
Date: 21/12/2018

0 25 50 100
Metres

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

PR3691_MPX_CampExtent_ParramattaPark
A4

Figure 2: Gladesville camp extent

Transport for New South Wales

Baseline Monitoring Program

Camp extent (December 2018)

Property boundary

ecosure

Job number: PR3691
Revision: 0
Author: KF
Date: 21/12/2018

0 25 50 100
Metres

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

PR3691_MPX_CampExtent_Gladesville
A4

Figure 3: Clyde camp extent

Transport for New South Wales

Baseline Monitoring Program

Camp extent (December 2018)

Property boundary

ecosure

Job number: PR3691
Revision: 0
Author: KF
Date: 21/12/2018

0 25 50 100
Metres

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

PR3691_MPX_CampExtent_Clyde
A4

4 Discussion

There are no indications of stress in the flying-foxes at Parramatta Park due to early works for the project.

4.1 Recommended actions

Due to high number of juveniles at Parramatta, undertaking monitoring during concerts or events with loud music would be recommended.

No additional mitigation is required.

References

BOM 2018, Climate Data Online Station: Parramatta North (Masons Drive) No. 66124, Available: http://www.bom.gov.au/climate/data/index.shtml?bookmark=136&zoom=3&lat=-32.5355&lon=147.74&layers=B00000TFFFFFFFTFFFFFFFFFFFFFFFFFTTT&dp=IDC10002-d, accessed 19 December 2018

Ecosure 2018, *Grey-headed flying-fox Baseline Monitoring Program; Parramatta Light Rail Project*, report for Transport for New South Wales, Brisbane.

Revision History

Revision No.	Revision date	Details	Prepared by	Reviewed by	Approved by
00	21/12/2018	PLR Baseline Monitoring Report -Spring	Emily Hatfield Senior Wildlife Biologist	Dave Fleming, Manager - SEQ	

Distribution List

Copy #	Date	Type	Issued to	Name
1	21/12/2018	Electronic	Transport for New South Wales	Megan Haberley
2	21/12/2018	Electronic	Ecosure	Administration

Citation: Ecosure, 2018, *Baseline Monitoring Report -Spring*, Proposal to Transport for New South Wales, Burleigh Heads

Report compiled by Ecosure Pty Ltd

ABN: 63 106 067 976

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P 1300 112 021

Appendix 7 Summer survey

ecosure

Improving Ecosystem Resilience

Baseline Monitoring Program - Summer

February 2019

TRANSPORT FOR NEW SOUTH WALES

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1 Introduction

Transport for New South Wales (TfNSW) engaged Ecosure to undertake monitoring of the Parramatta Park grey-headed flying-fox (*Pteropus poliocephalus*; GHFF) camp along with two control camps, as part of the Parramatta Light Rail project (the project) Conditions of Approval.

1.1 Background

This monitoring program seeks to establish baseline behaviour in GHFF at:

- Parramatta Park
- two nearby control camps (Clyde and Gladesville).

The aim of pre-construction monitoring is to provide a baseline of normal flying-fox behaviour at the Parramatta Park camp with a comparison of the two control sites. Control sites will provide a benchmark of normal regional flying-fox behaviour during construction works.

This data will:

- allow for an assessment of potential impacts of the project's enabling-works and construction of the project on the Parramatta Park flying-fox camp, particularly:
  - patterns of occupation (population size)
  - demographic composition (sex and age class)
  - species composition
  - key behaviours (including reproductive status)
  - area of occupancy (location and extent of roosting flying-foxes)
- inform construction monitoring and additional mitigation measures if required.

An initial monitoring assessment was undertaken in August 2018 for the development of the Grey-headed Flying-fox Baseline Monitoring Program (Ecosure 2018). This report represents the third baseline monitoring event (summer) for this monitoring period (Table 1).

Table 1 Baseline reporting schedule

Monitoring event	Scheduled	Completed
Winter		August 2018
Spring	27 November 2018	4 December 2018
Summer	February 2019	27 February 2019 (this report)
Autumn	April 2019	
Pre-construction	June 2019	
Construction commencement	July 2019	

2 Methods

Baseline monitoring was undertaken by Ecosure wildlife team members on Wednesday 27 February 2019 at Parramatta, Clyde and Gladesville.

Data was collected via an electronic data capture form synced to an online cloud database.

2.1 Data

2.1.1 Weather conditions

Ambient weather conditions including temperature, rainfall and wind were recorded (BOM 2019).

