Flora and Fauna Management Plan

Transport for NSW

Supply, Operate, Maintain (SOM) Package

Parramatta Light Rail

November 2023

PLR1SOM-GLR-ALL-PM-PLN-000033 Rev 5

NSW GOVERNMENT

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Document control

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Revision	Date	Description
A	April 2019	Draft for review – prepared by Advisian
B	17/04/2020	Draft for review – Prepared by MMD
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5.1	20/11/2023	Revised to include ER comments on previous version.

Contents

Glossary / Abbreviations

Abbreviations	Expanded text
Ancillary facility	A facility established for construction of the project which will be decommissioned at the end of construction, which may include an office and amenities compound, construction compound, material crushing and screening plant, materials storage compound, maintenance workshop, testing laboratory and material stockpile area
AQF	Australian Qualifications Framework
AS	Australian Standard
BAR	Biodiversity Assessment Report
BC Act	*Biodiversity Conservation Act 2016*
BOCC	Back up Operations Control Centre
CAF	Construcciones y Auxiliar de Ferrocarriles
CBD	Central Business District
CEMP	Construction Environmental Management Plan
CoA	Conditions of Approval
Construction area	A separable portion of work that is identified early in construction planning to help drive early definition of construction methodology and alignment of design activities. Work Areas should be listed in the overall construction methodology. The planning document for a work area is called a CAP
CSSI	Critical State Significant Infrastructure
DBH	Diameter at Breast Height
DECCW	NSW Department of Environment, Climate Change and Water (former)
DPE	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
ECM	Environmental Control Map

Abbreviations	Expanded text
EES	Environment, Energy and Science Group (DPE) (replaces former OEH)
EIS	Environmental Impact Statement
EMM	Environmental Management Measure
EMS	Environmental Management System
Environmental aspect	Defined by AS/NZS ISO 14001:2004 as an element of an organisation's activities, products or services that can interact with the environment.
Environmental impact	Defined by AS/NZS ISO 14001:2004 as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects.
Environmental incident	An unexpected event that causes, or has the potential to cause, harm to the environment and requires some action to minimise the impact or to restore the environment.
Environmental objective	Defined by AS/NZS ISO 14001:2004 as an overall environmental goal, consistent with the environmental policy, that an organisation sets itself to achieve.
Environmental policy	Statement by an organisation of its intention and principles for environmental performance.
Environmental Representative	A suitably qualified and experienced person independent of project design and construction personnel employed for the duration of construction. The principal point of advice in relation to all questions and complaints concerning environmental performance.
Environmental target	Defined by AS/NZS ISO 14001:2004 as a detailed performance requirement, applicable to the organisation or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
EPO	Environmental Performance Outcome (as provided in the SPIR)
ETS	Electronic Ticketing System
FFMP	Flora and Fauna Management Plan
GHFF	Grey-Headed Flying-fox
GRCLR	Greater River City Light Rail

Abbreviations	Expanded text
IA	Independent Arborist
KPI	Key Performance Indicators
LGA	Local Government Area
NPW Act	*National Parks and Wildlife Act 1974*
OEH	NSW Office of Environment and Heritage (former; now Environment, Energy and Science Group)
OHW	Overhead wiring
Project sites	All Project sites within the SOM scope of works
PLR	Parramatta Light Rail
REMMM	Revised Environmental Management Measure
RMS	NSW Roads and Maritime Services (merged with TfNSW)
SaMF	Stabling and Maintenance Facility
SEMP	Site Establishment Management Plan
SEPP	State Environmental Planning Policy
SOM	Supply, Operate and Maintain package
SPIR	Submissions report (incorporating Preferred Infrastructure Report)
SSI	State Significant Infrastructure
TEC	Threatened Ecological Community
TfNSW	Transport for New South Wales
TOP	Tree Offset Package
UDLP	Urban Design and Landscape Plan
UDRR	Urban Design Requirements Report
Ventia	Remediation Contractor – Responsible for the remedial works at the Stabling and Maintenance Facility Site at Rosehill
WIRES	NSW Wildlife Information, Rescue and Education Service

1 Introduction

1.1 Context

This Flora and Fauna Management Plan (FFMP or Plan) is a Plan to the Construction Environmental Management Plan (CEMP) for the Parramatta Light Rail (PLR) Supply, Operate and Maintain (SOM) Contract (Package 5).

PLR is one of the NSW Government's major infrastructure projects being delivered to serve a growing Sydney. PLR will connect Westmead to Carlingford via Parramatta Central Business District (CBD) and Camellia. PLR is expected to be operational in 2024. More detailed description of the overall PLR Project is provided in Section 1.2.

The PLR Project received planning approval on the 29 May 2018 (SSI 8285) and has subsequently been modified twice with approvals issued on 21 December 2018 and 25 January 2019, respectively. This FFMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), the Revised Environmental Mitigation and Management measures (REMMM) and Environmental Performance Outcomes (EPOs) listed in the *Parramatta Light Rail Stage 1 Westmead to Carlingford via Parramatta CBD and Camellia Environmental Impact Statement* (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) and all applicable legislation.

1.2 Background and project description

PLR will create new communities, connect great places and help both local residents and visitors move around and explore what the region has to offer. The route will link Parramatta's CBD and train station to a number of key locations, including the Westmead Precinct, the Parramatta North Growth Centre, the new Western Sydney Stadium, the Camellia Town Centre, the new Powerhouse Museum and Riverside Theatre arts and cultural precinct, the private and social housing redevelopment at Telopea, the Rosehill Gardens Racecourse and the three Western Sydney University campuses.

In summary, the key features of PLR include:

- A new dual track light rail network of approximately twelve kilometres in length, including approximately seven 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 stops 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 5am to 1am. Weekday services will operate approximately every 7.5 minutes in the peak period between 7am and 7pm
- Modern and comfortable air-conditioned light rail vehicles, nominally 45 metres long and driver-operated, each 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 (SaMF) located in Camellia for light rail vehicles 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 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 (ETS)
- Real time information in light rail vehicles and at Stops via visual displays and audio.

An overview of PLR route is shown in Figure 1-1.

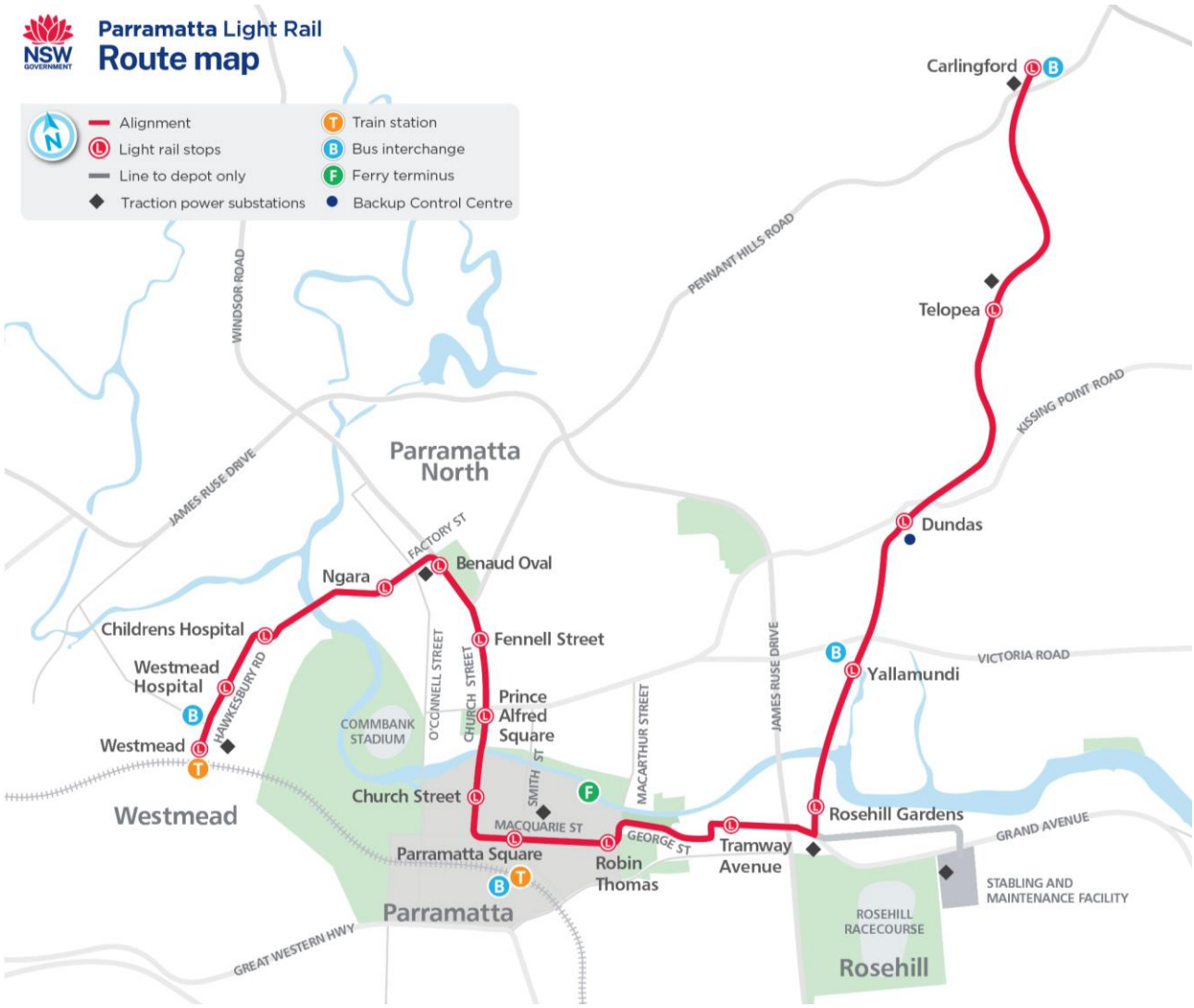

Figure 1-1: Parramatta Light Rail route

1.2.1 Statutory context

PLR has been subject to environmental impact assessment under the *Environmental Planning and Assessment Act 1979* (EP&A Act). It is classified as Critical State Significant Infrastructure (CSSI).

Detailed environmental impact assessments have been carried out and approved by the Minister for Planning. The Planning Approval for PLR is described in Section 1.2.2.

1.2.2 Parramatta Light Rail planning approval

The Parramatta Light Rail was approved by the Minister for Planning on 29 May 2018, under Section 5.19 of the *Environmental Planning and Assessment Act* (EP&A Act) *1979*. An environmental impact statement (EIS) was prepared as part of the infrastructure application (SSI-8285) as was a submissions and preferred infrastructure report (SPIR) following public exhibition of the EIS.

The Infrastructure Approval has subsequently been modified under Section 5.25 of the EP&A Act, with approvals issued on 21 December 2018 and 25 January 2019, respectively. The modifications related to changes to conditions of approval (CoA) not the physical description of PLR.

1.3 Staging of PLR Works

The PLR comprises approximately 12km alignment from Westmead to Carlingford via Camellia and consists of a mix of both on-street and dedicated corridor.

PLR is being delivered under five delivery packages as detailed in the Staging Report:

- Enabling Works (**Package 1**) – Local road network improvements including O'Connell Street and George Street (off-alignment)
- Westmead Precinct Works (**Package 2**) – Hawkesbury Road widening and demolition at Cumberland Hospital (east and west Campus)
- Early Works (**Package 3**) – Remediation of the Stabling and Maintenance Facility (SaMF)
- Infrastructure Works (**Package 4**) – 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 utility services (excluding high-voltage power supply and cabling for rail systems), and decommissioning of the T6 Carlingford Line
- Supply Operate and Maintain Works (**Package 5**) – The Project (subject of this Plan) Design and construction of the light rail systems, high-voltage power supply and stops above slab level, the supply of light rail vehicles, and the design and construction of the SaMF, including all light rail operations, customer service and asset management.

The Infrastructure Approval, modifications and related environmental assessment documents can be found at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8285.

1.4 Project description for Supply, Operate and Maintain – Package 5

As System Integrator for PLR, the Supply, Operate and Maintain (SOM) Contractor's activities include:

- Delivery activities
- Light rail vehicle procurement
- Operation and maintenance.

The delivery activities include all investigation, selection, specification, design, approvals, construction, manufacture, installation, testing & commissioning, operational readiness and activities to transition from the delivery phase to the operations phase.

In summary the package includes the following. Figure 1-2 further details these activities.

- All works above and additional to the platform concrete foundation slab at all stops
- Stabling and maintenance facility
- Central control system
- Light rail signalling system
- Elements of the road intersection signalling system
- Communications and passenger information systems
- Power Supply system
- Procurement of light rail vehicles (LRV)
- Testing and Commissioning (T&C)
- Maintenance plant and machinery for the LRVs
- Earthing & bonding, electrolysis and electromagnetic compatibility
- Electronic ticketing system for top up or ticket machine and fixed location reader.

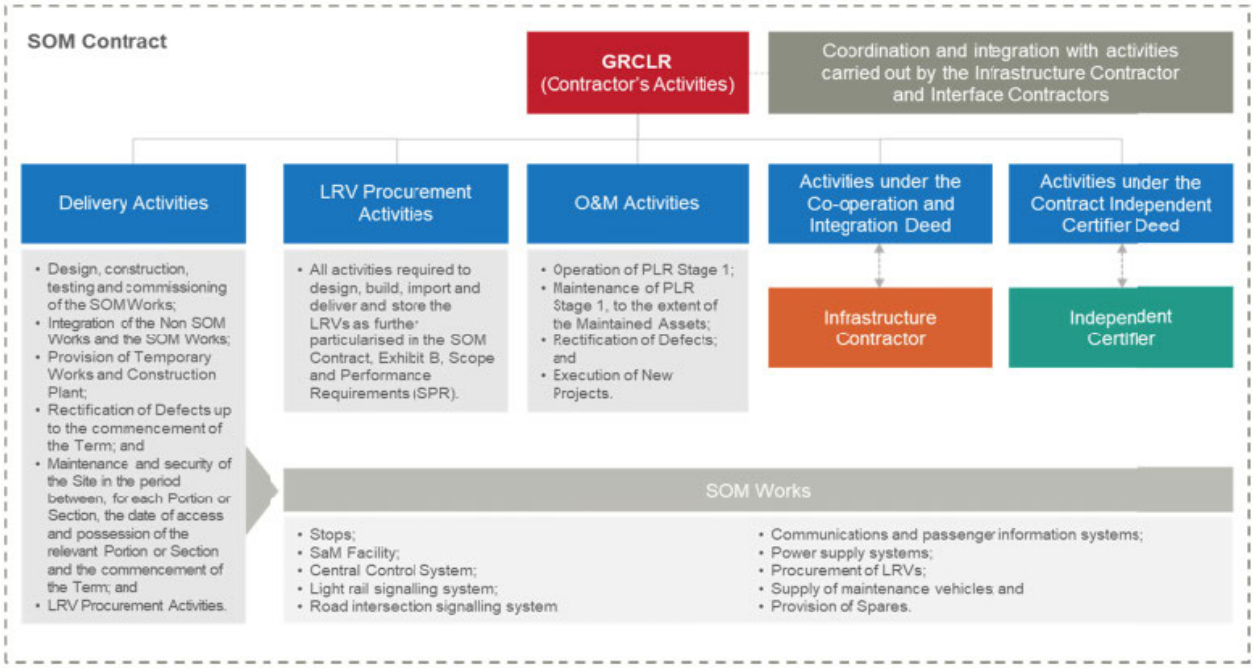

Figure 1-2: SOM contract activities for PLR

Great River City Light Rail (GRCLR) is responsible for the delivery of the SOM works for PLR. GRCLR has sub-contracted out the supply component of these works to Construcciones y Auxiliar de Ferrocarriles (CAF) who has engaged Thales, General Electric and Laing O'Rourke Australia (LORAC) to undertake the design and construction activities associated with the supply component of the works, which includes the design and construction related activities including testing and commissioning, and excludes all operational and maintenance activities.

GRCLR is the owner of the Construction Environmental Management Plan (CEMP) and Plans, and is responsible for ensuring implementation of and compliance by all subcontractors during

construction works of the SOM package, which include the construction of the light rail systems (including high-voltage power supply), stops above slab level, as well as the stabling and maintenance facility. Further detail on the SOM construction works is provided below.

All Project sites for the SOM scope of works have already been completely cleared of all vegetation by the Remediation and Infrastructure Contractors prior to handover of those sites to GRCLR for construction of SOM works.

1.4.1 Stops

Light rail stops would be constructed after the Infrastructure Contractor has completed the stop slabs and access, with works at each stop commencing progressively after the completion of the adjacent linear segment of track infrastructure. There are sixteen stops that would be constructed. The stops will be in the following locations:

- Westmead
- Westmead Hospital
- Childrens Hospital (Westmead)
- Ngara (Cumberland Hospital)
- Benaud Oval (Factory Street)
- Fennell Street
- Prince Alfred Square
- Church Street
- Parramatta Square
- Robin Thomas (Harris Street)
- Tramway Avenue
- Rosehill Gardens (Camellia)
- Yallamundi (Rydalmere)
- Dundas
- Telopea
- Carlingford.

1.4.2 Stabling and maintenance facility

A stabling and maintenance facility (SaMF) will be constructed at 6 Grand Avenue, Camellia on a former industrial site adjacent to the Rosehill Gardens Racecourse. The facility will provide for maintenance, repair, refurbishing, upgrading, stabling, cleaning of light rail vehicles and a base for infrastructure maintenance activities and will operate 24 hours a day and 7 days a week. Administration and staff facilities, as well as the operations control centre for the light rail network, will be located within the maintenance building. Parking for staff and visitors will be provided on site, including maintenance vehicle parking. An electrical substation will be located at the site to power the facility and light rail.

This site is referred to as Area of Environmental Interest (AEI) 27 in the Parramatta Light Rail (Stage 1) Westmead to Carlingford via Parramatta CBD and Camellia Environmental Impact Statement.

The site has undergone subsurface remediation works to render the site suitable for commercial industrial use. This work has removed all vegetation from the site. GRCLR will receive the site cleared of vegetation and with an unsealed capping layer.

The Local heritage listed tram alignment (I6) passes adjacent to the northern end of the site. Grand Avenue lies within the curtilage of the heritage tram alignment.

This site is to be used as the main SOM project compound. The facility will be established following completion of ground remediation works and capping of the site, which will be completed by others. GRCLR will receive the site along with a validation certificate from an EPA Accredited Site Auditor. Prior to establishment, the ground will be managed to minimise dust emissions.

The type and extent of works to construct the SaMF are summarised in Table 1-1.

Table 1-1: Type and extent of works to construct the SaMF.

Type of works	Works extent
Site establishment	• Site office and amenities during construction
Earthworks and subsurface works	• Combined service route • Drainage • Hydraulics (sewer, water, fire)
Civil works	• Fencing • Service roads • Footpaths • Carparks • Landscaping • Substation – TPS 8
Rail Systems	• Track • Overhead wiring • DC feeders
Structures	• Administration and Maintenance building (construction of foundation and slab, structural frame, roofing and cladding, MEP fit out, finishes) • Outbuildings (fire pump house, sanding plant building, cleaners store, train wash building)
Operations Control Centre	• Construction of foundation and slab, structural frame, roofing and cladding, MEP fit out, finishes • Fire pump house, sanding plant building, cleaners store, train wash building
Rail stops	none

1.4.3 Substations

Traction Power Substations (TPS) would generally comprise prefabricated structures, which are manufactured off-site. On-site works would typically comprise excavation, foundation preparation and construction, and the installation of conduits and other in-situ works (i.e. electrical works) prior to the installation of the prefabricated substation building and security fencing surrounding the site. Note that the demolition of existing buildings at TPS sites will be undertaken by the Infrastructure Contractor and is outside of the scope of this Plan.

1.4.4 Rail systems

The installation of rail systems would include the installation of overhead wiring and jewellery, rail signalling and associated infrastructure and systems. The overhead wiring structures and footings will be constructed by the Infrastructure Contractor, as will be the combined services route within

which the rail systems conduits will be installed. The overhead wiring (OHW), structures and footings within the SaMF will be constructed by SOM.

