

Review of Environmental Factors Report

Parramatta Park Trust

PPT Safer Cities for Women & Girls Lighting and future CCTV conduits

Volume 1

December 2023



Acknowledgement of Country

Greater Sydney Parklands acknowledges the Traditional Custodians of the Land, Water and Sky of Western Sydney as well as all Aboriginal and Torres Strait Islander Peoples who live in this area today. We pay our respects to all Elders past, present and emerging.

Document Control

Title: Parramatta Park Lighting – PPT Safer Cities Women & Girls

Document Control Log

Version	Date	Author	Description	Reviewed by
Draft 1.0	31/08/2023	Bishal Ghimire	Draft 1.0	Kyle Mercer and Brooke Marshall
Final 1.0	24/10/2023	Bishal Ghimire	Final 1.0	Kyle Mercer and Brooke Marshall
Final 1.1	07/12/2023	Bishal Ghimire	Final 1.1	Kyle Mercer Sarah Hillis

Table of Contents

Decision Statement	vii
Certification	ix
Determination	ix
1. Introduction	1
1.1. Proposed Activity	1
1.2. Location of the Proposal	1
1.3. Proposal Background	3
1.4. Environmental Assessment and Approval process	3
1.5. Methodology	4
2. Site Analysis	5
2.1. Site Location and Context.....	5
2.2. Site Characteristics.....	5
3. Proposed Activity	7
3.1. Description of the Activity.....	7
3.2. Design	10
3.3. Alternatives and Preferred Option.....	12
3.4. Proposal Justification.....	12
4. Legislative and Planning Framework	13
4.1. Planning Approval Pathway	13
4.2. Environmental Planning and Assessment Act 1979.....	13
4.3. Environmental Planning and Assessment Regulation 2021	13
4.4. Environment Protection and Biodiversity Conservation Act 1999	14
4.5. Parramatta Park Trust Act 2001.....	14
4.6. Greater Sydney Parklands Trust Act 2022	15
4.7. Parramatta Park (Old Government House) Act 1967	15
4.8. Parramatta Local Environmental Plan 2023	15
4.9. Other Relevant Legislation.....	16
4.10. State Environmental Planning Policies.....	17
4.10.1. State Environmental Planning Policy (Transport and Infrastructure) 2021	17
4.11. Statutory Management Framework.....	17
5. Engagement	19
5.1. SEPP (Transport and Infrastructure)consultation.....	19
5.2. Community trustee board consultation.....	20
5.3. Agency consultation.....	20
5.3.1. City of Parramatta Council	20
5.3.2. Other NSW Government Agencies	21
5.4. Aboriginal community consultation.....	21
5.5. Local community consultation	22
6. Environmental Impact Assessment	23
6.1. Consideration of Key Issues	23
Aboriginal Heritage impacts	23
6.1.1. 23	
6.1.2. Post 1788 Cultural Heritage	28

6.1.3.	Soils and contamination.....	45
6.1.4.	Biodiversity	53
6.1.5.	Waste management.....	77
6.1.6.	Visual impacts	78
6.1.7.	Hydrology, catchment and water quality	81
6.1.8.	Air quality.....	82
6.1.9.	Noise and vibration impacts.....	84
6.1.10.	Transport, traffic, access and parking	89
6.1.11.	Cumulative Impacts on the environment.....	91
6.1.12.	Ecologically sustainable development and sustainability.....	91
6.1.	EP&A Regulation 2021 – Environmental Factors to be considered.....	92
6.2.	Consideration of National Environmental Significance	94
7.	Mitigation Measures.....	96
8.	Conclusion.....	104
9.	References.....	105
	Appendices	107
A.	Detailed Design	108
B.	Site Photographs	109
C.	Threatened Species Habitat Evaluations	111
D.	Threatened species Biodiversity Conservation Act 2016 Test of Significance	153
E.	Threatened Species Environment Protection and Biodiversity Conservation Act 1999 Test of Significance	162
F.	Background searches	167
G.	Aboriginal and cultural heritage impact report.....	168
H.	Noise calculator	169
I.	Preliminary site investigation	170
J.	Heritage Impact Statement	171