2.1.2 Flying-fox demographics

The number and species of flying-foxes present, approximate ratio of females to males, health condition, breeding activity or young present were recorded for each camp. A day time static count was used to estimate abundance at the camps.

2.1.3 Flying-fox behaviour

The following flying-fox behaviours were recorded for each camp:

- resting
- grooming
- vocalising and interacting
- mating or breeding activity
- lifting in response to sudden noise
- signs of stress
- morbidity/mortality.

2.1.4 Camp extent

The camps' area of occupancy (spatial extent of the camp) were recorded.

2.1.5 Management and public use

The community's use of Parramatta Park for events and detectable impacts from enabling works were recorded to inform a complete understanding of the surrounding context.

3 Results

3.1 Weather conditions

In the week leading up to the monitoring, the City of Sydney had a moderate rainfall, totalling 27 mm at the closest BOM Station (No. 66124 Parramatta North) to Parramatta Park. No rain was recorded on the days of monitoring (Table 2).

Table 2 Weather conditions during summer monitoring event (BOM station 66124)

Monitoring event	Max temp (ºC)	Min temp (ºC)	Rainfall (mm)	Wind Ave (km/h)	Wind Max (km/h)	Condition
27 February 2019 (Parramatta, Clyde and Gladesville)	27.7	15.4	0	12.9	33.3	Fine

3.2 Flying-fox demographics

Parramatta camp contained 13,105 GHFF with a ratio of (males:females:juveniles/young) 43:32:25. Gladesville camp contained 10,405 GHFF at a ratio of 32:34:34. Clyde camp contained 4,300 GHFF at a ratio of 30:44:26 (Table 3).

Table 3 Flying-fox demographics

Camp	GHFF	Males	Females	Females visibly pregnant	Juveniles	Dependent young	Body condition	Morbidity/ mortality
Parramatta	13,105	5,635	4,194	0	3,276	0	Healthy	None
Gladesville	10,405	3,329	3,538	0	3,538	0	Healthy overall, with some underfed individuals	None
Clyde	4,300	1,290	1,892	0	1,118	0	Healthy	None

3.3 Flying-fox behaviour and camp extent

Flying-foxes at all three camps demonstrated normal daily behaviours. No signs of stress were observed. Roosting vegetation was generally in good condition.

The area occupied by the flying-foxes at each camp can be seen in Figures 1-3.

Table 4 Flying-fox behaviour and camp characteristics

Camp	Stress indicators	Behavioural observations	% camp occupied	% available habitat	Vegetation condition
Parramatta	None	Resting, fanning, grooming, vocalising and fighting males. Flying to drink from river.	90	10	Several trees are showing signs of stress, loss of leaves.
Gladesville	None	Resting, fanning, grooming, vocalising and interacting.	75	25	Healthy mangrove system. Lots of eucalypt trees, good condition mid story of mangroves. Weed infested ground cover.
Clyde	None	Resting, grooming, fanning, social interactions.	90	10	Very heavy infestations of weeds. Water level low.

3.4 Management actions and public use

No disturbance was recorded at any of the camps during the monitoring event.

Table 5 Management actions required

Camp	Public use	Impacts to camp	Project works	Non-project related disturbance	Actions required
Parramatta	High public use of bike and walkway	None	None	Park maintenance and music festival preparations not currently affecting camp.	None
Gladesville	Walkway along extent of colony	None	N/A	None	None
Clyde	Walkway	None	N/A	None	None