A Backup Operations Control Centre (BOCC) will be constructed adjacent to Dundas Station on the corner of Dudley Street and Calder Road, Dundas. Table 5.1 provides the construction activities being undertaken at the BOCC site.

1.4.5 Testing and Commissioning

The Testing and Commissioning (T&C) phase of Parramatta Light Rail – Stage 1 Supply, Operate, Maintain, Package 5 (SOM) includes the introduction of Light Rail Vehicles (LRVs) to the alignment, LRV testing and ramp-up to operational readiness, including a 28-day trial run period.

T&C is considered to be a 'construction' activity under the Infrastructure Approval (SSI-8285) and Environmental Protection Licence (EPL) 21606 and the subordinate management system framework. However, as T&C also incorporates movements of LRVs along the alignment, some approval conditions relating to rolling stock also apply. Therefore, T&C activities straddle 'construction' and 'operation' in a way that other SOM activities do not.

Key T&C activities (not necessarily in chronological order) include:

A. Introduction of LRVs to the alignment:
    i. Static testing of LRVs at the SaMF
    ii. Localised infrastructure tests on the alignment without LRVs
    iii. Running an LRV during the daytime from SaMF to Carlingford.
B. Increased LRV running, incorporating:
    i. Dynamic testing at the SaMF, including main depot interfaces
    ii. Initial dynamic testing along the alignment (SaMF to Carlingford) with traffic controls
    iii. LRV integration testing with signalling and communications system (SaMF to Carlingford)
    iv. Initial dynamic testing along the alignment (Westmead to Tramway Avenue) with traffic controls, including movements near Cumberland Hospital
    v. Broader dynamic testing along the alignment without traffic controls
    vi. Driver training.
C. Trial running on the alignment.
    i. Full schedule trial running (28 days, 0500 to 0100).

1.5 Scope of this Plan

The scope of this FFMP is to outline how GRCLR proposes to manage and control construction impacts to flora and fauna. It has been prepared for the construction of Package 5 Activity A (Stabling and Maintenance Facility) and Activity B (remaining SOM works), as per the PLR Staging Report. Referred to as the Project.

This FFMP applies to the construction of the stabling and maintenance facility (SaMF), and the entirety of the SOM works for the whole alignment including; Stops, Traction Power Stations (TPS), Back-up Operations and Control Centre (BOCC), and other sites (i.e. full SOM scope or construction works). It also covers all Testing and Commissioning activities prior to operations.

The FFMP is applicable to all activities during construction including all areas where physical works will occur, or areas that may be otherwise impacted by the construction works, and which are under the control of the GRCLR. All GRCLR staff and sub-contractors are required to operate fully under the requirements of this Plan and related environmental management plans, over the full duration of the construction program.

The FFMP is required to be submitted to the Secretary for information, at least one month before construction works commence in accordance with CoA C6. Construction would not commence until the FFMP is submitted to the Secretary. Construction of each stage would not commence until the FFMP for that stage have been submitted to and approved by the Secretary.

1.6 Relationship with relevant works packages

1.6.1 Infrastructure contractor – Parramatta Connect (Package 4)

The Infrastructure Works is closely aligned to the Package 5, Supply, Operate and Maintain (SOM) Works. A graphical representation of the split in scope between the two packages is depicted in Figure 1-3. The reason for dividing this work into two packages is to ensure that suitably qualified and experienced sub-contractors are in place for each specialised component; civil infrastructure, and operational systems. The Infrastructure Works will deliver the civil infrastructure components and will not trigger the operational conditions, except for those that relate to detailed design.

An interface between the two packages has been established to monitor cumulative impacts and the coordination of environmental complaints management, site management controls, and the delineation of incident reporting and non-compliance management.

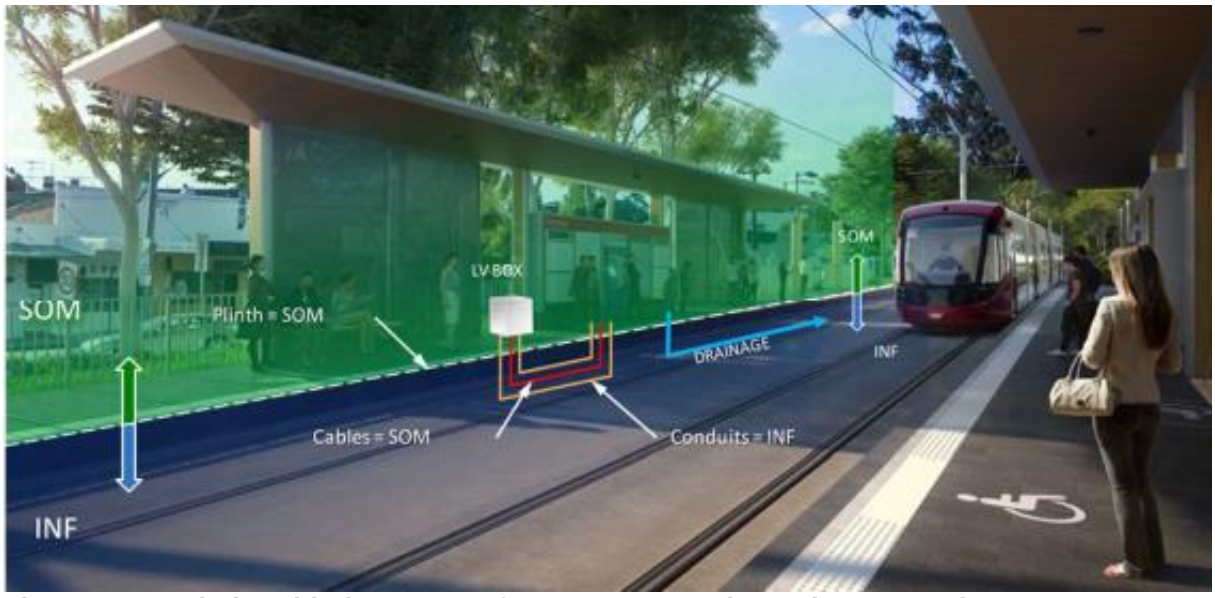

Figure 1-3: Relationship between Infrastructure Works and SOM Works

1.6.2 Early works portion 2 contractor – Ventia (Package 3)

The SOM contract is dependent on the completion of the remediation works at the stabling and maintenance facility (SaMF) site, by the Early works portion 2 contractor (referred to as the remediation contractor).

The SaMF site is subject to historical contamination and is a listed contaminated site by the Environment Protection Authority (EPA). The works have been split to ensure that appropriately qualified contractor, experienced in remediating heavily contaminated sites, is managing the remediation of the site. The remediation contractor will complete their works and provide GRCLR a remediated site, complete with a site audit statement, and supporting management documentation, fit for purpose for site establishment, construction and operational activities associated with PLR.

The remediation works will deliver the remediated site, including any details of any ongoing management requirements, and will not trigger the construction and operational conditions, except for those that relate to detailed design. The Remediation Contractor will provide GRCLR with a Long Term Environmental Management Plan (LTEMP) for the SaMF, the LTEMP will include all construction, operation, management, maintenance and monitoring requirements for the SaMF. GRCLR will implement the requirements relevant to the construction of the Stabling and Maintenance facility.

Ongoing management for the remedial works on the SaMF site will be implemented through a Long Term Environmental Management Plan (LTEMP) which will be approved by the Site Auditor, as part of the issuing of the Site Audit Statement (SAS) for the site. The LTEMP will be a stand-

alone document, and all monitoring and reporting will be managed through the processes and procedures in the LTEMP, and not through the SOM CEMP.

An interface between the two packages has been established to ensure the remediated site meets the design requirements for the construction, operation and maintenance of the site.

1.7 Environmental management systems overview

The construction of the Project will be managed in accordance with the GRCLR Integrated Management System (IMS) which includes an Environmental Management System (EMS). The EMS will be adopted as the guiding environmental management framework for the Project. The EMS is compliant with AS/NZS ISO 14001:2015. The EMS is integrated with the project wide IMS which includes assurance, quality and health and safety, management systems.

The EMS will guide the development of the Project's governance documentation, including the Site Establishment Management Plan (SEMP), the CEMP and associated management plans (including this Plan), procedures and management tools to achieve the commitments and intentions established by the GRCLR Environment and Sustainability Policy, to ensure environmental performance and sustainability objectives and targets are achieved.

All works carried out on the site will be in accordance with:

- Minister's Conditions of Approval (CoA) SSI-8285
- Revised Environmental Mitigation and Management Measures (REMMMs)
- Environmental Performance Outcomes (EPO's)
- AS/NZ ISO 14001
- All applicable legislation
- Project Deed
- GRCLR IMS.

1.7.1 Construction Environmental Management Plan

A CEMP has been prepared for the SOM contract (Package 5). This CEMP provides the system to manage and control the environmental aspects of the SOM contract (Package 5) during construction. It also provides the overall framework for the system and procedures to ensure environmental impacts are minimised and legislative and other requirements are fulfilled. In accordance with CoA C8 construction will not commence until the CEMP and the associated management plans specified in CoA C3 are approved by the Secretary or provided to the Secretary for information (as required by CoA C3).

1.7.2 Environment management plans

Subject-specific environmental management plans have been prepared to support the CEMP. These documents were prepared to identify requirements and processes applicable to specific impacts or aspects of the SOM contract (Package 5). They address the relevant requirements of the CoAs, REMMMs and EPOs. A list of construction management plans for the SOM contract (Package 5) and their approval requirements are provided in Table 1-2.

Table 1-2: Environmental management plans

Document name	Document number	Approval pathway/ requirement
Traffic, Transport and Access Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000032	REMMM GEN-1 CoA C3 (a) REMMM TT-25
Flora and Fauna Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000033	REMMM GEN-1 CoA C3 (e) REMMM BI-3
Soil and Water Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000035	REMMM GEN-1 REMMM HY-6
Noise and Vibration Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000034	REMMM GEN-1 CoA C3 (b) REMMM NV-1
Heritage Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000037	REMMM GEN-1 CoA C3 (d) REMMM AB-2 REMMM HE-21
Air Quality Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000038	REMMM GEN-1 REMMM AQ-1
Construction Waste and Resource Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000039	REMMM GEN-1 REMMM WM-2
Contaminated Land Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000040	REMMM GEN-1 REMMM CM-3
Site Establishment Management	PLR1SOM-GLR-ALL-PE-PLN-001002	REMMM GEN-1 CoA C18 REMMM GEN-2

Document name	Document number	Approval pathway/ requirement
Flood Management Plan	PLR1SOM-GLR-ALL-PM-PLN-000047	REMMM GEN-1 CoA C3 (c) REMMM HY-4

1.7.3 Interaction with other management plans

Documents that have been incorporated into this Plan include:

- Grey-headed Flying-fox Monitoring Program – the monitoring program required under CoA C9(c) has been prepared as a free-standing document.
- Biodiversity Offset Strategy – identifies the residual biodiversity impacts which require offsets (i.e. focus on threatened ecological communities and threatened species) and identifies the ecological values of the offsets.

2 Purpose and objectives

2.1 Purpose

The purpose of this Plan is to describe how construction impacts on flora and fauna will be minimised and managed during the construction of the Project.

2.2 Objectives

The key objectives of the FFMP are to:

- Ensure the Project is constructed in compliance with all relevant Conditions of Approval (CoA), Revised Environmental Mitigation and Management Measures (REMMMs), Environmental Performance Outcomes (EPO) and any other licence/permit requirements relevant to the protection of all native flora and fauna including threatened species and threatened ecological communities
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Section 3 of this Plan
- Ensure compliance with the Environmental Impact Statement prepared for PLR Stage 1 (August 2017) and SPIR (February, 2018).

2.3 Targets

Targets for the management of flora and fauna during the Project are presented in Table 2-1, with key performance indicators for each.

Table 2-1: Targets and key performance indicators for fauna and flora management

Target	Key Performance Indicators	Records
Full compliance with the relevant legislative requirements, CoA, REMMMs and EPOs.	No non-conformances, and no reoccurrences when non-conformances identified	Environmental inspection checklist, audits
Avoid disturbance to flora and fauna outside the Project construction sites and minimise impacts within the Project footprint	• Implement Grey-headed Flying-fox mitigation measures, as required to minimise potential impacts to the camp. • All native mammals, birds and reptiles encountered during construction are handled by an ecologist in accordance with the Fauna rescue and release procedure detailed in section 6.3	Environmental inspection checklist, audits
Minimise the introduction and distribution of weed species	• Implementation of 'Arrive Clean, Leave Clean' procedure described in section 6.4, focusing on monitoring for	Environmental inspection checklist, audits

Target	Key Performance Indicators	Records
	early identification and management of invasive weeds and pathogens.	
Remediation / rehabilitation of disturbed areas	• Revegetation / remediation of disturbed areas to be completed within 1 month of completion of works in that area	Environmental inspection checklist, audits

3 Environmental requirements

3.1 Relevant legislation and guidelines

3.1.1 Legislation

Legislation relevant to flora and fauna is included in Table 3-1.

Table 3-1: Relevant legislation for the management of flora and fauna

Act	Requirement
Biodiversity Conservation Act 2016 Biodiversity Conservation Regulation 2017	This Act and Regulation provide for obtaining licenses to harm or pick threatened species populations or ecological communities whether plant or animal or to damage any critical habitat. The offence of picking or harming any threatened species is covered under the National Parks & Wildlife Act Part 8A. It is a defence under Part 8A of that Act if the offence was essential to carrying out development that is in accordance with a Development Consent within the meaning of the EP&A Act or an approval within the meaning of Part 5 of the EP&A Act. **Requirements -** Maintain a wealthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development.
Biosecurity Act 2015 Biosecurity Regulation 2017	This Act relates to diseases and pests that may cause harm to human, animal or plant health or the environment, and for related purposes. Declared weeds are listed in Schedule 3 of the Biosecurity Regulation 2017. **Requirements –** Land managers have a responsibility for managing biosecurity weeds on their property.
Environmental Planning and Assessment Act 1979 Environmental Planning and Assessment Regulation 2000	This Act and Regulation establishes a system of environmental planning and assessment of development proposals for the State. **Requirements -** Comply with the Minister for Planning's approval for the Project. Any modification to the Project must undergo further approval from the Minister for Planning.
Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022	The plan provides a framework for the implementation of the *NSW Biosecurity Act 20*15 by articulating community expectations in relation to effective weed management and facilitating a coordinated approach to weed management in the region.

Act	Requirement
	Requirements - Land managers have a responsibility for identifying and managing regional biosecurity weeds.
National Parks and Wildlife Act 1974	The objective of this Act is to conserve nature, including habitats, ecosystems, biodiversity and landforms. **Requirements –** No protected species can be picked or harmed (unless approved by the Chief Executive)
Pesticide Act 1999	This Act controls the use of pesticides in NSW. **Requirements –** No non-target animals or non-target plants can be harmed as a result of using pesticide onsite.

3.1.2 Guidelines

The main guidelines, specifications and policy documents relevant to this Plan include:

- Transport for NSW's Fauna Management Guidelines 3TP-SD-113/4.0
- Transport for NSW's Weed Management and Disposal Guideline 3TP-SD-110/2.0
- Australian Standard 4419-2003 Soils for Landscaping
- Roads and Maritime Service's: Biodiversity Guidelines – Protecting and managing biodiversity on RTA projects (2011)
- IS Technical Manual Version 1.2, Infrastructure Sustainability Council of Australia (ISCA, 2016)
- NSW Government's: Arrive Clean, Leave Clean (2015)
- Parramatta Council's Parramatta Ways: Implementing Sydney's Green Grid
- Transport for NSW's Guide to Environmental Control Maps
- Australian Standard AS 4373 – Pruning of Amenity Trees
- Australian Standard AS 4970 – 2009 – Protection of Trees on Development Sites
- Transport for NSW's Vegetation Management (Protection and Removal) Guideline 9TP-SD-111/3.0.

3.2 Ministers Conditions of Approval

The CoA relevant to this Plan are listed in Table 3.2. A cross reference is also included to indicate where the condition is addressed in this Plan or other project management documents.

Table 3-2: Minister's Conditions of Approval relevant to the FFMP

CoA No.	Condition Requirements	Document Reference	How Addressed
A1	The CSSI must be carried out in accordance with the terms of this approval and generally in accordance with the description of the CSSI in the Parramatta Light Rail (Stage 1) Westmead to Carlingford via Parramatta CBD and Camellia Environmental Impact Statement (dated August 2017) (the EIS) as amended by a) the Parramatta Light Rail (Stage 1) Westmead to Carlingford via Parramatta CBD and Camellia Submissions Report (incorporating Preferred Infrastructure Report) (February 2018) (the SPIR); b) SSI 8285 Administrative modification (November 2018) (MOD 1); c) SSI 8285 Correction to Administrative modification (January 2019) (MOD 2).	General note	Tables 3-1, Table 3-1, Table 3-3, Table 3-4 and Table 6-1 demonstrate how the Project works will be carried out in accordance with CoA A1.
A5	Where the terms of this approval require a document or monitoring program to be prepared or a review to be undertaken in consultation with identified parties, evidence of the consultation undertaken must be submitted to the Secretary with the document or	Stand Alone Consultation Report [PLR1SOM-GLR-ALL-EN-RPT-001009]. Summary in Appendix A The CEMP	Appendix A provides a summary of consultation undertaken on this plan. A complete record of the consultation undertaken for this Plan demonstrating compliance with A5 is in a standalone consultation report submitted to DPE together with this plan.

CoA No.	Condition Requirements	Document Reference	How Addressed
	monitoring program or review. The evidence must include: a) Documentation of the engagement with the party(ies) identified in the relevant condition of approval before submitting the document for approval b) Log of the points of engagement or attempted engagement with the identified party(ies) and a summary of the issues raised by the identified party(ies) c) Documentation of any follow-up with the identified party(ies), where feedback has not been provided, to confirm that the identified party(ies) has none or has failed to provide feedback after repeated requests d) Outline of the issues raised by the identified party(ies) and how they have been addressed, including evidence that the party(ies) is satisfied the issues have been addressed e) Where there are outstanding issues raised by the identified party(ies) that have not been adopted, the reasons why they have not been/could not be adopted must be provided, including evidence of consultation with the relevant party(ies).		The following consultation has been undertaken for this FFMP: • City of Parramatta Council • Environment, Energy and Science (EES), which replaces OEH. All comments have been considered and this document updated accordingly. Each document or monitoring program that is to be prepared or a review to be undertaken in consultation with identified parties will be issued to the relevant party and a summary only of the records included in Appendix A of this Plan.

<table>
<tr><th>CoA No.</th><th>Condition Requirements</th><th>Document Reference</th><th>How Addressed</th></tr>
<tr>
<td>C3</td>
<td>The following CEMP Sub-plans must be prepared in consultation with the relevant government agencies identified for each plan and be consistent with the CEMP referred to in Condition C1:
<table>
<tr><th>Required CEMP Sub-plan</th><th>Relevant government agencies to be consulted for each CEMP Sub-plan</th><th>Secretary Approval/ Information</th></tr>
<tr><td>(a) Traffic, transport and access</td><td>Relevant Council(s), Roads and Maritime Services, Emergency Services</td><td>Information</td></tr>
<tr><td>(b) Noise and vibration</td><td>Relevant Council(s), EPA, NSW Health</td><td>Approval</td></tr>
<tr><td>(c) Flood Management</td><td>Relevant Council(s), OEH, Sydney Water</td><td>Information</td></tr>
<tr><td>(d) Heritage</td><td>Relevant Council(s), OEH</td><td>Approval</td></tr>
<tr><td>(e) Flora and Fauna Biodiversity</td><td>Relevant Council(s), OEH</td><td>Information</td></tr>
</table>
</td>
<td>Appendix A (summary only)

Stand Alone Consultation Report [PLR1SOM-GLR-ALL-EN-RPT-001009].

The CEMP</td>
<td>This FFMP has been prepared for the construction the Project as described in Section 1.4

The following consultation is to be undertaken for this FFMP:
• City of Parramatta Council
• EES, which replaces OEH.

All comments have been considered and this document updated accordingly.