List of Figures

Figure 1-1.	Proposal site	2
Figure 3-1.	Plans of Proposal.....	9
Figure 3-2.	Light pole indicative design	10
Figure 3-3.	Light pole footing indicative design.....	10
Figure 3-4.	Typical consolidated underground cabling trench under landscaped areas.....	11
Figure 3-5.	Typical pit design	11
Figure 6-1.	AMZ's for the Proposal.....	24
Figure 6-2.	Areas of test excavation.....	27
Figure 6-3.	Heritage items in proximity to the Proposal site (WHL, NL).....	30
Figure 6-4.	Heritage items in proximity to the Project Area (SHR and PLEP).....	31
Figure 6-5.	Built heritage items	39
Figure 6-6.	Areas of archaeological sensitivity within and in close proximity to the Proposal site.....	41
Figure 6-7.	Site topography.....	47
Figure 6-8.	Exposed cement pipe	49
Figure 6-9.	AECs identified within and nearby to the Proposal site.....	51
Figure 6-10.	Results of desktop assessment.....	56
Figure 6-11.	PCT 0 within a landscaped area and unclassified vegetation type in foreground	57

Figure 6-12. PCT 0 within an area of grassed lawn	58
Figure 6-13. PCT 4024 within the Proposal site	58
Figure 6-14. Map 1 of 4 showing results from field assessment in March 2023	60
Figure 6-15. Map 2 of 4 showing results from field assessment in March 2023	61
Figure 6-16. Map 3 of 4 showing results from field assessment in March 2023	62
Figure 6-17. Map 4 of 4 showing results from field assessment in March 2023	63
Figure 6-18. <i>Eucalyptus tereticornis</i> HBT mapped during field assessment	65
Figure 6-19. <i>Grevillea juniperina</i> ssp. <i>juniperina</i> recorded during field assessment.....	66
Figure 6-20. Map 1 of 4 showing location of Development Footprint and Proposal site	69
Figure 6-21. Map 2 of 4 showing location of Development Footprint and Proposal site	70
Figure 6-22. Map 3 of 4 showing location of Development Footprint and Proposal site	71
Figure 6-23. Map 4 of 4 showing location of Development Footprint and Proposal site	72
Figure 6-24. Air quality at North Parramatta monitoring station (NSW Government, 2023) .	83
Figure 6-25. Annual exceedances at North Parramatta monitoring station for same pollutants (NSW DPIE, 2023).....	83
Figure 6-26. Noise Catchment Areas for the Proposal	87

List of Tables

Table 3-1. Proposal Alternatives	12
Table 4-1. PLEP heritage items in the Proposal site	15
Table 4-2. Other relevant legislation.....	16
Table 5-1. Assessment of items of SEPP (Transport and Infrastructure) Part 2.2 Division 1	19
Table 6-1. Places listed under the EPBC Act 1999	29
Table 6-2. Places listed under the <i>Heritage Act</i> 1977	32
Table 6-3. Objectives and controls in Planisphere (2012) relating to the Proposal site.....	33
Table 6-4. Built heritage items – potential impact and consideration of need for mitigation measures	33
Table 6-5. Archaeological sites - potential impact and consideration of requirement for mitigation measures.....	42
Table 6-6. Background searches undertaken	54
Table 6-7. Extent of vegetation/surface types surveyed within the Development Footprint..	59
Table 6-8. HBT details recorded during site assessment, bold entries represent trees within the Proposal site	64
Table 6-9. Landscape character and visual impact grading matrix (Transport, 2020).....	78
Table 6-10. Summary of landscape character and visual impact of the Proposal	79
Table 6-11. Summary of NCAs during ‘construction’ during standard hours	86
Table 6-12. Recommended minimum working distances for vibration-intensive plant from sensitive receivers (Transport for NSW, 2020).....	88
Table 6-13. Factors to be considered.....	92
Table 7-1. Mitigation Measures	96

Decision Statement

This Review of Environmental Factors (REF) has been prepared by NGH Pty Ltd on behalf of the Parramatta Park Trust to take into account all matters affecting, or likely to affect the environment as a result of the proposed lighting construction and its associated activities at Parramatta Park.