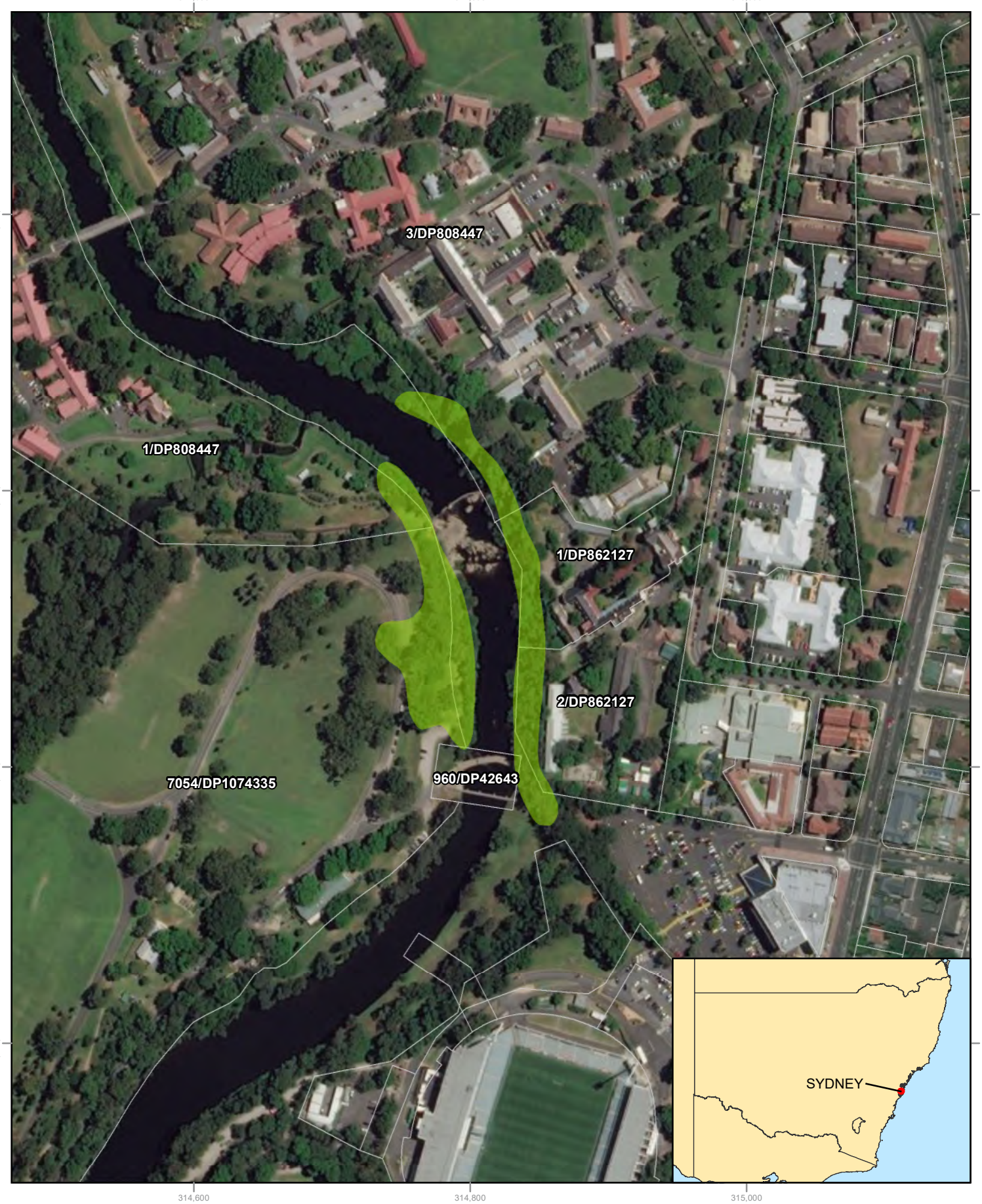

Figure 1: Parramatta Park camp extent

Transport for New South Wales

Baseline Monitoring Program

Camp extent (February 2019)

Property boundary

ecosure

Job number: PR3691
Revision: 0
Author: KF
Date: 3/1/2019

0 25 50 100
Metres

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

PR3691_MPX_CampExtent_ParramattaPark_Summer
A4

Figure 2: Gladesville camp extent

Transport for New South Wales

Baseline Monitoring Program

Camp extent (February 2019)

Property boundary

ecosure

Job number: PR3691
Revision: 0
Author: KF
Date: 3/1/2019

0 25 50 100
Metres

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

PR3691_MPX_CampExtent_Gladesville_Feb19
A4

Figure 3: Clyde camp extent

Transport for New South Wales

Baseline Monitoring Program

Camp extent (February 2019)

Property boundary

ecosure

Job number: PR3691
Revision: 0
Author: KF
Date: 3/1/2019

0 25 50 100
Metres

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

PR3691_MPX_CampExtent_Clyde_Feb19
A4

4 Discussion

There are no indications of stress in the flying-foxes at Parramatta Park due to early works for the project.

4.1 Recommended actions

Due to proximity of the camp to music events at Parramatta Park, undertaking monitoring during concerts or events with loud music is recommended.

No additional mitigation measures are required.