The summary of records of consultation will be provided in Appendix A of this Plan, and full record in a standalone consultation report (See A5).</td>
</tr>
</table>

CoA No.	Condition Requirements	Document Reference	How Addressed
C4	The CEMP Sub-plans must state how: a) The environmental performance outcomes identified in the documents listed in Condition A1 will be achieved; b) The mitigation measures identified in the documents listed in Condition A1 will be implemented; c) The relevant terms of this approval will be complied with; and d) Issues requiring management during construction, as identified through ongoing environmental risk analysis, will be managed.	Section 2, Section 3.2, Section 5, Table 2-1, Table 3-3, Table 3-4 and Table 6-1	a) Section 2 and Table 2-1 identifies the environmental objectives and targets and Table 3-4 b) Table 3-3 provides a guide to where the relevant REMMMs have been addressed in this Plan c) This section (Section 3.2) outlines the terms of this approval and will be complied with through the preparation and implementation of this Plan d) The issues requiring management are outlined in Section 5 of this Plan, which describes the construction activities and predicted impacts. The environmental risk assessment for the Project works is outlined in the CEMP (with an environmental risk register included in Appendix A2 of the CEMP).
C5	The CEMP Sub-plans must be developed in consultation with relevant government agencies (including Relevant Council(s)). Details of all information requested by an agency to be included in a CEMP Sub-plan as a result of consultation, including all copies of correspondence from those agencies, must be provided to the Secretary with the relevant CEMP Sub-plan.	Appendix A Stand Alone Consultation Report [PLR1SOM-GLR-ALL-EN-RPT-001009].	This FFMP has been developed in consultation with relevant government agencies, as required by CoA C3. Details of this consultation is summarised in Appendix A of this Plan, and recorded in a Stand Alone Consultation Report [PLR1SOM-GLR-ALL-EN-RPT-001009] which is to be provided to the Secretary in accordance with CoA C3 and A5. The following consultation will be undertaken for this FFMP:

CoA No.	Condition Requirements	Document Reference	How Addressed
			• City of Parramatta Council • EES, which replaces OEH. Cumberland City Council consultation is not required for the Project, as the Project construction sites are outside the Cumberland City Council boundary. All comments have been considered and this document updated accordingly.
C6	Any of the CEMP Sub-plans may be submitted along with, or subsequent to, the submission of the CEMP but in any event, no later than one month before construction.	General note	Discussed in Section 1.5 and Table 6-1.
C8	Construction must not commence until the CEMP and any CEMP Sub-plan specified in Condition C3 have been submitted to or approved by the Secretary. The CEMP and CEMP Sub-plans submitted to or approved by the Secretary, including any minor amendments approved by the ER, must be implemented for the duration of construction. Where construction of the CSSI is staged, construction of a stage must not commence until the CEMP and Sub-plans for that stage have been submitted to or approved by the Secretary. Note: The requirement to submit or have a CEMP or CEMP Sub-plan approved is specified in Condition C3.	Section 1.5	Construction will not commence until this Plan has been submitted to the Secretary for information and will be implemented for the duration of construction. Details of this have been incorporated into Section 1.5.

CoA No.	Condition Requirements	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 Monitoring Program	Appendix C	The *Grey-headed Flying-fox Monitoring Program Ecosure 2019* has been prepared to identify the monitoring requirements and mitigation measures during construction of the Project, in accordance with C9 (refer to Appendix C).
E100	The Proponent must avoid and/or minimise the removal of native vegetation or other bushland that provides habitat for native fauna with the objective of reducing impacts to threatened species, populations and ecological communities. Impacted vegetation must be rehabilitated in proximity to the area of disturbance with a diversity of endemic species (in the first instance) and locally native tree, shrub and groundcover species to the greatest extent practicable or offset in accordance with the Proponent's Biodiversity Offset Strategy and the Flora and Fauna Management Plan required by Condition C3, in consultation with OEH, DPI Fisheries, and the Biodiversity Conservation Trust.	Section 4.6	All Project sites have already been cleared of all significant communities of established vegetation by the Remediation and Infrastructure Contractors. Consultation with DPI Fisheries is not applicable to this plan, due to the works not impacting riparian environments. Additionally, consultation is not considered applicable with the Biodiversity Conservation Trust, as vegetation removal works are limited to vegetation pruning for overhead utilities or individual trees not previously cleared by the infrastructure contractor that are determined to be impacted by the Project works.
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	Appendix C Table 6-1	The Grey-headed Flying-fox Monitoring Program (Ecosure 2019) will monitor for the location of the Grey-headed Flying-fox camp (refer to Appendix C). Monitoring will be undertaken by a suitably

CoA No.	Condition Requirements	Document Reference	How Addressed
	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. Monitoring must commence at least 12 months before the commencement of construction within 300 metres, unless otherwise agreed with the Secretary, of the camp to establish baseline behaviour. Monitoring must be undertaken regularly during construction (in consultation with OEH) with the results compiled in a monitoring report submitted to OEH each month. Monitoring should include species present, numbers, a map of the extent of the camp, breeding status, and condition of animals. 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.		qualified and experienced fauna specialist (Ecosure). The requirements of this condition have been included as a mitigation measure FF8 (Table 6-1).
E102	The Proponent must commission a suitably qualified and experienced Arborist with a minimum AQF Level 5 qualification in Arboriculture that is independent of the design and construction personnel for the duration of construction. The Arborist must be approved by the Secretary before works commence and commissioned for the duration of construction.	Section 6.2	An Independent Arborist has been engaged by TfNSW to fulfil the requirements of this CoA. The nominated Independent Arborist was approved on the 21 August 2018 by the Secretary (letter reference DOC18/584975) and will be engaged for the duration of the entire PLR project.
E103	The Arborist must:	Section 6.2	The Tree Register will be delivered by the Independent Arborist (engaged by TfNSW – see

CoA No.	Condition Requirements	Document Reference	How Addressed
	a) Be the principal point of advice in relation to the assessment and management of CSSI impacts on trees b) Prepare a Tree Register of all trees within the CSSI footprint (either for the entire CSSI or separate areas where tree removal and/or pruning is proposed) before the removal of any trees c) Identify those trees within the footprint that must be removed for construction to proceed or for CSSI operations d) Identify those trees where their fate is uncertain and may be retained, removed or pruned (either for construction or for ongoing maintenance during operation).		E102 above) in stages to reflect the staged construction of the CSSI.
E104	The Tree Register must include: a) The georeferenced location of each tree; b) Those attributes as defined in AS 4970-2009 protection of trees on development sites; c) The tree retention value; d) The outcomes of a visual assessment of the condition of the tree;	Section 6.2.3	The Tree Register would be managed by the Independent Arborist (see E102 and E103) and updated during the detailed design phase. During construction, a tree impact form will be filled out by the Project Arborist and submitted to the Independent Arborist. Through this form, package contractors would be required to demonstrate the requirements of Condition E105 before the removal, damage or pruning of a tree in accordance with Condition E106.

CoA No.	Condition Requirements	Document Reference	How Addressed
	e) Where a tree requires removal, whether, in the opinion of the arborist, it can be successfully transplanted f) The extent of the proposed impact (complete removal or extent of pruning) g) Measures for the management, protection and monitoring of compensatory vegetation for a minimum of two years from being planted h) Timing and responsibilities for the implementation of compensatory vegetation.		Section 6.2.3 commits to development of a Tree Register (prepared by the Independent Arborist) in compliance with relevant CoAs.
E105	For those trees identified as requiring removal in the Tree Register, the Proponent must demonstrate consideration of options to avoid or minimise impacts on trees through the detailed design and construction planning process. The options considered must include, but not be limited to: a) Consideration of operational requirements with existing tree locations b) Consideration of the health of each tree, including its vigour and likely ability to survive in situ pruning or transplanting c) Review of the construction methodology and layout to identify any options to avoid or minimise impacts on trees	Section 6	Any pruning or removal required to trees located on adjacent properties and overhanging the SOM works sites would be assessed as per the requirements of Condition E105 by a suitably qualified arborist and included in the Tree Register. Appropriate measures will be implemented as required on an individual basis, as discussed in Section 6, in accordance with the GRCLR Tree Management Procedure.

CoA No.	Condition Requirements	Document Reference	How Addressed
	d) Considering opportunities to narrow/move footpaths e) Modification of the design to reduce impact to the tree (e.g. Use of porous pavement) f) Reduction in the standard offsets required for underground services g) Where fencing, other ancillary infrastructure or services affect tree retention, relocation or alternative construction methods are considered to reduce impacts (e.g. From strip footings to pier footings for posts).		
E106	The Tree Register and any evidence required by Condition E105 must be submitted to the Secretary before the removal or damage (as defined by the Independent Arborist) of a tree for the purposes of the CSSI. The recommendations of the Independent Arborist must be outlined in the Tree Register and implemented by the Proponent, unless otherwise agreed by the Secretary.	Tree Register Section 6.2	The Tree Register shall be maintained by the Independent Arborist and updated in stages to reflect the staged construction of the CSSI. Section 6 commits to complying with the CoA.
E107	The Proponent must prepare and implement a Tree Offset Package for the CSSI in consultation with the independent Arborist required by Condition E102, and Relevant Council(s). The Package must consider the objectives and opportunities identified in Sydney Green Grid West Central District (Department of Planning and Environment, 2017), Greener Places (NSW Government Architect, 2017), and Parramatta	Tree Offset Package Section 4.6 Section 6.2	TfNSW is responsible for developing the Tree Offset Package (TOP) required under Condition E107. GRCLR will provide necessary information to allow TfNSW to prepare the TOP. The Project works will comply with the Urban Design Requirements Report (UDRR) that

CoA No.	Condition Requirements	Document Reference	How Addressed
	Ways (Implementing Sydney's Green Grid) (City of Parramatta, 2017). The package must: a) Identify how impacts on trees and vegetation will be mitigated, managed, and compensated b) Ensure that where trees are removed, they are replaced at the following ratios regardless of their value, near the impact or, where this is not practicable, within other areas of the lga or surrounding lgas, in consultation with the relevant authority(s): i. Large trees (DBH greater than 60cm) – plant minimum of eight trees ii. Medium trees (DBH greater than 15 cm, but less than 60 cm) – plant minimum of four trees iii. Small young trees (DBH less than 15cm) – plant minimum of two trees. c) Ensure a mix of species and a range of mature heights to provide visual diversity and benefits, in consultation with the Relevant Council(s) d) Street tree plantings are to have a minimum pot size of: i. 200 litres in the Parramatta CBD precinct ii. 75 litres in other streets. e) Tree planting in parks, open space, bushland, and within the Carlingford Line corridor, should be sized to suit the location, species and planting style, in consultation with the relevant authority(s)		incorporate the planting requirements of the TOP for SOM scope of works only. This will be done in accordance with the Staging Report.

CoA No.	Condition Requirements	Document Reference	How Addressed
	f) Ensure at least 80% offset works must be completed before CSSI operations commence. Where the requirements of this condition cannot be met, the Proponent must provide documented evidence demonstrating how the matters in (a) to (f) were considered and provide information and justification for an alternative offset option for the Secretary's approval.		
E108	The ongoing maintenance and operation costs of urban design and landscaping items (including tree offsets) and works implemented as part of this approval remain the Proponent's responsibility until satisfactory arrangements have been put in place for transfer to the relevant authority. Before the transfer, the Proponent must maintain items and works to the design standards established by the Urban Design Requirements Report, and the Tree Offset Package.	Urban Design Requirements Report Tree Offset Package	This requirement is committed to in the Project's UDRR and TOP.

3.3 Revised environmental mitigation and management measures

Relevant REMMMs from the SPIR are listed in Table 3-3. This includes references to required outcomes, the timing of when the commitment applies, relevant documents or sections of the environmental assessment influencing the outcome and implementation.

Table 3-3: Revised environmental mitigation and management measures relevant to this FFMP

REMMM	Environmental mitigation and management measures	Document Reference	How Addressed
BI-3	A flora and fauna management plan would be prepared as part of the CEMP. Specific measures would be identified in consultation with relevant government agencies. The flora and fauna management plan would include the following: • A requirement to prepare Environmental Control Maps in accordance with Transport for NSW's Guide to Environmental Control Map. The maps would delineate ecologically sensitive areas (such as habitat areas or locations of threatened species, populations or ecological communities), clearing extents, vegetation to be retained, and any other no go areas • Procedures for the clearing of vegetation and the relocation of flora and fauna. Where possible, the removal of native vegetation would be minimised as far as practicable. Measures to minimise the removal of native vegetation would include: ◦ Use of high visibility fencing (such as barrier mesh) to delineate vegetation to be retained or limits of clearing ◦ A trained ecologist would accompany clearing crews in order to ensure disturbance is minimised and to assist any native animals to relocate to adjacent habitat. • Measures to reduce disturbance to sensitive fauna ◦ Rehabilitation requirements, including identification of flora species and sources, and measures for the management and	Section 5.3 Section 6 Section 7.3 The CEMP	Consultation is to be carried out with the relevant government agencies to identify specific measures. These agencies include: • City of Parramatta Council • EES Section 6 commits to the preparation of Environmental Control Maps (ECMs) which identify sensitive areas. ECMs will be prepared in accordance with TfNSW's Guide to Environmental Control Map, and endorsed by the ER. Fauna protection and clearing procedures are provided in Section 6, which includes the stated measures. Section 6.4 states how the Project works would control the introduction of weeds; including training, soil segregation, cleaning of tools and equipment upon

REMMM	Environmental mitigation and management measures	Document Reference	How Addressed
	maintenance of rehabilitated areas (including for example a program of weed removal and monitoring) ◦ Weed management measures focusing on monitoring for early identification of invasive weeds and pathogens and detailed effective management controls for minimising the risk of introducing weeds and pathogens ◦ Procedure for dealing with unexpected identification of threatened Ecological Communities or threatened species during construction ◦ Auditing and monitoring of the plan.		entry to the site and compliance with guideline measures. Section 6.5 provides the procedure in case of unexpected threatened species finds. The procedure involves the prevention of further impact, notification/consultation and protection steps. Monitoring (Section 7.3) will involve inspection of sensitive areas and activities with the potential to cause impact. Internal and external audits will be undertaken in accordance with the CEMP to review compliance with the management plan.
BI-7	The flora and fauna management plan would include measures to mitigate habitat loss as a result of the project. These measures would be confirmed during preparation of the plan, and would include: • Consideration would be given to fitting roost boxes to the bridges over existing river crossings to provide roost sites for the Large-footed Myotis and other species of microbats (e.g. Eastern Bentwing-bat) which may utilise such structures. The quantity and location of roost boxes would be determined in consultation with an ecologist to meet the specific needs for the targeted species and would be installed prior to structure disturbance • Nest boxes of a variety of designs would be installed including boxes suitable for roosting by microbats. Relocation of natural hollows by either affixing them to existing live retained trees or to	Section 6 Table 6.1	The Project sites have already been cleared of all significant communities of established vegetation by the Remediation and Infrastructure Contractors and works do not include any impacts on bridge structures so many of the measures are not applicable. The contingency plan outlined in the Grey-headed Flying-fox monitoring program (produced by others) is committed to in Section 6.7. Contingency measures will include reporting to TfNSW

REMMM	Environmental mitigation and management measures	Document Reference	How Addressed
	poles/trunks of felled trees installed in revegetated areas would also be considered as an alternative to nest box installation. The quantity and location of roost boxes would be determined in consultation with an ecologist to meet the specific needs for the targeted species and would be installed prior to disturbance in the area • Important habitat elements (e.g. large woody debris) would be moved from the construction area to locations outside the clearing area in native vegetation remnants or to stockpiles for later use in vegetation/habitat restoration • Development of contingency measures with relation to the potential impacts to the Parramatta Grey-headed Flying-fox camp. • Suitable winter-flowering vegetation would be preferentially planted in landscaped areas of the site to provide a winter foraging resource for migratory and nomadic nectar-feeding birds and the Grey-headed Flying-fox.		if Grey-headed flying-foxes are seen in sensitive locations and stopping works if required. Section 6 commits to planting winter flowering species.
BI-9	The potential for translocation of threatened plant species as individuals or as part of a soil translocation process would be considered during the detailed development of the flora and fauna management plan prepared as part of the CEMP.	Section 4.2 Section 6	No threatened plant species are located within the Project sites. In the event that threatened plant species are identified, a translocation feasibility assessment will be completed by trained ecologist.

REMMM	Environmental mitigation and management measures	Document Reference	How Addressed
GEN-1	A CEMP would be prepared for the construction phase of the project. The CEMP would provide a centralised mechanism through which all potential environmental impacts would be managed. The CEMP would document mechanisms for demonstrating compliance with the commitments made in the Environmental Impact Statement, the submissions report, as well as any other relevant statutory approvals (e.g. conditions of approval, licences and permits). The CEMP would outline a framework for the management of environmental impacts during construction, including further details on the following: • Traffic, transport and access management • Noise and vibration management • Heritage management • Air quality and dust management • Soil and water management • **Flora and fauna management** • Waste and resource management • Site compound and ancillary works management • Landscape and temporary works management • Emergency and incident response management. The CEMP would be prepared by the responsible contractor(s) and approved by the Secretary of the NSW Department of Planning and Environment.	The CEMP This FFMP	The CEMP provides a central mechanism for all potential environmental impacts and how they will be managed. Preparation of this FFMP for flora and fauna management. This Plan complies with relevant approval, statutory and contract requirements.

REMMM	Environmental mitigation and management measures	Document Reference	How Addressed
TR-3	The use of low impact construction techniques (on existing tree roots) for all works would be considered, where appropriate and feasible.	Section 6.2	Any trees that are to be retained will be protected in accordance with the AS 4970-2009 - Protection of Trees on Development Sites.
TR-4	All tree pruning and removal works, including any root pruning, would be carried out in accordance with Australian Standard AS 4373-2007, Pruning of Amenity Trees.	Section 6.2.2	The AS 4373-2007 is included as a document of reference when carrying out pruning of trees.
TR-5	Where the loss of trees is unable to be mitigated, trees removed as a result of the project would be offset in accordance with the Transport for NSW's Vegetation Offset Guide (2016). The proposed offsetting activities would be documented in the Tree Offset Strategy to be developed for the project. The City of Parramatta Council's Parramatta Ways: Implementing Sydney's Green Grid would be considered as part of the development of a Vegetation Offset Strategy for the project.	Section 6.2.2	Mitigation measures in Section 6.2.2 would ensure any loss of trees is documented and offset in accordance with REMMM TR-5.
TR-6	Temporary tree protection measures would be installed prior to construction works commencing in accordance with AS 4970-2009 - Protection of Trees on Development Sites as required for any trees to be retained within active construction sites.	Section 6.2	Temporary tree protection measures would be installed prior to construction works commencing in accordance with AS 4970-2009.

REMMM	Environmental mitigation and management measures	Document Reference	How Addressed
TR-7	Where activities which could cause soil compaction within the tree protection zone (TPZ) of trees to be retained cannot be avoided (e.g. due to space constraints), opportunities to raise construction facilities (e.g. demountable) above the ground level or use of suitable ground protection measures beneath site access tracks (e.g. geotextile fabric) would be investigated and implemented, where feasible, so as to avoid impacting on the underlying tree roots, in accordance with Australian Standard AS 4970 Protection of Trees on Development Sites.	Section 6.2	Temporary tree protection measures would be installed prior to construction works commencing in accordance with AS 4970-2009.
TR-9	As far as practical, the construction compounds would be configured so as to not directly impact on trees that would not already be directly impacted by the project. Where trees which can be retained are located within construction boundaries, exclusion fencing would be erected to protect these trees from construction activities. Similarly, for road network modifications away from the main alignment, these works would be carried out, as far as practical, so as to minimise any further impact on trees as a result of the project.	SEMP	This requirement will be implemented in the Site Establishment Management Plan.

3.4 Environmental performance outcomes

Relevant environmental performance outcomes are listed in Table 3-4. This includes reference to required outcomes, the timing of when the commitment applies relevant documents or sections of the environmental assessment influencing the outcome and implementation.