The REF has been prepared in accordance with the *Environmental Planning and Assessment Act 1979*, *Environmental Planning and Assessment Regulation 2021 (EP&A Regulation)*, *Biodiversity Conservation Act 2016*, *Environment Protection and Biodiversity Conservation Act 1999*, *National Parks and Wildlife Act 1974*, *Heritage Act 1977*, *State Environment Planning Policy (Precincts – Western Parkland City) 2021*, *Chapter 7, State Environment Planning Policy (Transport and Infrastructure) 2021*.

This REF addresses all matters affecting, or likely to affect the environment as a result of the proposed activity and provides a true and fair review in relation to its potential effects on the environment. The information contained in this REF is neither false nor misleading and contains all available information that is relevant to the environmental assessment of the proposed activity.

It is concluded that by adopting mitigation measures identified in Chapter 7 to eliminate, minimise or manage environmental impacts, the proposed activity:

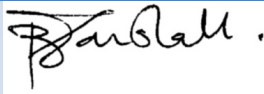
- a. is not likely to have a significant impact on the environment, therefore an Environmental Impact Statement is not required;
- b. the proposed activity will not be carried out in a declared area of outstanding biodiversity value and is not likely to significantly affect threatened species, populations or ecological communities, or their habitats or impact biodiversity values, meaning a Species Impact Statement and/or BDAR is not required;
- c. is not likely to affect any Commonwealth land, or significantly affect any matters of National Environmental Significance.

Subject to implementation of the mitigation measures identified in Section 6 the proposed activity is recommended for approval.

The proposed activity requires publication of the REF in accordance with clause 171(4) of the EP&A Regulation as the proposed works requires an Aboriginal Heritage Impact Permit (AHIP) that is issued under the *National Parks and Wildlife Act 1974*. The proposed works also require a Section 60 permit under *Heritage Act 1977* as there is potential that works will disturb an archaeological relic (of non-Aboriginal origin).

Prepared by	NGH Pty Ltd
Qualifications	Reviewed by Sarah Hillis, principal planner NGH BEnvSc, MEnvMgt Approved by Brooke Marshall, principal planner NGH Ba. Natural Resources (hons1), CENVP & REAP
Address	PO Box 470 Bega

Signature




Date

26/10/2023 Final V1.0

13/12/2023 Final V1.1


Certification

I certify that I have reviewed and endorsed the contents of this REF document and, to the best of my knowledge, it is in accordance with the EP&A Act, the EP&A Regulation and the Guidelines approved under section 171 of the EP&A Regulation, and the information it contains is neither false nor misleading.

Name	Kerrie Symonds
Qualifications	BTP (Hons 1), M Comm (Land Ec), MBA (Tech Mgt)
Address	Level 1, 6 Parramatta Square, Parramatta
Signature	
Date	20 December 2023

Determination

I accept this REF on behalf of the Parramatta Park Trust, as the determining authority, and determine that the proposed activity is approved subject to mitigation measures in Section 7.0 being implemented and may proceed.

Trust Delegated Officer	Callantha Brigham
Position	Director Strategy, Design and Delivery
Address	Level 1, 6 Parramatta Square, Parramatta
Signature	
Date	12 January 2023