References

BOM 2019, Climate Data Online Station: Parramatta North (Masons Drive) No. 66124, Available: http://www.bom.gov.au/climate/data/index.shtml?bookmark=136&zoom=3&lat=-32.5355&lon=147.74&layers=B00000TFFFFFFFTFFFFFFFFFFFFFFFFFTTT&dp=IDC10002-d, accessed 28 February 2019

Ecosure 2018, *Grey-headed flying-fox Baseline Monitoring Program; Parramatta Light Rail Project*, report for Transport for New South Wales, Brisbane.

Revision History

Revision No.	Revision date	Details	Prepared by	Reviewed by	Approved by
00	04/03/2019	PLR Baseline Monitoring Report -Summer	Adam Pavitt Graduate Scientist	Emily Hatfield Senior Wildlife Biologist	Julie Whelan Senior Environmental Scientist

Distribution List

Copy #	Date	Type	Issued to	Name
1	04/03/2019	Electronic	Transport for New South Wales	Megan Haberley
2	04/03/2019	Electronic	Ecosure	Administration

Citation: Ecosure, 2019, *Baseline Monitoring Report -Summer*, Proposal to Transport for New South Wales, Burleigh Heads

Report compiled by Ecosure Pty Ltd

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Certified System Quality ISO 9001 SAI GLOBAL
Certified System Health & Safety AS 4801 SAI GLOBAL

Appendix 8 Letter of Agreement

NSW GOVERNMENT | Planning & Environment

Our ref: 19/144028

Ms Megan Haberley
Senior Manager Environment
Transport for NSW
Locked Bag 5085
Parramatta, NSW 2124

Dear Ms Haberley

Subject: Parramatta Light Rail – Stage 1 (SSI 8285) – Agreement on Grey-headed Flying-fox Baseline Monitoring under condition E101

I refer to your correspondence dated 15 February 2019 and supporting information on 21 and 25 February 2019 requesting agreement that the project baseline monitoring data on the behaviour of the Grey-headed Flying-fox camp commence 7 months (instead of 12 months) before the start of construction, as provided by Condition E101, with the remaining five-month monitoring period to be supplemented by historic data.

Following a review of the information provided, I note that baseline monitoring has been occurring between August 2018 and February 2019. I also note that consultation on the Monitoring Program has been completed with the Office of Environment and Heritage (OEH). The Department has also contacted OEH to confirm its position on supplementing project baseline data with historic data. OEH has advised the Department that it has no concerns with this approach subject to the monitoring methodology between the historic data and the baseline data being the same. I note your email correspondence dated 25 February 2019 confirming that this is the case.

I note that the use of combined historic and project baseline data would establish the baseline behaviour of the camp.

I am satisfied that the combined project and historic data, covering the period from February 2018 to February 2019, would be representative of the baseline behaviour of the camp. I therefore, as delegate for the Planning Secretary, give my agreement to the use of the combined project baseline and historic data, for the establishment of the baseline behaviour of the Grey-headed Flying-fox camp.

You must ensure that the Grey-headed Flying-fox Monitoring Program under Condition C9(c) is consistent with the above baseline monitoring and is submitted to the Department for information within the timeframes under Conditions C13 and C14 of the SSI Approval.

If you require clarification regarding this matter please contact Adrien Lalchere, Planning Officer, Infrastructure Management via email at adrien.lalchere@planning.nsw.gov.au.

Yours sincerely

26-2-2019

Erica van den Honert
Director – Infrastructure Management
As delegate of the Planning Secretary

Appendix 9 ER Written statement

16 August 2019

Transport for NSW

Attention to: **Megan Haberley**
A/Senior Manager Environment
Parramatta Light Rail
130 George St, Parramatta, NSW 2150

Review of Grey-headed Flying-fox Construction Monitoring Program
Parramatta Light Rail Stage 1 (Revision 10, 12 August 2019)

Pursuant to SSI8285 Condition of Approval A23 (d) i), as the approved Environmental Representative, I confirm that I have reviewed the Grey-headed Flying-fox Construction Monitoring Program , Parramatta Light Rail - Stage 1 (Revision 10, dated 12 August 2019), prepared by Ecosure for consistency with the requirements of the Conditions of Approval.

In my opinion the aforementioned document is consistent with the requirements included in or required under the terms of the Conditions of Approval for the Parramatta Light Rail (Stage 1) development.