Table 3-4: Environmental performance outcomes relevant to this FFMP

ID Ref #	Environmental Performance Outcome	Timing	FFMP reference	How Addressed
EPO-BI-1	The project would minimise impacts on biodiversity through the implementation of relevant mitigation measures and the implementation of the Biodiversity Offset Strategy (BOS) for the project.	Pre-construction/ construction	Section 3, Section 5, Section 6 and Section 7	Targets to minimise impact to biodiversity are provided in Section 2.3. Sections 5, 6 and 7 set out strategies and mitigation measures to achieve the targets

4 Existing environment

The following sections summarise existing flora and fauna within and adjacent to the Project construction sites including species, communities and habitats. The key reference documents are Chapter 4, Chapter 5 and Chapter 6 of the Environmental Impact Statement - Technical Paper 4 Volume 3 prepared by Parsons Brinckerhoff 2017. The Project sites for the SOM scope of works have been cleared of all vegetation since the EIS was prepared.

The SaMF is located at 6 Grand Avenue, Camellia. The historic heavy industrial uses of the land along Grand Avenue have resulted in the contamination of soils and groundwater. The Camellia precinct is also prone to flooding.

The site has undergone subsurface remediation works subject to render the site suitable for its proposed land use as a stabling and maintenance facility (SaMF). The SaMF site has been sealed using a sediment binder to minimise dust emissions. Reapplication of the binder will continue throughout the construction and operation of the SaMF, as required.

The SaMF site will be established with the following:

- Site security fence with hoarding around the site perimeter
- Cattle grid and wheel wash facilities at the exit point on Grand Avenue
- The boundary of the SaMF site will be enclosed by an erosion sediment control fence to prevent any offsite flow, until such time as boundaries of the Site are stabilised or sealed. This will ensure all surface flows are directed to the site's stormwater basin whilst construction is underway.
- Site sheds and facilities (offices, lunch rooms and amenities)
- Laydown area, including concrete washout area and hazardous material storage
- Concrete washout area will be a lined and bunded area where washout will be allowed to solidify before it is disposed of offsite
- Hazardous materials will be stored in the laydown area in self-bunded shipping containers in accordance with the relevant Australian Standards
- No fuel will be stored at the site. Fuel will be supplied to site equipment from a mobile fuel tanker. This tanker may park within the laydown area when it is not required
- Light vehicle car park
- Breezeways and emergency muster/meeting points
- Site-wide lighting (faced into site and down to avoid light spill). Lighting will initially be provided by generator powered tower lights. These will be replaced by grid-powered lighting after establishment of the facility
- General construction waste bins will be located in the laydown area. General construction waste will be removed offsite by a licenced contractor. No general waste segregation will occur onsite
- Hazardous waste bins will be located in the laydown area. Hazardous waste will be removed offsite by a licenced contractor
- Power, water and sewer connection to the local grid. Temporary power may be required until the site is connected to the grid.

Ancillary facilities are temporary and only established to assist with construction.

The indicative Project locations and relevant ecological data within a 500 metre study area is shown on Figures 4-1 to 4-5 below, noting that any vegetation within the Project sites has now already been cleared.

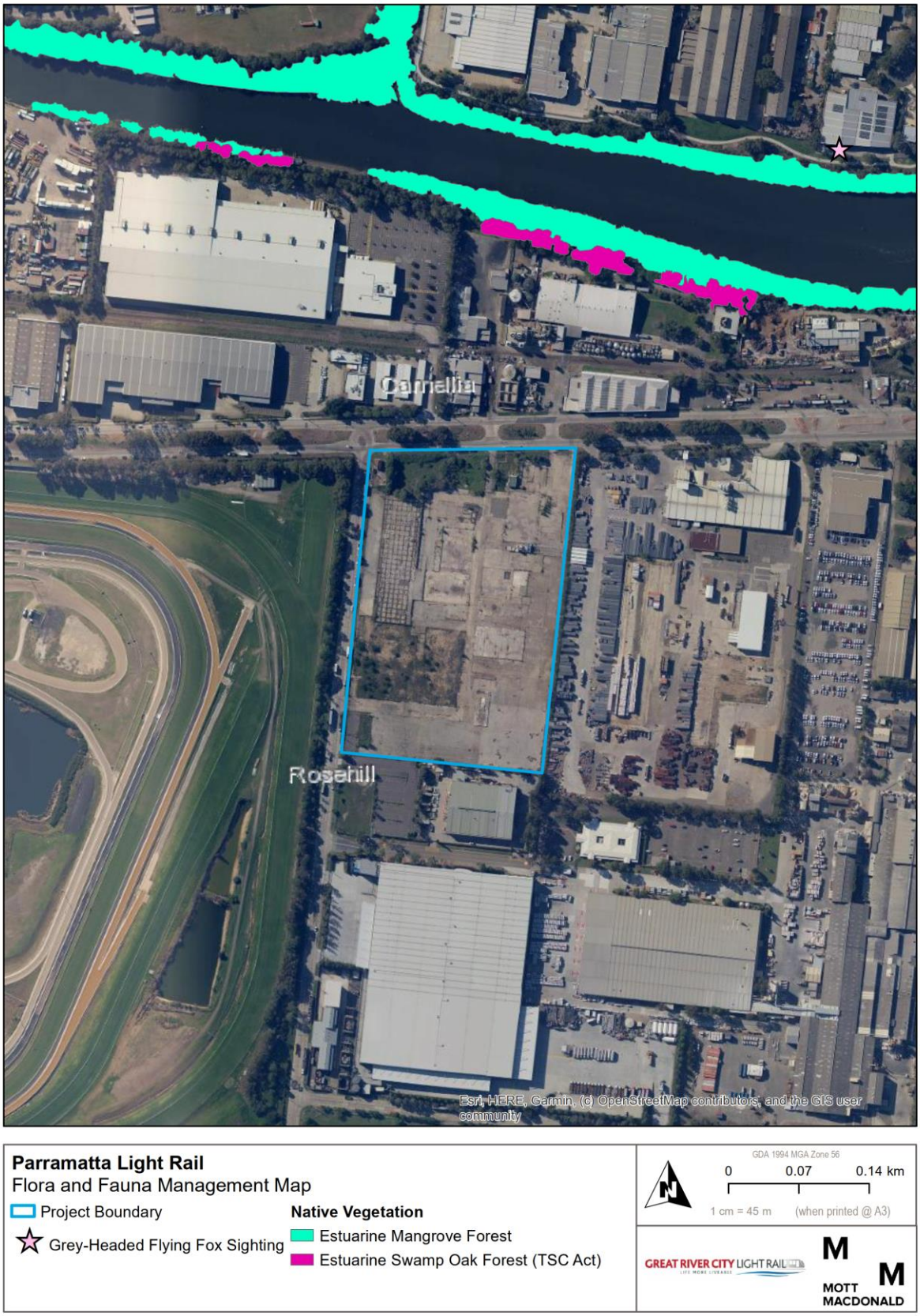

Figure 4-1: Flora and fauna map (SaMF)

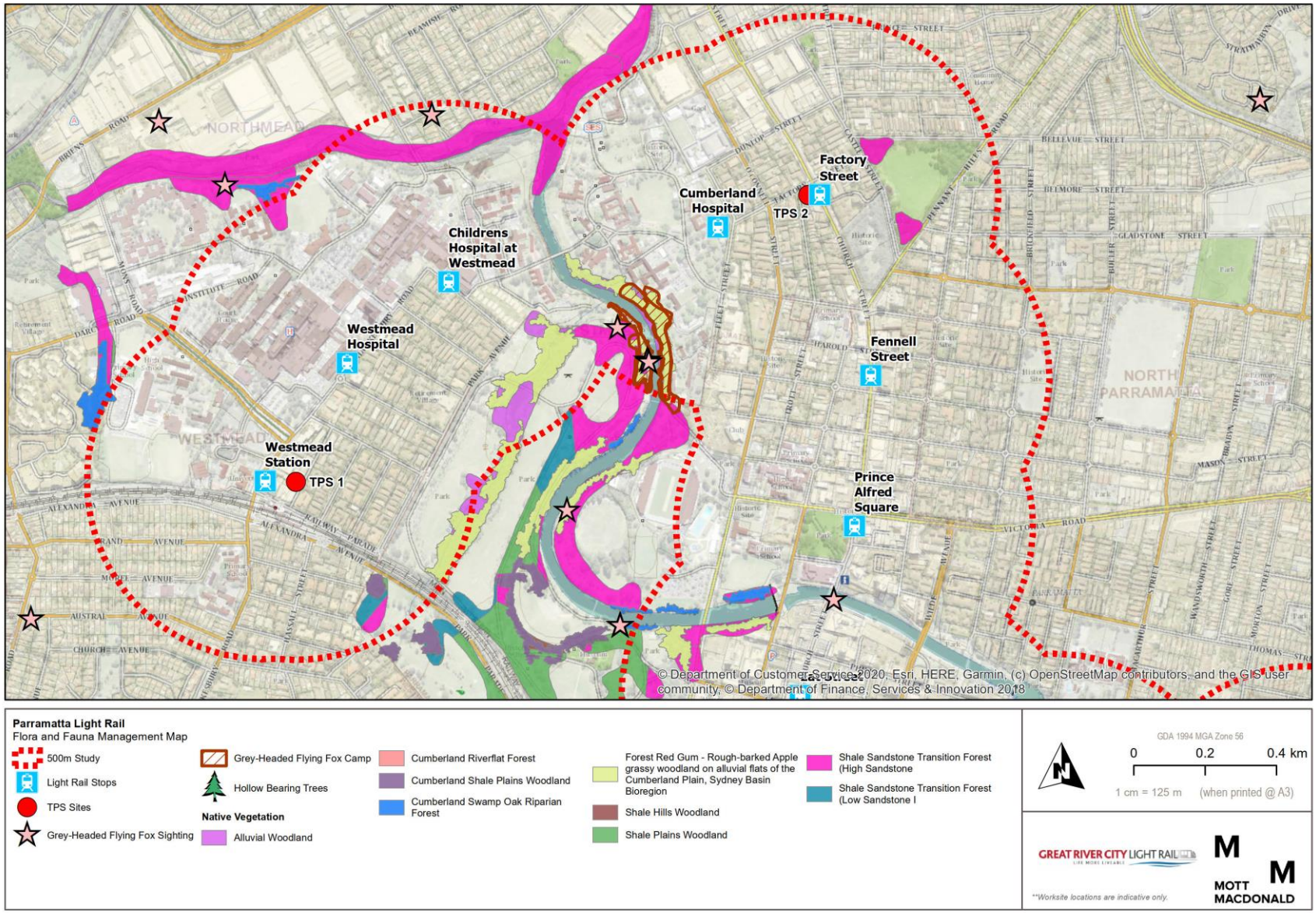

Figure 4-2: Flora and fauna map (line wide – Westmead to Prince Alfred Square)

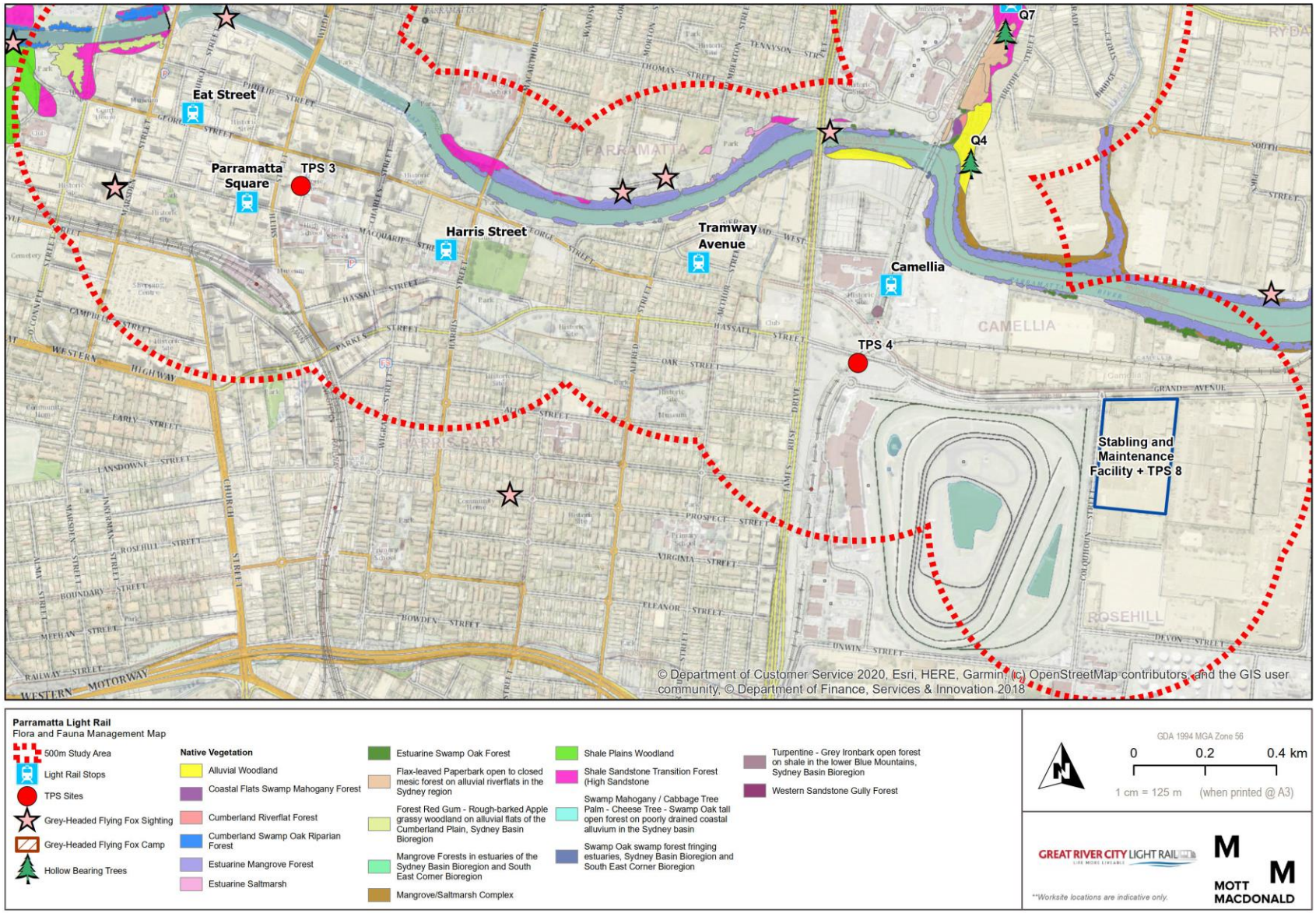

Figure 4-3: Flora and fauna map (line wide – Eat Street to SaMF)

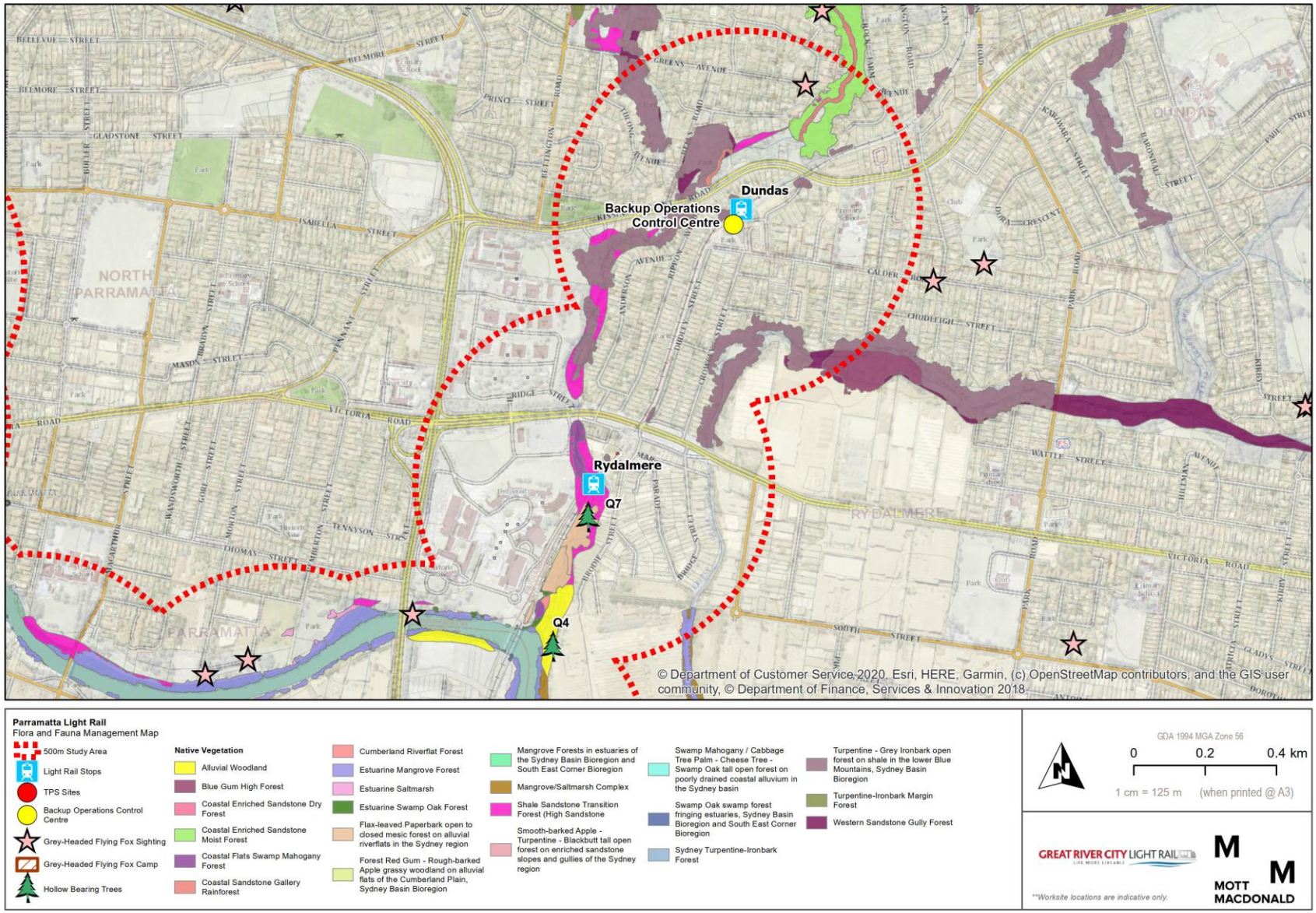

Figure 4-4: Flora and fauna map (line wide – Rydalmere to Dundas Stop)

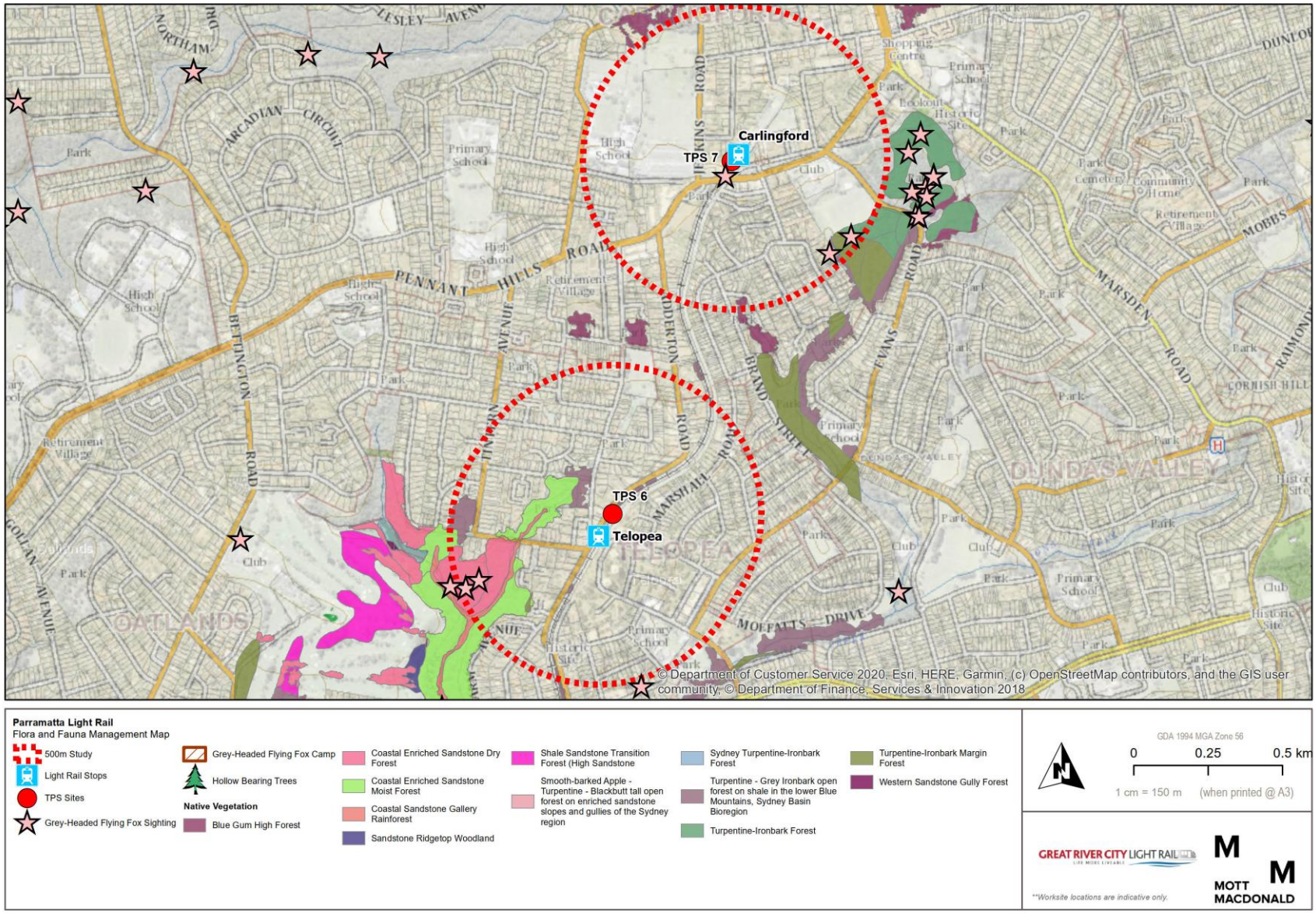

Figure 4-5: Flora and fauna map (line wide - Telopea to Carlingford stop)

4.1 Threatened ecological communities

Industrial and residential development, associated weed invasion and soil disturbance has resulted in the loss and/or degradation of most of the native vegetation at the SaMF site. Any existing vegetation at the SaMF site has been cleared as part of Early Works Portion 1 (refer to Section 4.6).