1. Introduction

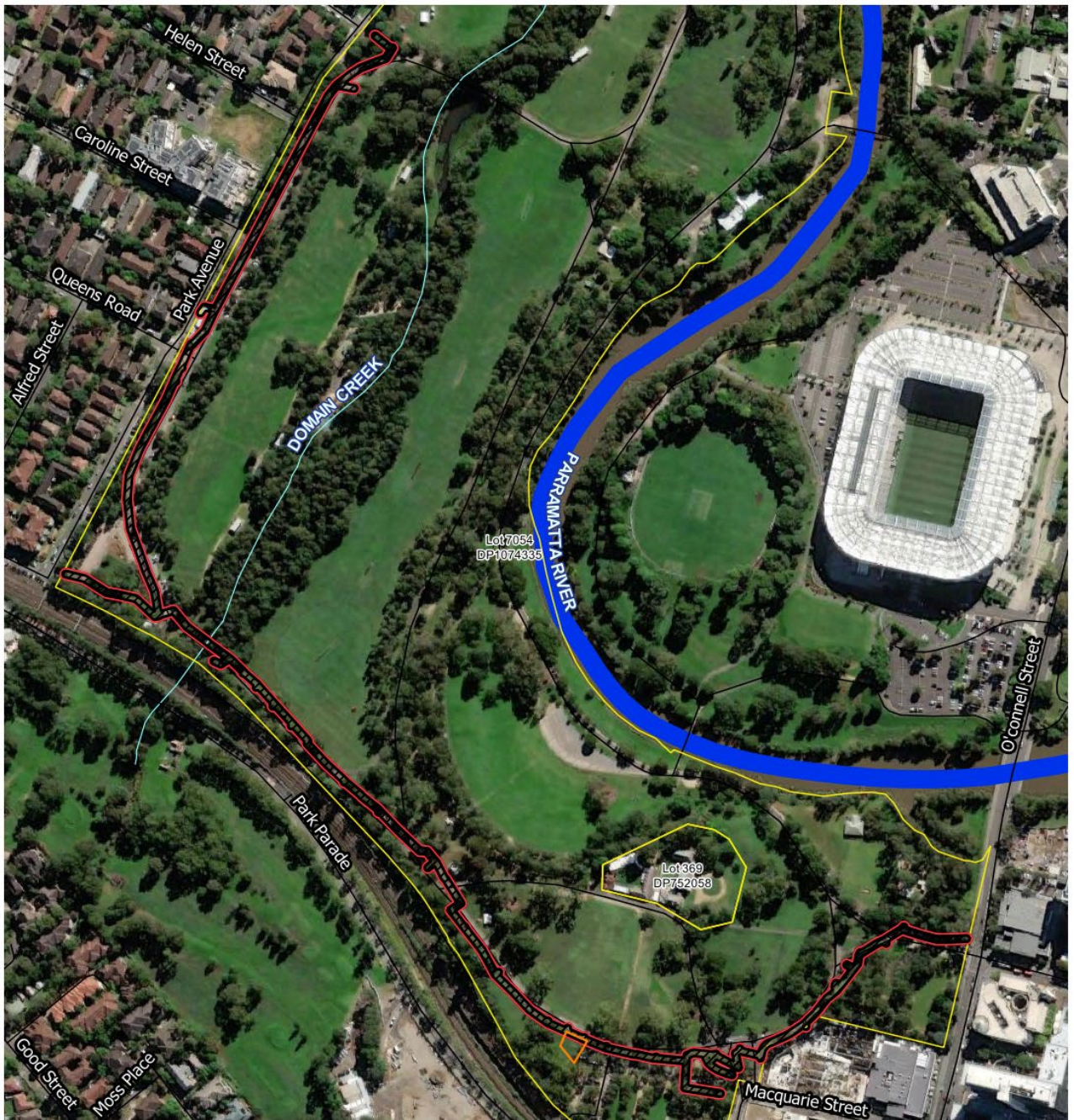
1.1. Proposed Activity

This Review of Environmental Factors (REF) has been prepared by NGH Pty Ltd (NGH) for the Parramatta Park Trust (PPT) to take into account all matters affecting, or likely to affect the environment as a result of construction of lighting along pathways at Parramatta Park and associated works (the Proposal).