Yours sincerely,

Australian Quality Assurance & Superintendence Pty Ltd (AQUAS)

Gillian Lehn
Environmental Representative
phone: +61 2 9956 9963 | fax: 02 9954 1951 | mobile: +61 438 355 346 |
email: gillian.lehn@aquas.com.au |

Filename : *AQ1148.05 PLR GHFF endorsement 190816*

Appendix 10 Cumberland demolition

(Source: TMR 2019 Nearmaps)


3
4
5
6
8

Appendix 11 Visual Inspection Checklist

Date:		**Time:**	
Assessor(s):		**Trained? (Y/N):**	
Duration of monitoring:	(*Note: must be at least 10 mins*)		
Weather Conditions:			
Monitoring location:	*Mark up on Map overleaf (Figure 2)*		
Description of the work activities / location:			

Are large numbers of the GHFF camp located substantially outside the extent shown in Figure 1	Yes. ☐ If yes, follow contingency planning (Section 7.5) and call Flying-fox expert (Ecosure) and TfNSW No ☐
Are more than 50% of the camp taking flight or are in flight for more than 20 minutes (outside of dawn, dusk and overnight)	Yes. ☐ Notify construction manager / site supervisor and TfNSW / Ecosure. Note: Works may need to temporarily cease. No ☐
Are any GHFF located on or within two metres of the ground	Yes. ☐ Notify construction manager / site supervisor and TfNSW / Ecosure. Works may need to temporarily cease No ☐
Are there any signs of injury or death to GHFF	Yes. ☐ If yes, notify TfNSW and DPE EES No ☐
Can the activity be heard at the camp site	Yes. ☐ Regular visual inspections during the noisy works are to be conducted to monitor potential impact on camp behaviour No ☐
Are there any signs of young being abandoned at the camp	Yes. ☐ Notify construction manager / site supervisor and TfNSW / Ecosure. Works may need to temporarily cease No ☐
Other comments on camp behaviour	

Figure 1: Parramatta Park camp extent

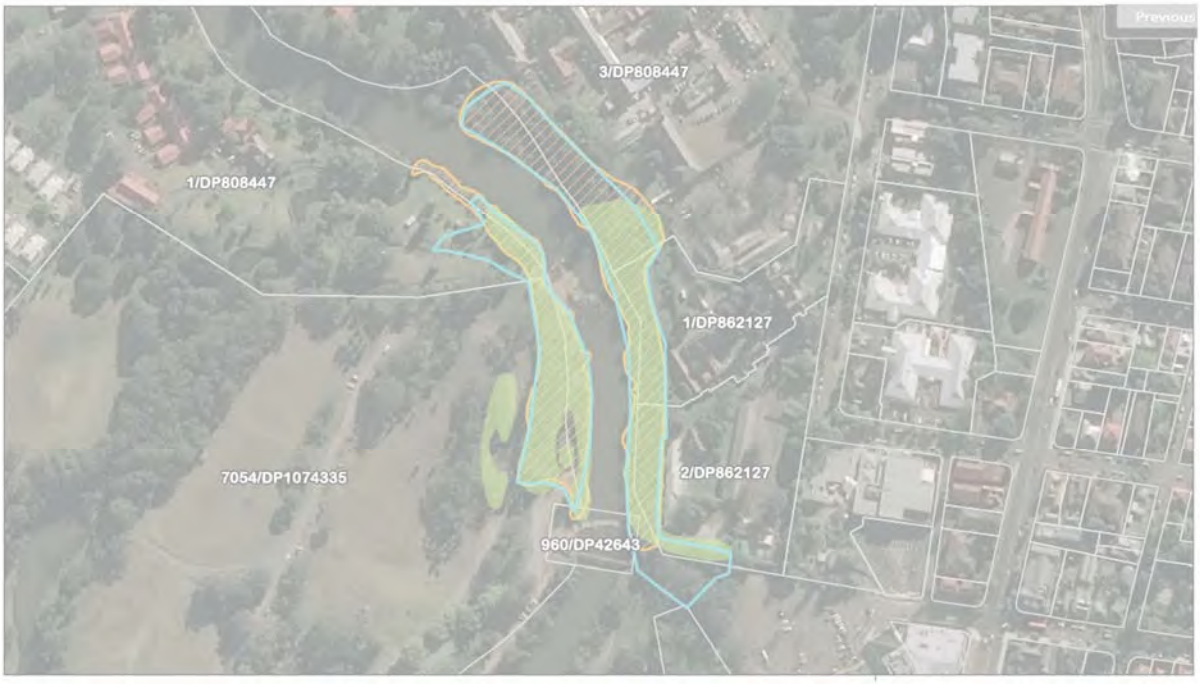

Figure 2: Visual inspection monitoring location (to be marked onto this map)
Note: visual inspections to be within 50 metres of the camp.