No Threatened Ecological Communities (TECs) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were recorded within the Project sites (Section 4.5, Parsons Brinckerhoff 2017).

No NSW *Biodiversity Conservation Act 2016* (BC Act) listed EECs have been recorded within the Project sites (Section 4.5, Parsons Brinckerhoff 2017).

As shown in Figure 4-1 to 4-5 there are several patches of native vegetation communities adjacent to the Project sites, and in surrounding areas, with the nearest listed below:

- The BOCC and Dundas Stop - Turpentine Ironbark Forest in the immediate vicinity
- Yallamundi Stop – Shale Sandstone Transition Forest and Coastal Flats Swamp Mahogany Forest in the immediate vicinity
- Rosehill Gardens Stop - Turpentine Ironbark Forest approximately 50 metres to the south
- Bernard Oval Stop an TPS 2 - Shale Sandstone Transition Forest approximately 200 metres to the east
- The TPS 6 and the Telopea Stop – Turpentine Ironbark Forest approximately 100 metres to the north west.

4.2 Threatened or otherwise significant flora species

The following threatened flora species listed under the EPBC Act or BC Act were identified as having a moderate or high likelihood of occurring within the wider Project area (Section 6.4, Parsons Brinckerhoff 2017).

- Native Pear (*Marsdenia viridiflora subsp. Viridiflora*)
- Tadgells Bluebell (*Wahlenbergia multicaulis*)
- Narrow-leafed Wilsonia (*Wilsonia backhousei*)
- *Epacris purpurascens var. purpurascens*
- *Dillwynia tenuifolia*
- Bynoes Wattle (*Acacia bynoeana*)
- Downy Wattle (*Acacia pubescens*)
- Netted Bottle Brush (*Callistemon linearifolius*)
- Narrow-leaved Black Peppermint (*Eucalyptus nicholii*)
- *Leptospermum deanei*
- Magenta Lilly Pilly (*Syzygium paniculatum*)
- Plum-leaf Pomaderris (*Pomaderris prunifolia var. prunifolia*)
- *Pimelea curviflora var. curviflora*
- Spiked Rice-flower (*Pimelea spicata*).

4.3 Fauna habitat

Several areas containing hollow-bearing trees were identified during a systematic hollow-bearing tree assessment as part of the EIS (Section 4.6, Parsons Brinckerhoff 2017). Four trees containing hollows were found within 500 metres of the Rosehill Gardens (Camellia) light rail stop (flora survey site Q4 in the Parsons Brinckerhoff 2017 Technical Paper) and one hollow-bearing tree was identified within 500 metres of Rydalmere light rail stop (flora survey site Q7). There are patches of estuarine mangrove forests along Parramatta River near Tramway Avenue and Rosehill Gardens (Camellia) stops, which would provide foraging habitat for a variety of fauna, including bats and estuarine bird species, such as White-faced Herons (Egretta novaehollandiae). There are several patches of native vegetation within 500 metres of the Project sites for SOM scope of works. As shown in Figures 4-1 to 4-5, there is potential fauna habitat within 500 metres of the Project sites.

4.4 Threatened fauna

No threatened fauna species listed under the EPBC Act or BC Act were identified as having a moderate or high likelihood of occurring within the SaMF site (Section 6.5, Parsons Brinckerhoff 2017).

Twenty threatened fauna species were identified as potentially occurring within the broader study area (Section 6.5, Parsons Brinckerhoff 2017). Of these, the likelihood of occurrence assessment identified two threatened fauna species as having a moderate or high likelihood of occurring; Grey-headed Flying-fox and Swift Parrot. A Grey-headed Flying-fox camp has been identified along the Parramatta River, approximately 250 metres south west of the Cumberland Hospital Stop, located in Forest Red Gum/ Cumberland Riverflat Forest vegetation (refer to Grey-headed Flying-fox Monitoring Program Ecosure 2019, attached in Appendix C).

Monitoring of the population will be undertaken by TfNSW during the Project works in accordance with the Monitoring Program (Appendix C). If the monitoring indicates that the population is roosting closer to the project area, the Grey-headed Flying-fox Camp monitoring and mitigation measures (Section 6.6 of this FFMP) should be implemented.

4.5 Aquatic flora and fauna

No threatened aquatic fauna species listed under the EPBC Act or *NSW Fisheries Management Act 1994* were identified as having a moderate or high likelihood of occurring within the Project sites (Section 6.6, Parsons Brinckerhoff 2017). Twenty threatened aquatic fauna species were identified as potentially occurring within the broader study area. Of these, the likelihood of occurrence assessment identified one threatened fauna species as having a moderate or high likelihood of occurring; Black Rock Cod (Section 6.6, Parsons Brinckerhoff 2017).

The scope of Project works does not involve any works in or over water.

4.6 Remediation of the SaMF

The SaMF site has undergone remediation works by the Early Works (Package 3) remediation contractor. Remediation works removed all vegetation from the site. GRCLR will receive the site with an unsealed capping layer prior to the commencement of SOM scope of works. No vegetation clearing is required as part of the SOM scope of works at the SaMF.

The remediation contractor will provide GRCLR a remediated site, complete with a site audit statement, and supporting management documentation, fit for purpose for site establishment, construction and operational activities associated with PLR.

5 Environmental aspects and impacts

5.1 Construction activities

The Project (subject of this Plan) includes the construction of the following:

- Stabling and Maintenance Facility (SaMF)
- Traction Power Substations (TPS)
- Light rail stops above slab level
- Back Up Operations Centre (BOCC).
- Testing and Commissioning.

Testing and Commissioning (T&C) activities are considered 'construction' but are unlikely to have significant impacts on flora and fauna.

Construction activities that could result in impacts to flora and fauna during the SOM scope of works are limited to:

- Utility installation (overhead wiring)
- TPS and BOCC site establishment and substructure construction, and
- Lifting and installation of pre-fabricated equipment.

Refer to Section 4 of this Plan and the Environmental Risk Register included in Appendix A2 of the CEMP

Chapter 2 of the CEMP provides a description of the Project features and construction activities. **Table 5-1** provides a summary of the construction activities for the Project.

Table 5-1: Construction Activity Summary

SaMF	TPS	Light rail stops	BOCC
• Site establishment • Shallow earthworks and subsurface works • Hydraulics (sewer, water, fire, drainage) • Rail systems • Operational Control Centre • Development of structures • Fencing • Landscaping • Carpark and footpaths • T&C of LRVs and driver training.	• Construction site establishment • Surface clearing and grubbing at some sites • Substructure construction • Installation of utilities and services • Installation of architectural screening, security fencing and lighting • Landscaping • Roadworks	• Prefabricated column and canopy placement • Installation of wind break screens and, lighting • Connection to previously constructed or existing utilities • Stop fit out. • T&C of LRVs and driver training.	• Construction site establishment • Surface clearing and grubbing • Substructure construction • Installation of utilities and services • Superstructure building works

5.2 Ecological impacts

The Project sites have been prepared by other contractors during the Early Works Portion 2 (Package 3) and Infrastructure Works (Package 4) scope of works. GRCLR would receive the sites generally devoid of vegetation, and therefore with little potential for fauna, prior to the commencement of SOM scope of works.

Key aspects of the construction works at the Project that could result in indirect impact to terrestrial and aquatic flora and fauna include:

- Noise and vibration impact to sensitive fauna
- Dust deposition impacts
- Vehicle strike
- Weed invasion.

This FFMP provides a full suite of control measures in compliance with the CoA, REMMM and EPOs to ensure the construction teams are aware of all of the flora and fauna management requirements for both direct and indirect impacts for the wider SOM construction scope, as described in Section 1.3, even though direct impacts are not considered relevant for the Project.

Notwithstanding, mitigation measures for the Project provided in Table 6-1 aim to minimise any impact to flora and fauna.

5.2.1 Pre-construction vegetation surveys

The EIS indicates that there are no pre-construction native or planted vegetation surveys required for this FFMP.

6 Environmental mitigation and management measures

6.1 Flora and fauna management strategies

Sensitive areas and planted vegetation within and surrounding the Project sites will be marked on Environment Control Maps (ECMs) provided to contractors, as well as on the ground using high visibility fencing (such as barrier mesh). No direct disturbance should occur in these areas, including vehicle access.

6.2 Tree management and removal

Note: all provisions in this section relate to trees that were pre-existing prior to the project commencing. These provisions do not apply to landscaped and planted trees.

6.2.1 Tree protection

If there are any pre-existing trees to be retained within active construction sites, temporary tree protection measures would be installed prior to construction works commencing, in accordance with REMMM TR-6.

If any additional tree removal or pruning is required, they would be identified in the Tree Register, which would be prepared in accordance with CoA E102, E103, E104 and E107. A consistency assessment would be conducted prior to any impact to trees outside the Project boundary.

Any additional trees to be removed or pruned are to be managed in accordance with the Australian Standard AS 4373 – Pruning of Amenity Trees and the GRCLR Tree Management Procedure.

6.2.2 Pre-clearing surveys

Trees that require trimming or removal (that have not previously been identified as requiring impact on the Tree Register) require approval from the Independent Arborist prior to works commencing. Prior to removal of a tree, the following must be considered to avoid or minimise impacts on trees:

- Consideration of operational requirements with existing tree locations
- Consideration of the health of each tree, including its vigour and likely ability to survive in situ pruning or transplanting
- Review of the construction methodology and layout to identify any options to avoid or minimise impacts on trees
- Considering opportunities to narrow/move footpaths
- Modification of the design to reduce impact to the tree (e.g. use of porous pavement)
- Reduction in the standard offsets required for underground services
- Where fencing, other ancillary infrastructure or services affect tree retention, relocation or alternative construction methods are considered to reduce impacts (e.g. from strip footings to pier footings for posts)
- Where the loss of trees is unable to be mitigated, trees removed as a result of the Project works would be offset in accordance with REMMM TR-5. The proposed offsetting activities would be documented in the Tree Offset Package to be developed for the SOM scope of works

- Where activities that could cause soil compaction within the tree protection zone (TPZ) of trees to be retained cannot be avoided (e.g. due to space constraints), opportunities to raise construction facilities (e.g. demountable) above the ground level or use of suitable ground protection measures beneath site access tracks (e.g. geotextile fabric) would be investigated and implemented where feasible, so as to avoid impacting the underlying tree roots, in accordance with REMMM TR-7.

During construction, and prior to the removal, damage or pruning of a tree, an arborist assessment will be produced by the Project Arborist and submitted to the Independent Arborist. This report will demonstrate that consideration was made to avoid or minimise impact on trees and is subject to IA approval in accordance with CoA E106.

6.2.3 Tree Register

To ensure compliance with the CoA, the Tree Register must be maintained and updated by the Independent Arborist. The Tree Register would be kept on the document control system, as outlined in the CEMP.

Before removal or damage of a tree, the Tree Register and any other evidence or consideration must be submitted to the Secretary. The recommendations of the Independent Arborist must be outlined in the Tree Register and implemented by TfNSW and GRCLR, unless otherwise agreed by the Secretary.

The Tree Register must include:

- The georeferenced location of each tree
- Those attributes as defined in AS 4970-2009 protection of trees on development sites
- The tree retention value
- The outcomes of a visual assessment of the condition of the tree
- Where a tree requires removal, whether, in the opinion of the arborist, it can be successfully transplanted
- The extent of the proposed impact (complete removal or extent of pruning)
- Measures for the management, protection and monitoring of compensatory vegetation for a minimum of two years from being planted
- Timing and responsibilities for the implementation of compensatory vegetation.

6.2.4 Vegetation Clearing Protocol

A Vegetation clearing protocol is provided as **Appendix B** to ensure that vegetation is cleared in a manner that avoids or minimises impacts to Fauna. Key steps of the vegetation clearing protocol are:

- Demarcation of the vegetation to be retained
- Pre-clearing inspection as outlined above
- Tree felling process.

6.2.5 Tree Protection Plans

Tree Protection Plans will be prepared for all retained trees that are located within 15 metres of the Project works, in accordance with AS 4970:2009 to identify tree-specific protection requirements for the maintenance of retained trees. The Tree Protection Plans must be submitted to and approved by the Independent Arborist prior to the commencement of works and be maintained on site for the full duration of the Project works. Construction personnel must be inducted in the tree protection requirements. The Project Arborist will undertake monthly inspections of the

implementation of Tree Protection Plans, for active worksites. Actions raised from Project Arborist inspections will be noted in inspection reports and rectified immediately by GRCLR.

6.3 Fauna rescue and release procedure

A Fauna Rescue Procedure applies to all native and introduced species (domestic and pest) that are found on the Project sites, including injured, shocked, juvenile and other animals.

Handling of fauna should be avoided, where possible. Where handling of animals cannot be avoided, it should only be done by a licensed fauna ecologist or wildlife carer with specific animal handling experience. The fauna handler will keep a record of all fauna captured and a copy of these records will be provided to GRCLR. If fauna is identified within the work site, work shall stop in the area and the licensed fauna ecologist or wildlife carer will be contacted.

Fauna injury or death has the greatest potential to occur during the initial phase of construction when vegetation and habitats are removed or damaged. There is minimal risk of fauna injury or death due to vegetation removal for SOM works, as the Project sites have already been cleared by the Early Works Portion 2 (Package 3) and Infrastructure Works (Package 4) Contractors. Any potential risk would come from additional tree removal or pruning, or vehicle strike. Any additional tree removal or pruning would be undertake in accordance with the Vegetation Clearing Protocol included in **Appendix B**.

Fauna strike to be recorded

During the Testing and Commissioning phase, especially during driver training and trial running, the risk of fauna strike increases. In the event of fauna strike of a native species which is observed by the driver, the GRCLR Environment and Sustainability Manager is to notified. The notification may be verbal or in writing and shall include the following details:

- Fauna struck
- Impact of strike (injury, death) and does the fauna need assistance
- Time and date
- Location on the alignment.

The GRCLR Environment and Sustainability Manager is to include a summary of the number and type of fauna strikes in the Monthly Environment Report required under the CEMP.

6.4 Weed and pathogen control procedure

There is potential for additional weeds, plant and animal pathogens being introduced to the Project area on the tyres of vehicles entering the site and on construction plant and materials. These weeds and pathogens could then spread into the retained native vegetation and habitat in the surrounding locality.

Weeds listed in Appendix 2 of Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 include species known to occur in the region as well as species not currently known to occur but at risk of moving into the region in the future. Many of the species pose potential risks to biodiversity, agriculture, and human health. The environmental inspection checklist should include a list of the recorded weed species within the area, as listed in Technical Paper 4 Volume 3 of the EIS, including photos to aid in their identification.

Prior to on ground works, plant, equipment, and clothing would be inspected to ensure they are free of soil and vegetative matter prior to being brought to site.

During on ground works:

- Provide training to all workers on pathogen and weed spreading risks and risk mitigation strategies. Training on weed identification will occur during inductions and pre-starts. Weeds will be identified in Environmental Control Maps if present in a work area to help site staff identify weeds
- Ensure workers, tools, equipment and vehicles are clean prior to coming on site and regularly washed down to prevent spread of weeds and soil contamination
- Regularly monitor the site for weeds for early identification
- All weeds situated within the Project construction sites are to be treated in accordance with the General Biosecurity Duty and the NSW Weed Control Handbook (NSW Department of Primary Industries (DPI), 2017) to prevent weed spread and reduce abundance.

To minimise the spread of weeds and pathogens at the Project construction sites, the principles of the Department of Energy and Environment's 'Arrive Clean, Leave Clean' procedure will be implemented throughout all aspects of construction (Australian Government, 2015). A summary of these principles is provided below:

- Identifying construction activities with the potential to spread weeds and pathogens throughout the Project construction sites (movement of plant and equipment from infested areas etc.)
- Ensuring all plant and equipment transported onsite are clean of weeds, seeds and soil/gravel – undertake an inspection of plant/equipment prior to transportation onsite
- Providing training to all staff during site inductions and toolbox talks regarding the importance of weed and pathogen management and associated processes
- Providing adequate vehicle wash-down locations at the Project construction sites – washing down tyres and underneath vehicles prior to transporting materials from one location to another
- Monitoring wash-down procedures and weed/pathogen management procedures during construction to ensure procedures are suitable. Consider altering weed/pathogen management procedures as required.

6.5 Unexpected threatened species finds

If a suspected threatened flora species is unexpectedly identified:

- Stop work in the immediate work area
- Notify the on-site manager
- Cordon off the area
- Consult an ecologist to assess the significance of the find, and determine any additional approvals, licences or permits that may need to be obtained before works in that area can commence
- Provision of photos and other notes early in this process will increase the efficiency of resolving the unexpected find process
- Notify TfNSW.

If a fauna species is identified, which cannot relocate itself immediately, or which appears to be injured:

- Stop work in the immediate area of the fauna species
- Notify the on-site manager
- Cordon off the area

- Contact WIRES
- Consult an ecologist to assess the significance of the fine, and determine any additional approvals, licences or permits that may need to be obtained before works in that area can commence
- Provision of photos and other notes early in this process will increase the efficiency of resolving the unexpected find process
- Notify TfNSW.

6.6 Grey-headed Flying-fox camp

The Grey-headed Flying-fox Monitoring Program (Ecosure 2019) (**Appendix C**) monitored three flying-fox camps, located in Parramatta Park, Clyde and Gladesville, to establish a baseline for the Parramatta Light Rail project (including the SOM scope of works). Monitoring events recorded camp behaviour, including species present, numbers, mapping of the extent of the camp, breeding status, and condition of animals.

The Ngara (Cumberland Hospital) Stop works will be undertaken within the 300 metre buffer zone, which encompasses the distance for Grey-headed Flying-fox monitoring and recommended mitigation (note that CoA E101 requires monitoring during construction near the Parramatta River by a suitably qualified fauna specialist). The Project works will pose a low to medium risk to the Grey-headed Flying-fox, depending on the time of year that construction works commence.