PPT is both the proponent and the determining authority under *Part 5 Division 5.1 of the Environmental Planning and Assessment Act 1979* (EP&A Act) for the proposed activity. Greater Sydney Parklands Trust (GSP) has responsibility for all functions of PPT under the *Parramatta Park Trust Act 2001* (PPT Act).

1.2. Location of the Proposal

The Proposal is located within suburb of Parramatta, in Sydney's Western region within the Parramatta Local Government Area (LGA). The Proposal is located within the boundaries of Parramatta Park within Lot 7054 DP1074335. The location of the Proposal is shown in Figure 1-1.



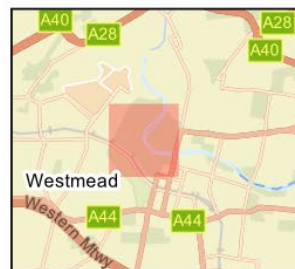
Parramatta Park New Path Lighting Proposal site

Legend

- Proposal site
- Development footprint
- Subject Lot
- Proposed construction compound
- 1st Order Stream (Domain Creek)
- 4th Order Stream (Parramatta River)
- Roads



Data Attribution
 © NGH 2023
 © PPT 2023
 © Google Satellite 2023



Ref: Parramatta Park New Path Lighting_REF
 20230823 \ NGH Template A4, In text, portrait
 [RENAME LAYOUT]
 Author: bishal.g
 Date create d: 25.10.2023
 Datum: GDA94 / MGA zone 56



Figure 1-1. Proposal site

1.3. Proposal Background

The Safer Cities Program is investing \$30 million over two years to improve safety in our cities and towns, particularly for women, girls and gender diverse people. The program aims are aligned with the United Nations Safer Cities for Girls program these initiatives include:

- Increasing women and girls' safety and access to public spaces
- Enabling women and girls to move freely and alone in their community
- Increasing women and girls' engagement with how the spaces around them are designed and managed.

The program engaged women, girls and gender diverse people to understand their perspectives and co-design place-based approaches to improve perceptions of safety when walking to, through and within public spaces including our streets.

Transport for NSW conducted a survey seeking community input to better understand the concerns and experiences that affect the community's sense of safety in and around public spaces across NSW. The survey closed on Wednesday 8 February 2023 and contributions to this consultation are under evaluation and review, with a detailed report to be published in the coming months.

Some initial findings from the state-wide survey are:

- 59 percent of women do not feel safe after dark in public spaces.
- 9 in 10 women agreed that safety influences how they move around.
- The top five things that help make a public space feel safer for women are: good lighting, presence of people, time of day, easy to navigate and if it looks cared for.
- When moving through and within public spaces, women prioritise safety over convenience.
- Three in four women would walk more if they felt safer in public spaces.
- Women feel safest in activated public spaces where there are people around no matter what time of day it is.

This Proposal is a part of this bigger initiative which aims to make the park safer during evening and night for women and girls.

1.4. Environmental Assessment and Approval process

PPT is both the proponent and the determining authority under Part 5 of the EP&A Act for the proposed activity.

Pursuant to clause 2.73(2)(b) of State Environmental Planning Policy - Transport and Infrastructure 2021 (SEPP (Transport and Infrastructure)), development for any purpose may be carried out with consent –

- b) On trust lands within the meaning of the Parramatta Park Trust Act 2001, by or on behalf of the Parramatta Park Trust.*

...if the development is for the purposes of implementing a plan of management adopted for the land under the Act referred to above in relation to the land or in accordance with the Local Government Act 1993 in relation to Crown managed land managed by a council.

The Proposal is within the lands of PPT and consistent with the plan of management. Therefore, is permissible without consent (refer to Section 4.10.1 for further discussion). The Proposal is not State

Significant Infrastructure or State Significant Development. The Proposal can be assessed under Division 5.1 of the EP&A Act.

PPT is the determining authority for the Proposal. This REF fulfils the obligation under section 5.5 of the EP&A Act including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

A referral to Australian Government Department of Climate Change, Energy, the Environment and Water under the EPBC Act is not considered to be required as the Proposal will not have significant impacts on any matters of National Environmental Significance (refer to Section 6.2).