Revision History

Revision No.	Revision date	Details	Prepared by	Reviewed by
00	17/08/2018	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – DRAFT	Emily Hatfield Senior Wildlife Biologist Ecosure	Jess Bracks Principal Wildlife Biologist Ecosure Dave Fleming, SEQ Manager Ecosure
01	28/09/2018	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – DRAFT R1	Emily Hatfield Senior Wildlife Biologist Ecosure	TfNSW AQUAS PLR Environmental Representative Sarah Burke Office of Environment and Heritage Jess Bracks Ecosure
02	12/10/2018	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – FINAL	Emily Hatfield Senior Wildlife Biologist Ecosure	TfNSW Sarah Burke Office of Environment and Heritage Jess Bracks Ecosure
03	12/11/2018	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – FINAL R1	Emily Hatfield Senior Wildlife Biologist Ecosure	TfNSW Jess Bracks Ecosure
04	15/11/2018	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – FINAL R2	Emily Hatfield Senior Wildlife Biologist Ecosure	TfNSW Jess Bracks Ecosure
05	05/03/2019	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – FINAL R3	Emily Hatfield Ecosure Wildlife Biologist Ecosure	
06	09/04/2019	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – FINAL R4	Emily Hatfield Senior Wildlife Biologist Ecosure	TfNSW Jess Bracks Ecosure
07	07/06/2019	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – FINAL R5	Emily Hatfield Senior Wildlife Biologist Ecosure	TfNSW Jess Bracks Ecosure
08	09/072019	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – FINAL R6	Transport for NSW	Emily Hatfield Ecosure Jess Bracks Ecosure
09	16/07/2019	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – FINAL R7	Transport for NSW	Emily Hatfield Ecosure Jess Bracks Ecosure
10	12/08/2019	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – FINAL R8	Transport for NSW	Emily Hatfield Ecosure
11	25/09/2019	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – FINAL R9_track changes	Transport for NSW	
12	29/10/2019	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – FINAL R10	Emily Hatfield Ecosure	Jess Bracks Ecosure
13	08/02/2021	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – FINAL R11	Transport for NSW	Emily Hatfield Ecosure
14	14/12/2021	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – FINAL R12	Ellie Kirke Wildlife Biologist Ecosure	Jess Bracks Ecosure
15	16/06/2022	Parramatta Light Rail Grey-headed Flying-fox Monitoring Program – FINAL R13	Transport for NSW	Jess Bracks Ecosure

Distribution List

Copy #	Date	Type	Issued to	Name
1	16/06/2022	Electronic	Transport for NSW	Megan Haberley
2	16/06/2022	Electronic	Ecosure	Administration

Citation: Ecosure, 2021, *Parramatta Light Rail Grey-headed Flying-fox Monitoring Program July 2019*, Report to Transport for New South Wales, Ecosure, Brisbane

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PR4093-DE.PLR GHFF construction monitoring program.FINAL.R13

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29 June 2022

Transport for NSW

Attention to: **Megan Haberley**
Senior Manager Environment
Parramatta Light Rail
130 George St, Parramatta, NSW 2150

Review of Grey-headed Flying-fox Construction Monitoring Program
Parramatta Light Rail Stage 1
(Revision 15)

Pursuant to SSI8285 Condition of Approval A23 (d) i), as the approved Environmental Representative, I confirm that I have reviewed the updated Grey-headed Flying-fox Construction Monitoring Program, Parramatta Light Rail – Stage 1 (PLR-TFNSW-CBD-PE-PRG-000001), revision 15, dated June 2022, prepared by ecosure on behalf of Transport for New South Wales, for consistency with the requirements of the Conditions of Approval.

The amendments to the aforementioned document are editorial in nature and do not increase the type or magnitude of impact on the environment. These amendments are classified as minor and are approved in accordance with Condition of Approval C8. The document continues to be consistent with the requirements included in or required under the terms of the Conditions of Approval for the Parramatta Light Rail (Stage 1) development.

Yours sincerely,

Australian Quality Assurance & Superintendence Pty Ltd (AQUAS)

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