The following standard control measures would be applied during construction:

- Regular monitoring of the Grey-headed Flying-fox camp (species present, numbers, map of extent, breeding status, conditions of animals)
- If regular Grey-headed Flying-fox monitoring suggests that construction associated with the CSSI is changing the behaviour of the camp, TfNSW must consult with DPE 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 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 de highly visible 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 of the Grey-headed Flying-fox Monitoring Program)
- Implement contingency planning as required (refer to Section 7.5 of the Grey-headed Flying-fox Monitoring Program).

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

- A wildlife carer (WIRES) should be on stand-by to accept injured or orphaned flying-foxes and take to a vet if required
- 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 specialist 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.

To mitigate impacts to the Grey-headed Flying-fox, a range of mitigation measures will be implemented. The mitigation measures are outlined in Table 6-1 below.

6.7 Grey-headed Flying-fox contingency plan

If during monitoring of the Grey-headed Flying-fox camp, flying-foxes are observed moving within Parramatta Park, land in exclusion area or a sensitive location, or are injured or killed then contingency measures will be implemented (by TfNSW) as outlined in Section 7.5 of the Grey-headed Flying-fox Monitoring Program. This process will be supported in the following ways:

- Reporting to TfNSW if Project staff observe flying-foxes landing in sensitive locations (including Parramatta Public School, Parramatta North Public School or St Patrick's Primary School)
- Taking supporting action within the Project construction areas and/or activities to support the Contingency Plan where required (for example, temporarily stopping works within 500 metres of the camp to support emergency dispersal plan).

The mitigation measure in case of a flying-fox being killed or injured in association with works is outlined in Table 6-1 below.

Table 6-1: Flora and fauna management and mitigation measures

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference
FF1	Flora and Fauna Management Strategies – clearly mark “no-go” areas with markers and signage. ‘No go’ areas will be marked on Environment Control Maps (ECMs). This will include any ecologically sensitive areas.	Boundary markers and signage	All stages	Design and Construct Environment Manager	Section 6.1 CoA C4 and E100 REMMM BI-3, BI-8, GEN01, TR-6, TR-9
FF2	When moving around the Project construction sites, including bringing plant and equipment onto site, ensure that wheels, plant and equipment are clean to prevent the transfer of weeds / pathogens	Refer to Section 6.4 Weed monitoring	All stages	Senior Construction and Staging Manager Civil Construction Team	Section 6.4
FF3	Training on weed identification will occur during inductions and prestart. Weeds will be identified in ECMs if present in a work area to help site staff identify weeds	Pre-work weed surveys	All stages	Design and Construct Environment Manager	Section 6.4
FF4	Stop work in the immediate area when an unexpected threatened species is found	N/A	All stages	Anyone.	Section 6.5
FF5	Ensure all plant and equipment is highly visible to flying-foxes to avoid	N/A	All stages	Design and Construct Environment Manager	Section 6.6

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference
	strike/ infrastructure-related mortality, including keeping the construction area and tall equipment (including cranes) well-lit at night-time.				
FF6	If a flying-fox appears to have been killed or injured in association with works: • Follow environmental incident procedure as outlined in CEMP • Alert flying-fox expert and WIRES to collect flying-fox. Do not touch any Flying-fox • Temporarily stop works in the area and follow advice of flying-fox expert • Notify EES of work changes to avoid further impacts.	Grey-headed Flying-fox expert	All stages	Design and Construct Environment Manager	Section 6.7
FF7	Winter-flowering vegetation will be preferentially planted in landscaped areas of the site to provide a winter foraging resource for migratory and nomadic nectar-feeding birds and the Grey-headed Flying-fox.	UDRR	Construction/ landscaping	Landscaping contractor	REMMM BI-7
FF8	If monitoring suggests that construction associated with the	The Grey-Headed Flying Fox	Construction	Design and Construct Environment Manager	CoA E101

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference
	CSSI is changing the behaviour of the camp, the Proponent must consult with EES to determine whether additional mitigation measures are required.	Monitoring Program (Ecosure, 2019)			
FF9	Opportunities for minimising the potential for injury and mortality of wildlife associated with overhead wiring and fences would be investigated in consultation with an ecologist and implemented where practicable.	Ecologist	Pre-construction Construction	Design and Construct Environment Manager Ecologist	REMMM-BI-1
FF10	Prior to trimming or removal of a tree (or undertaking any activity that would result in more than a minor impact), approval must be received from the Independent Arborist	Independent Arborist	All stages	GRCLR Environment and Sustainability Manager	E105-E106, Section 6.2
FF11	Prior to tree removal, a pre-clearance surveys for habitat trees (i.e. trees with hollows) is to be conducted where required	Trained ecologist	Clearing stage	GRCLR Environment and Sustainability Manager	Section 6.3

7 Compliance management

7.1 Roles and responsibilities

The roles and responsibilities for the construction of the SaMF are outlined in Section 4.2 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Table 6.1 and Section 6 of this Plan.

Table 7-1: Responsibilities specific to this Plan

Title	Roles, responsibilities and authorities relevant to this plan
GRCLR Environment and Sustainability Manager	• Provide environmental oversight, direction and leadership regarding the environmental management of the Project • Act as the primary contact for Independent Arborist and Interface Contractors • Oversee the environmental management and sustainability induction and training program • Oversee environmental monitoring, inspections and audits
Design and Construct Environment Manager	• Is responsible for the onsite environmental management and reports to the GRCLR Environment and Sustainability Manager • Ensure inspections, observations, monitoring and audits are performed so that compliance is maintained • Assist in the development and delivery of environmental training and awareness • Undertake inspections, observations, monitoring and audits as required
Environment Co-ordinators	• Conduct environmental inspections and monitoring • Co-ordinate with Project Arborist and Ecologist
Independent Arborist	• Engaged by TfNSW to prepare and maintain the Tree Register

Project Arborist (AQF level 5)	• Will work with the Independent Arborist and will action any requirements within the timeframes reasonably required by the Independent Arborist • Undertake a detailed survey of all trees with potential to be impacted by the SaMF works and will record in the Tree Register • Ensure the Tree Register is implemented • Identify trees or vegetation that require removal or pruning during design, construction and operation • Undertake detailed assessment of major pruning works, and the assessment is endorsed by the Independent Arborist, before the works are implemented • Prepare and manage Tree Protection Plans • Undertake monthly inspections of the implementation of Tree Protection Plans • Manage tree impacts and • Prepare a Post-Construction Tree Report detailing the outcomes of a post-construction inspection of the trees that were retained and protected, pruned or relocated.
Ecologist	• Licensed fauna ecologist engaged to provide assistance with fauna rescue and handling
All personnel	• Be inducted in Tree Protection Plans that apply in areas of works • Observe and comply with vegetation no-go zones • Only undertake tree removal, pruning or relocation following approval by and in accordance with the direction of the Independent Arborist. • Implement the Weed and Pathogen Control Procedure in Section 5.4 of this FFMP as required.

7.2 Training

All employees, contractors and utility staff working on site will undergo site induction training relating to flora and fauna management issues. The induction training will address elements related to flora and fauna management including:

- Existence and requirements of this FFMP
- Relevant legislation
- Specific species likely to be affected by the construction works and how these species can be recognised
- Fauna rescue requirements
- Weed control measures

- General flora and fauna management measures
- Specific responsibilities for the protection of flora and fauna
- What to do in the instance of fauna strike
- Identification of Grey-headed Flying-fox stress signs and management measures if a Grey-headed Flying-fox is sighted.

Further details regarding staff induction and training are outlined in Section 5 of the CEMP.

7.3 Monitoring and inspections

Inspections of sensitive areas and activities with the potential to impact flora and fauna will occur for the duration of the Project.

Requirements and responsibilities in relation to monitoring and inspections are documented in Section 8.2 of the CEMP.

Monitoring of the Grey-headed Flying-fox at the Clyde and Parramatta Park camps is not undertaken regularly at the time this plan was written. Future monitoring may be required if any significant impact to the camp is observed.

7.4 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this management plan, CoA and other relevant approvals, licenses and guidelines.

Audit requirements, including timing, are detailed in Section 8.3 of the CEMP.

7.5 Reporting

Reporting requirements and responsibilities are documented in Section 8.3 of the CEMP. There are specific reporting requirements associated with flora and fauna management and monitoring including:

- Results of any ‘Unexpected flora and fauna finds’
- Reports of any fauna strikes as per Section 6.3
- Weekly updates to TfNSW on the status of tree removals, by exception
- Monthly reports to TfNSW including:
  a. Progress reporting on tree removals, relocations and pruning in the month to date
  b. Tree removals, relocation and pruning programmed for the next two months
  c. Progress reporting on planting of trees identified in the detailed design.

8 Review and improvement

8.1 Continuous improvement

Continuous improvement of this Plan will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance
- Determine the cause or causes of non-conformances and deficiencies
- Develop and implement a Plan of corrective and preventative action to address any non-conformances and deficiencies
- Verify the effectiveness of the corrective and preventative actions
- Document any changes in procedures resulting from process improvement
- Make comparisons with objectives and targets.

Regular inspection and review of performance against environmental objectives will be undertaken in accordance with the procedures detailed in Section 7.5 of the CEMP.

In accordance with Section 9 of the CEMP, periodic assessments and reviews of this FFMP will be conducted by project management personnel. This review will generate actions for the continual improvement of this Plan.

Possible non-conformances with this Plan include non-compliance with the management measures and mitigation strategies outlined in Section 6 of this Plan.

All incidents and non-conformances are to be reported and investigated and corrected in accordance with Section 8.6 of the CEMP to ensure effective protection of flora and fauna.

8.2 FFMP update and amendment

The processes described in Section 8 and 9 of the CEMP may result in the need to update or revise this Plan. This will occur as needed and will include the assessment of risks associated with flora and fauna management for the project.

Only the GRCLR Environment and Sustainability Manager, or delegate, has the authority to change any of the environmental management documentation.

A copy of the updated Plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure – refer to Section 10.2 of the CEMP.

Appendix A – Summary of Agency Consultation

CoA A5 Consultation Report – Construction Flora and Fauna Management Plan

Transport for NSW

Supply Operate and Maintain (SOM) works Package 5

Parramatta Light Rail
November 2023
PLR1SOM-GLR-ALL-EN-RPT-001009 Revision D

NSW GOVERNMENT

Appendix B – Vegetation Clearing Protocol

The following protocol outlines the methodology for clearing of vegetation within the Project footprint following IA certification of the vegetation removal.

Before removal or damage of a tree(s), the IA's Tree Register will be submitted to the Secretary. The recommendations of the Independent Arborist will be outlined in the Tree Register and implemented by the JV, unless otherwise agreed by the Secretary.

Pre-Clearing Survey

Pre-clearing surveys will commence following the identification of trees to be removed and the marking of habitat trees.

The following procedure should be followed before vegetation clearance commences:

- Pre-clearing checklist for sign-off by relevant parties before commencement of clearing
- Vegetation to be retained is to be clearly demarcated
- Where necessary, identification and relocation of habitat items for salvage under guidance by Trained Ecologist (coarse woody debris and/or bushrock)
- Pre-clearing search/check for fauna for relocation prior to clearing under guidance of Project ecologist
- The Trained Ecologist to identify areas of habitat suitable for the release of fauna displaced during clearing of habitat trees prior to the commencement of vegetation clearance.
- Trained Ecologist should be present during felling of habitat trees to capture fauna displaced during clearing. Uninjured fauna shall be captured and relocated into predetermined release habitat. Injured fauna shall be captured and taken immediately to the nearest wildlife carers or veterinary surgeon (refer to Fauna Rescue Procedures).

The Superintendent or the Environment and Sustainability Manager should inform clearing contractors of any changes to the sequence of clearing if required, and in accordance with the pre-clearing survey for the Project.

Vegetation Clearing

Vegetation clearing and pruning works within the Project footprint would be undertaken in accordance with the pre-clearing survey and by suitably qualified staff/contractors using appropriate equipment and methods as identified below.

The following methods can be used for tree clearing works:

- Where feasible, trees can be felled using heavy machinery (e.g. excavators and bulldozers). Using this method trees are pushed in a safe direction and trees are felled with roots intact. This method would not require additional earthworks or tub-grinding to remove stumps
- In other situations, trees may be felled (whole or in portions) using chainsaws and accessed via tree climbing equipment or from an elevated work platform. Trees felled using this method will leave stumps that will need to be removed by other methods (digging or tubgrinding)

- Where habitat trees are to be removed, the Trained Ecologist or other suitably qualified professional shall be present. The methods outlined below will be used
- If using heavy machinery, habitat trees will be mechanically shaken or agitated prior to felling. This may result in fauna presenting at the entrance to hollows, or exiting the hollows completely prior to felling. If no fauna is seen following a brief period of observation, habitat trees should then be felled as carefully as possible. Where feasible, hollows should be facing upwards once trees have been felled. An inspection of the hollow would then be carried out to determine whether fauna is present. If present the fauna captured and relocated to an appropriate location, i.e. a similar habitat nearby and not impacted by the works
- If chainsaws are employed to fell habitat trees, hollow sections can be cut and lowered by rope so these can be inspected on the ground for fauna. Fauna capture and relocation is as recommended above
- Where pruning is required to accommodate the works (e.g. for low hanging branches or to remove safety hazards) as identified in the Tree Management Plan, branches will be pruned with appropriately sharp tools to enable a clean cut, close to the stem or trunk of plant.

Production and Stockpiling of Mulch

Waste generated following clearing or pruning works on native vegetation will be ground into mulch and locally stockpiled on site for future re-use in landscaping or in consultation with Local Council would be offered for potential for reuse of this material elsewhere within the Local Government Area (LGA) as applicable.

For exotic species or if re-use of native mulch is not considered feasible the material will be disposed to an offsite composting or waste facility in accordance with the project WRMP.

Appendix B1 - GRCLR Pre-clearing and Grubbing Inspection Checklist

GRCLR Pre-clearing and Grubbing Inspection Checklist

Work Activity:		**Permit No:**	
Requested By:			
Proposed Commencement Date:		**Completion Date:**	
A. Vegetation Clearing Location	*Insert Map*		
B. Details of work	Has the vegetation to be cleared been clearly delineated?	☐ Yes ☐ No	
	All trees/vegetation to be retained identified and "No-go Areas" fenced off?	☐ Yes ☐ No	
	How have they been identified?		
	Have habitat trees been identified and are they clearly marked?	☐ Yes ☐ No ☐ N/A	
	How have they been identified?		
	Is there risk of weed infestation or spread?	☐ Yes ☐ No	
	Were any animals observed?	☐ Yes ☐ No	
	Are any active nests present?	☐ Yes ☐ No	
	Are the proposed works covered by an existing approved by the Independent Arborist?	☐ Yes ☐ No	
	Are subcontractors aware of the extent of clearing and are aware of fauna handling procedures?	☐ Yes ☐ No	
C. Comments			

Approval

Inspection Completed by: (name/role) ……	Signature: ……..	Date
Robert Salisbury *GRCLR Environment, Planning and Sustainability Manager*	Signature ……	Date

Appendix C – Grey-headed Flying-fox Construction Monitoring Program (Ecosure, 2019)

ecosure

Grey-headed Flying-fox Construction Monitoring Program

Parramatta Light Rail - Stage 1
October 2019

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
DPIE	New South Wales Department of Planning, Industry and Environment
DPIE ESS	DPIE, 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 (DPIE 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.

DPIE 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 DPIE EES for comment (July 2019). DPIE EES confirmed that they had no comments on the revised program. Comments and responses provided in Appendix 1.

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 DPIE 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 DPIE ESS (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 DPIE 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 and by TfNSW trained staff on a monthly basis (during 'off months') 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	(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 DPIE 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 DPIE EES. After each monthly monitoring event the monitoring report will be submitted to DPIE EES. In addition, Section 7.3.1 identifies that if monitoring identifies changes in GHFF behaviours in the camp, consultation will be conducted with DPIE 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 DPIE 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 DPIE 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 DPIE 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 DPIE 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. 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 DPIE 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 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 DPIE 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 DPIE EES approval. It is the responsibility of the Parramatta Trust to obtain a licence from DPIE 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*)

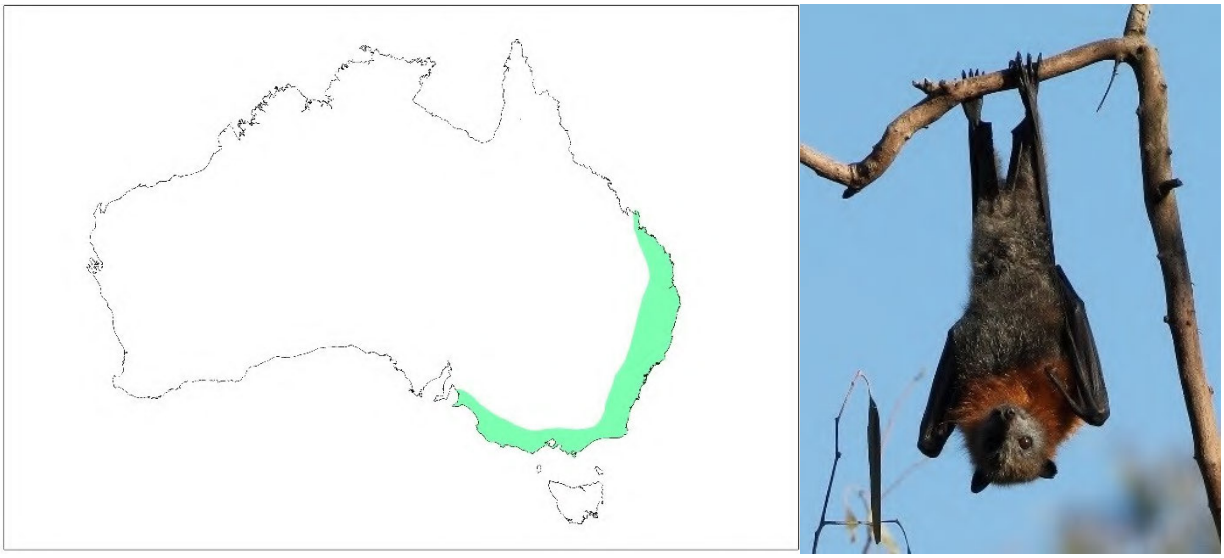

Figure 4 Grey-headed flying-fox indicative species distribution, adapted from OEH 2015a

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).

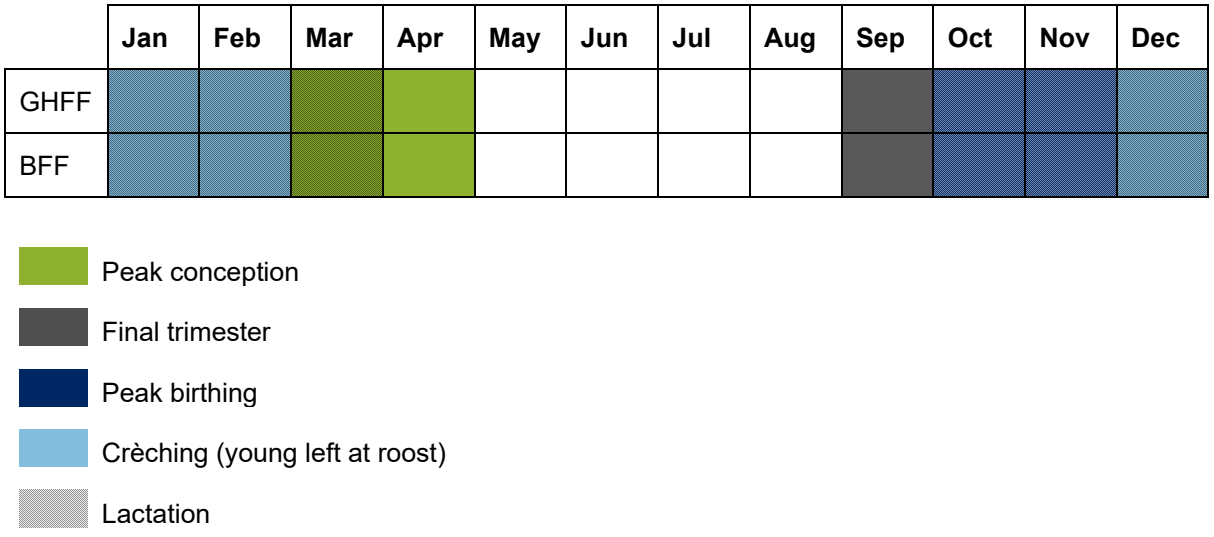

Figure 6 Indicative flying-fox reproductive cycle

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.

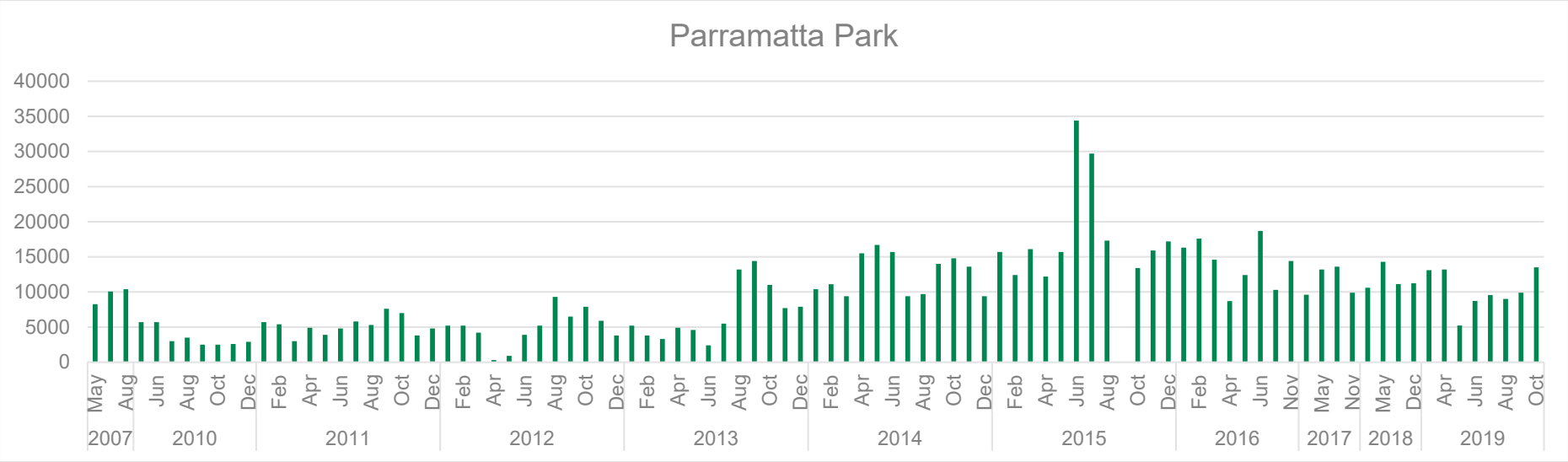

Figure 7 Numbers of flying-foxes at Parramatta Park camp (Source: Royal Botanical Gardens Martin J 2018 & Smith A 2018; NFFMP; Ecosure 2019)

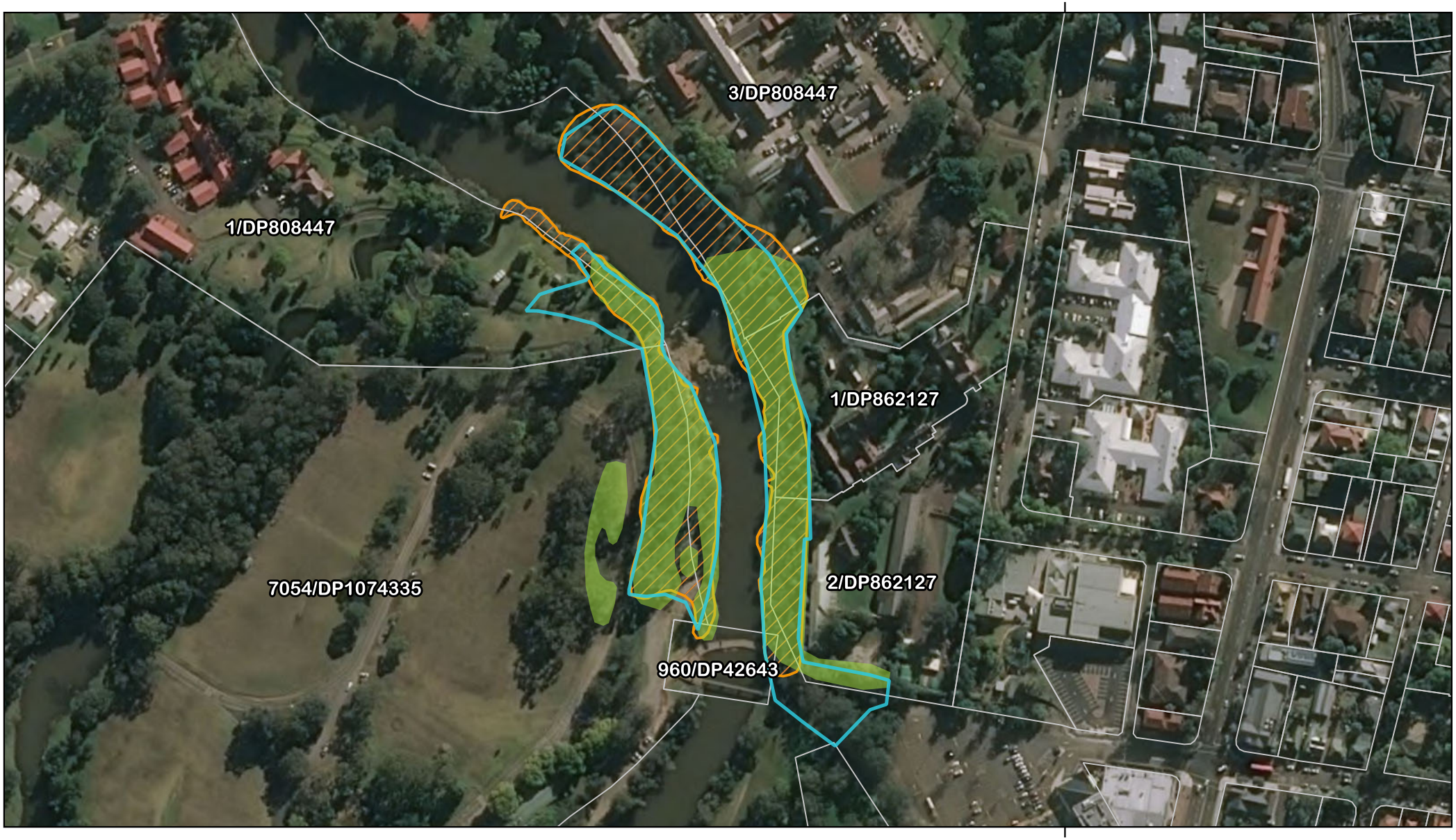

Figure 8: Parramatta park camp extent

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 DPIE 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.

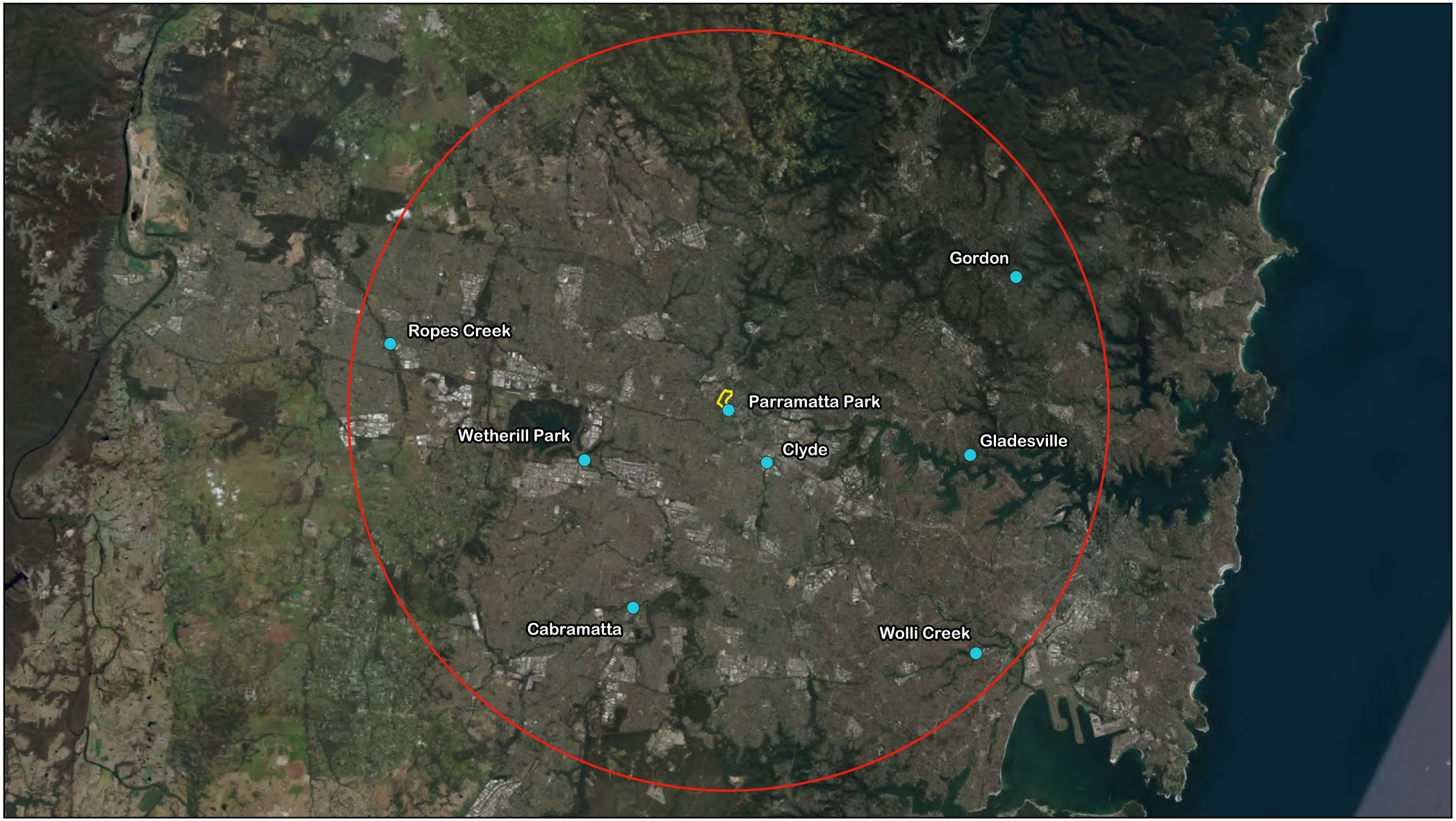

Figure 9: Camps within 20 km of Parramatta Park

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.

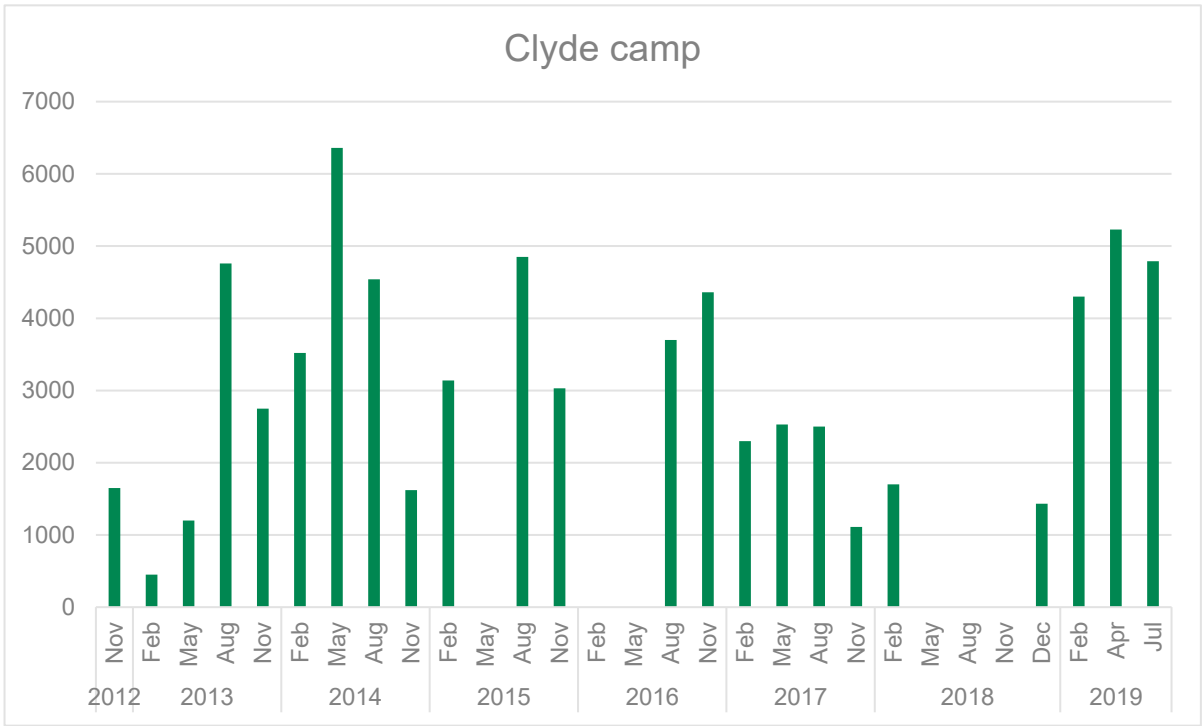

Figure 10 Numbers of GHFF at Clyde camp since 2012 (Source: NFFMP 2018, Ecosure 2019)

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.

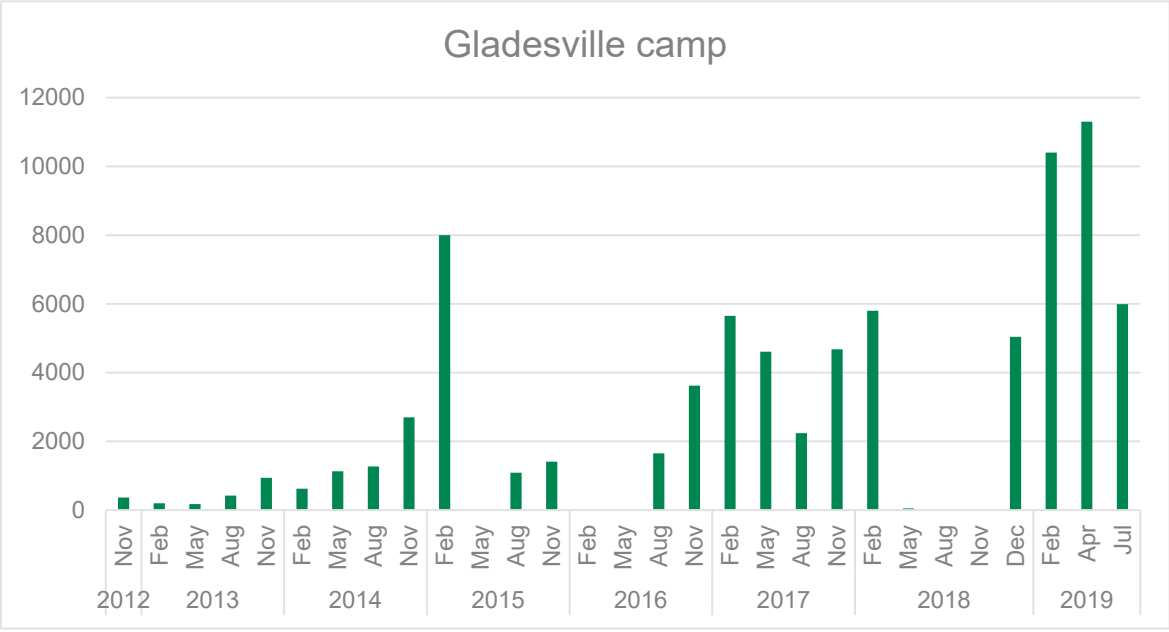

Figure 11 Numbers of flying-foxes at Gladesville camp since 2012 (Source: NFFMP 2018, Ecosure 2019)

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. These scheduled monitoring events will be undertaken quarterly, supplemented by monthly monitoring by trained TfNSW staff under the direction of Ecosure.

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	
Data	As per Proforma in Appendix 4	
Flying-fox expert	Ecosure personnel: Adam Pavitt (Scientist) Ben Gunston (Wildlife Field Team Leader) Emily Hatfield (Senior Wildlife Biologist) Jess Bracks (Principal Wildlife Biologist)	
Flying-fox camp monitors	Suitably trained TfNSW staff under direction of flying-fox expert	
Reporting frequency	Monthly – DPIE EES Quarterly –– DPIE	

6.2 Method

The monitoring methods used in the baseline monitoring program are to continue throughout 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. This will be supplemented by monthly monitoring at Parramatta Park (on off-months) by trained Transport for NSW staff under the direction of Ecosure. 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, mortality, 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 DPIE 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, TfNSW will submit this report to DPIE EES monthly. The reports will be submitted to the Secretary quarterly.

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 DPIE 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 Substation construction 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 OEH 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 de highly visible 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 OEH (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 monthly monitoring by trained TfNSW staff) suggests that construction associated with the CSSI is changing the behaviour of the camp, TfNSW must consult with DPIE 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. The monthly monitoring reports produced by TfNSW are 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 DPIE 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	[redacted]
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	[redacted] [redacted]
Flying-fox camp monitor	Observes flying-fox welfare Seasonal count of camp	Ecosure Avisure Sydney Botanic Gardens	[redacted]
Civil contractor – PLR road enabling works	Site supervisor / OHS Reports unusual sightings of flying-fox to Ecosure Stop work orders (as per company procedures)	[redacted]	[redacted]
Civil contractor – PLR Westmead Precinct	Project Manager – HAC Reports unusual sightings of flying-fox to Ecosure Stop work orders (as per company procedures)	[redacted] [redacted]	[redacted] [redacted]
Civil contractor – Infrastructure Works	Site supervisor / OHS Reports unusual sightings of flying-fox to Ecosure Stop work orders (as per company procedures)	[redacted]	[redacted]
Civil contractor – SOM Works	Site supervisor / OHS Reports unusual sightings of flying-fox to Ecosure Stop work orders (as per company procedures)	[redacted]	[redacted]
Contingency response	Extricate flying-foxes from sensitive locations	Ecosure WIRES Sydney Botanic Gardens Representative	[redacted]

Table 8 Enabling works schedule (Source: Environmental Risk Workshop presentation. R. Grace Diona Ward Joint Venture 28 August 2018). A suitably qualified person and DPIE 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 DPIE 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 DPIE EES of work changes to avoid further impacts.

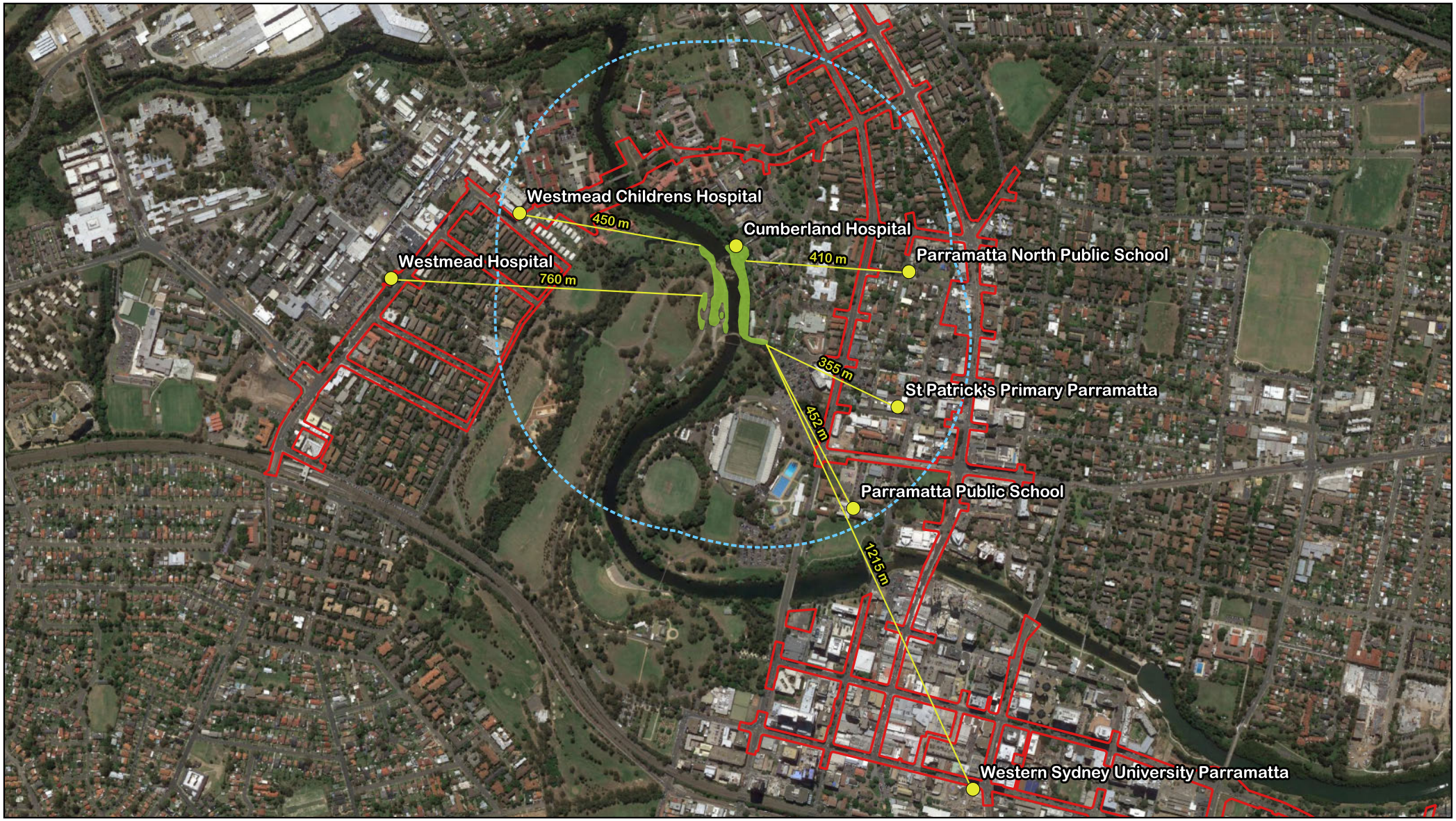

Figure 13: Locations of sensitive receptors and 500 m temporary stop works zone

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

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

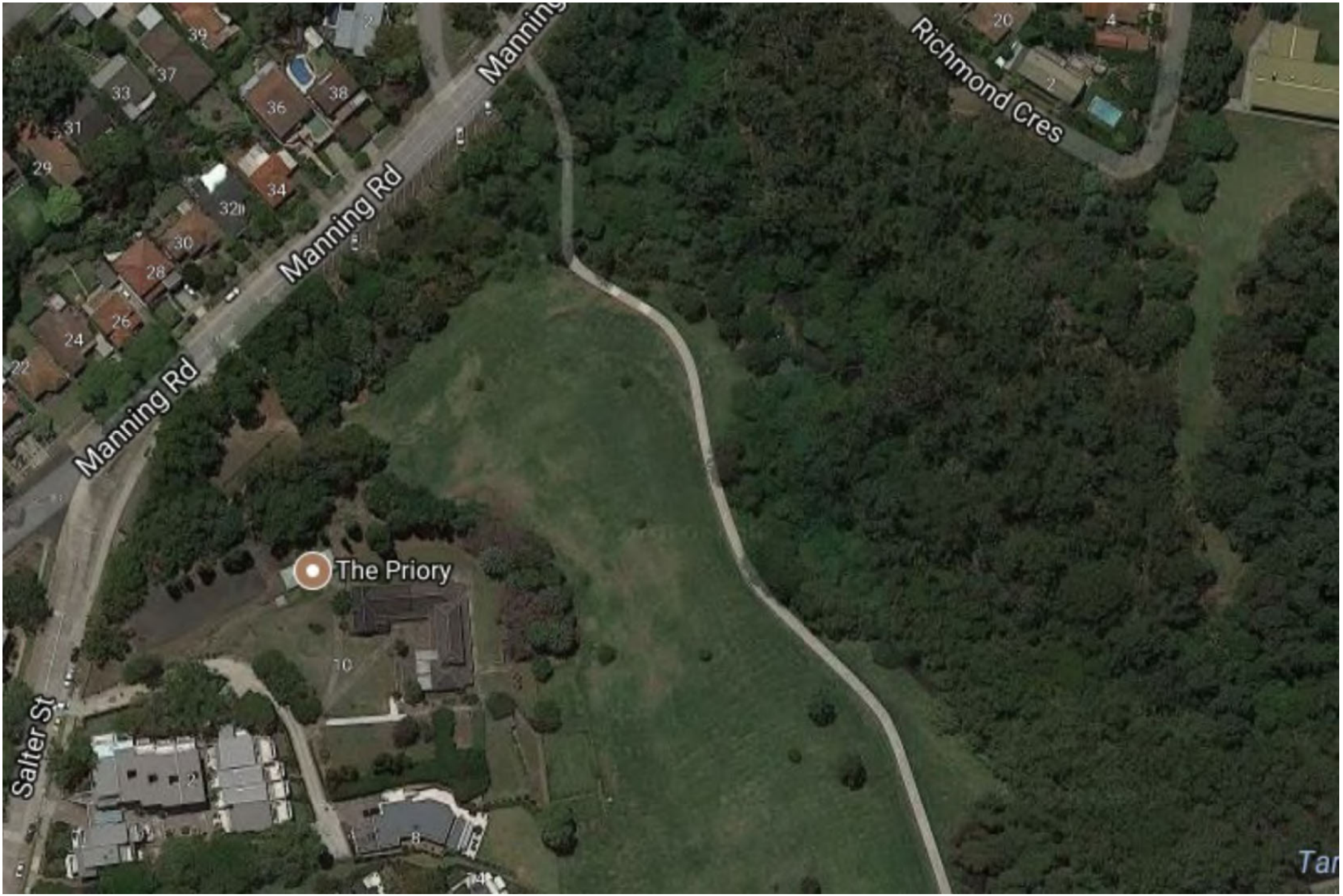
Below is an extract from Ecosure's electronic data form that can be used as a data sheet if required.

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

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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 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.

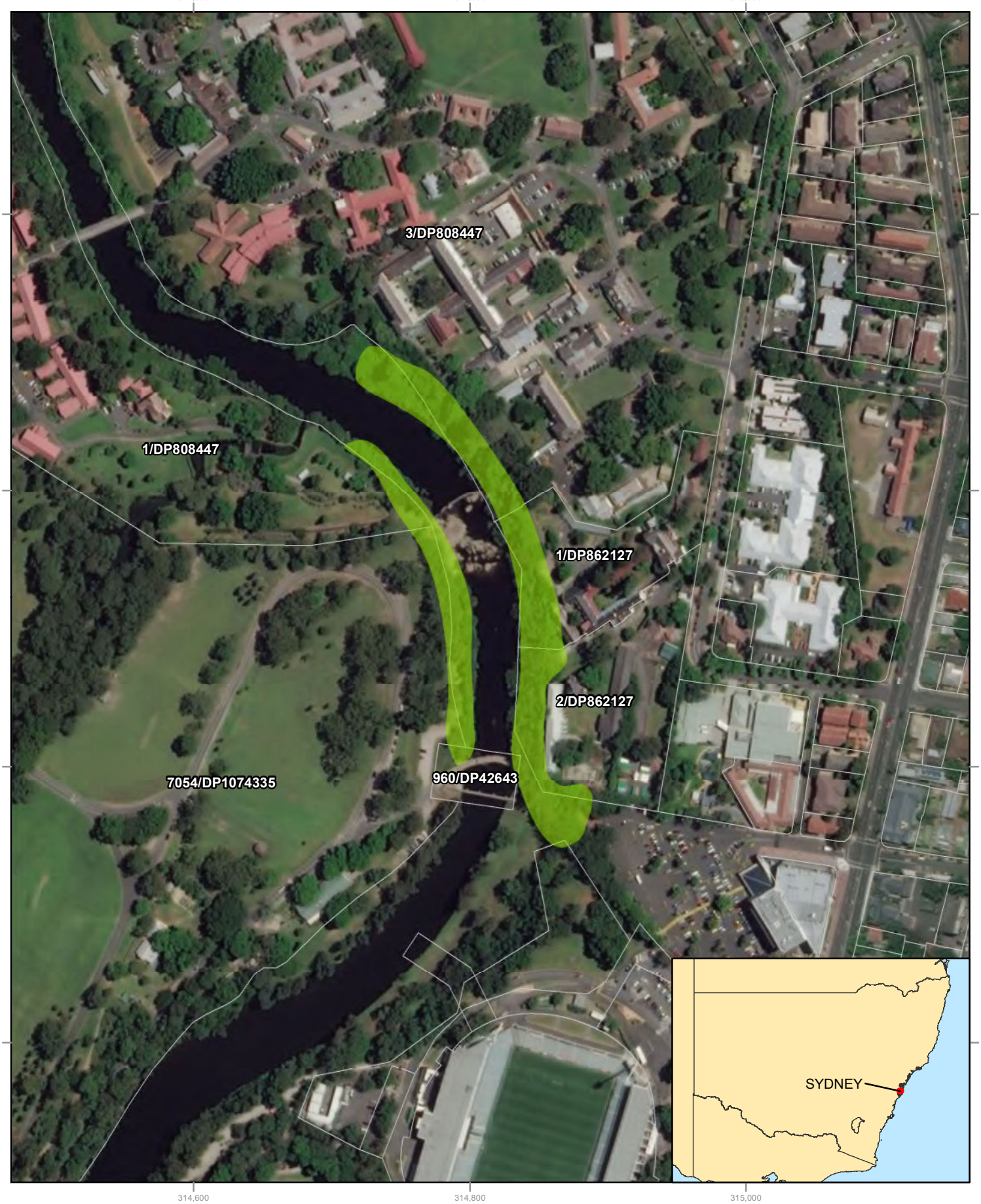

Figure 1: Parramatta Park camp extent

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=B00000TFFFFFFFTFFFFFFFFFFFFFFFFFFTTT&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	[redacted] Senior Wildlife Biologist	[redacted]	Manager - SEQ

Distribution List

Copy #	Date	Type	Issued to	Name
1	21/12/2018	Electronic	Transport for New South Wales	[redacted]
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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PR3691-DE.PLR Baseline Monitoring Report_Spring

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P 02 5621 8103

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Gladstone QLD 4720
P 07 4994 1000

Gold Coast
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West Burleigh QLD 4219
P 07 5508 2046
F 07 5508 2544

Rockhampton
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Rockhampton QLD 4700
P 07 4994 1000

Sunshine Coast
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Noosaville QLD 4566
P 07 5357 6019

Sydney
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Surry Hills NSW 2010
P 1300 112 021

Townsville
PO Box 2335
Townsville QLD 4810
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

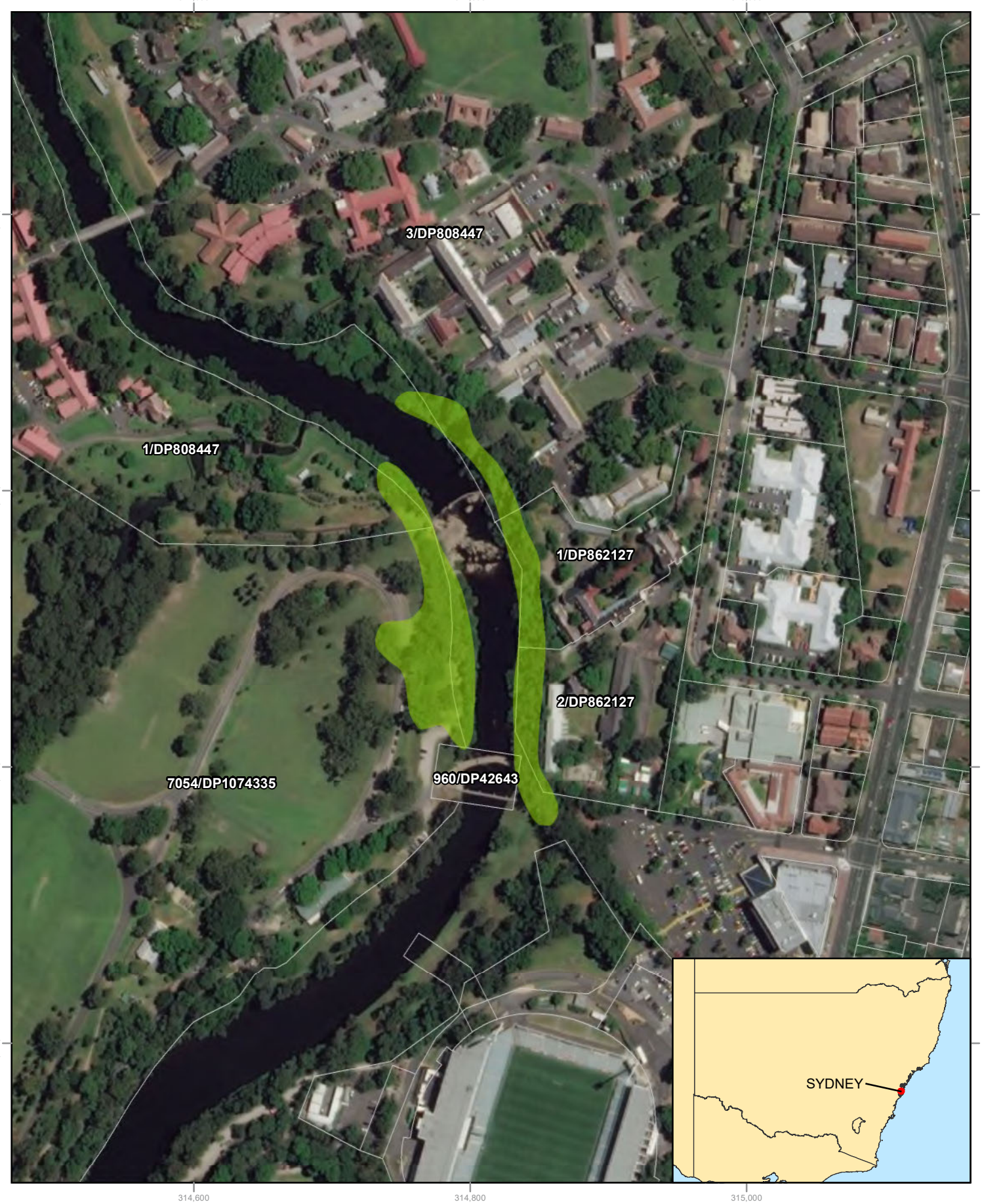

Figure 1: Parramatta Park camp extent

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	[redacted] Graduate Scientist	[redacted] Senior Wildlife Biologist	[redacted] Senior Environmental Scientist

Distribution List

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

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

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Certified System Environment ISO 14001 SAI GLOBAL
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

[redacted]
Senior Manager Environment
Transport for NSW
Locked Bag 5085
Parramatta, NSW 2124

Dear Ms [redacted]

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 [redacted] Planning Officer, Infrastructure Management via email at [redacted]@planning.nsw.gov.au.

Yours sincerely

26-2-2019

[redacted]
Director – Infrastructure Management
As delegate of the Planning Secretary

Appendix 9 ER Written statement

16 August 2019

Transport for NSW

Attention to: [redacted]
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)

[redacted]
Environmental Representative
[redacted]
email: [redacted]@aquas.com.au |

Filename : *AQ1148.05 PLR GHFF endorsement 190816*

Appendix 10 Cumberland demolition

(Source: TMR 2019 Nearmaps)


3
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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 DPIE 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

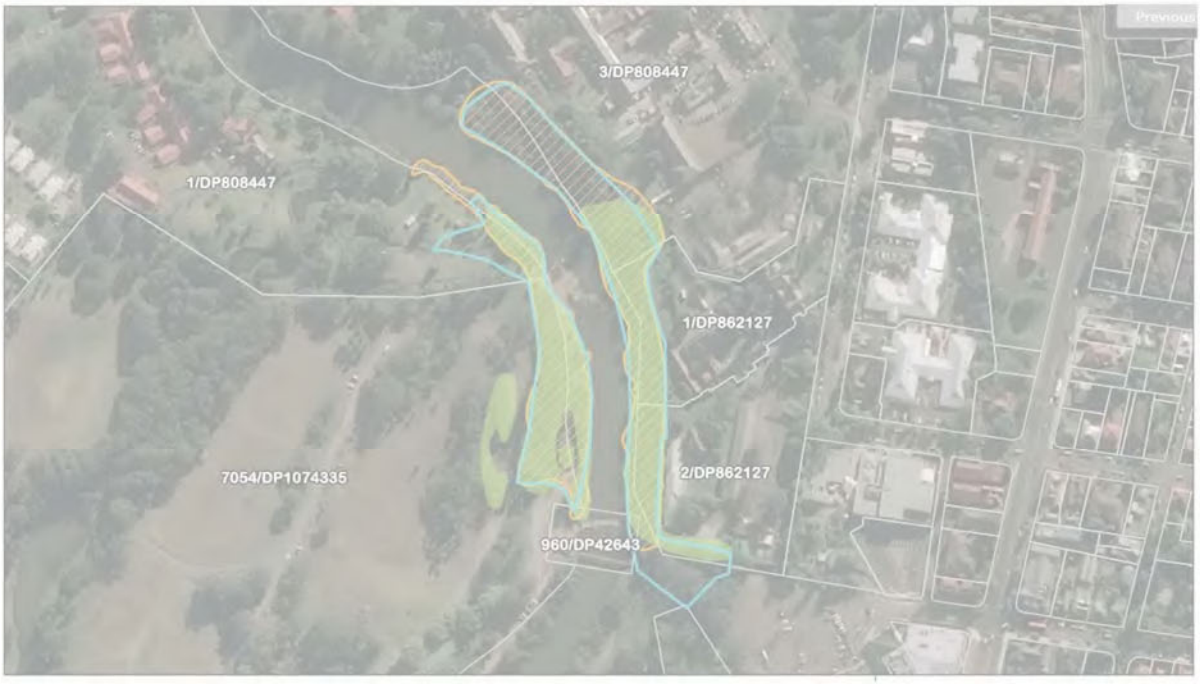

Figure 2: Visual inspection monitoring location (to be marked onto this map)
Note: visual inspections to be within 50 metres of the camp.

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

Distribution List

Copy #	Date	Type	Issued to	Name
1	29/10/2019	Electronic	Transport for NSW	[redacted]
2	29/10/2019	Electronic	Ecosure	Administration

Citation: Ecosure, 2019, *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.R10

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Appendix D – ER endorsement

The APP Group

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REF: AQ1148.05 PLR GLR FFMP rev5 endorsement 231122

Monday 22nd November 2023

[redacted]
Transport for NSW
Parramatta Light Rail

Re: Parramatta Light Rail, Flora and Fauna Management Plan. Supply, Operate, Maintain (SOM) Package

Pursuant to SSI8285 Condition of Approval A23 (d) ii), as the approved Environmental Representative, I confirm that I have reviewed the following updated documents for continued consistency with the requirements of the Conditions of Approval.:

- Flora and Fauna Management Plan, Supply, Operate, Maintain (SOM) Package 5 - Parramatta Light Rail (PLR1SOM-GLR-ALL-PM-PLN-000033 Rev 5.1), dated 20/11/2023, and
- CoA A5 Consultation Report – Flora and Fauna Management Plan, Supply, Operate, Maintain (SOM), Package 5 - Parramatta Light Rail (PLR1SOM-GLR-ALL-EN-RPT-001009 Rev D), dated 21/11/2023

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

These documents have been updated to include the testing and commissioning scope of works associated with the SOM package.

Yours sincerely,

[redacted]
Environmental Representative
The APP Group

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NSW GOVERNMENT