1.5. Methodology

This REF relies on specialist technical assessments to address the environmental impact of the Proposal. The findings of this report consider the results of the studies undertaken by these specialists, with the relevant technical reports reproduced in the Appendices of this report.

All appendices that are referenced in this report are presented in the following order:

Appendix A - Detailed Design

Appendix B - Site Photographs

Appendix C - Threatened Species Habitat Evaluations

Appendix D - Threatened species *Biodiversity Conservation Act 2016* Test of Significance

Appendix E - Threatened Species *Environment Protection and Biodiversity Conservation Act 1999* Test of Significance

Appendix F - Background searches

Appendix G - Aboriginal and cultural heritage impact report

Appendix H - Noise calculator

Appendix I - Preliminary site investigation

Appendix J - Heritage Impact Statement

Terminologies used in this report are:

Proposal site:	Area within 5m of the proposed infrastructure
Development Footprint:	Area within 3m of the proposed infrastructure
Study area:	Area within 10km of the Proposal site

2. Site Analysis

2.1. Site Location and Context

Parramatta Park is located on the western edge of the Parramatta Central Business District (CBD), approximately 25 kilometres west of Sydney CBD. The Darug People are the traditional owners of the land.

Parramatta Park contains several dominant and evolved natural landscape elements that together form an enduring centrality in this part of Burramattagal Country. These landforms include a freshwater section of the Parramatta River and its floodplain in the east, another freshwater watercourse (Domain Creek) that is set within a separated valley flat to the west and intervening and surrounding elevated ridge and hill landforms. The slope terrain in the park also retains a few mature Indigenous trees that are likely ‘descendant trees’ (regrowth) of the original open woodland that characterised the Country at Parramatta prior to 1788.

The Park is a nationally significant cultural landscape closely associated with early colonial government, with the beginnings of rural settlement in Australia and with the exploration and expansion of colonisation. The Park represents one of Australia’s oldest areas set aside and developed for public recreation and has had continuous use for 150 years as a public park.

The Park was gazetted as a public park in August 1858, making it one of the oldest parks in Australia and is zoned RE1 Public Recreation under *Parramatta Local Environmental Plan 2023* (PLEP). The park is visited by more than two million people each year and this number is growing.

The Park is bounded by residential areas to the south across the railway line, Pitt, Macquarie and O’Connell streets to the east, Park Avenue to the west and Parramatta River towards the north-eastern portion of the park. The Park covers an area of 85 hectares within Parramatta Local Government Area (LGA). The park also houses Old Government House which is listed on the national heritage list and also on World Heritage list. The building is the oldest surviving public building in Australia. Built by convicts, it became the decision making centre of the colony and served as the ‘country residence’ for the first ten Governors of NSW (National Trust NSW, 2023). The site of the proposed works is owned by PPT. The Proposal site is within Lot 7054 DP1074335. The activity is proposed along Railway Parade and West Domain Avenue extending to the nearby main streets. The proposed lighting works starts at O’Connell Street and travels through Murray Gardens, Rumsey Rose Gardens (where it connects to the junction of Pitt Street and Macquarie street), onto Coronation Hill and through Paddocks it extends to the end point (junction of Park venue and Jessie Street) as shown in Figure 1-1.

2.2. Site Characteristics

Parramatta Park is a cultural landscape that is significant for its Aboriginal, Early Colonial, Vice-Regal, People’s Park and natural heritage values. Many of these rich and unique values are recognised on local, state, national and World Heritage lists. The Park also contains recreational and community facilities including cafes, children’s playgrounds, sports fields, gardens, picnic areas, cycle paths, walking tracks and parklands.

The heritage values of the park are varied and complex. Above ground heritage values are as important as below ground archaeological values along with their associated visual settings. The key heritage values identified in the Your Parramatta Park 2030 Conservation Management Plan are:

Natural heritage and features – Parramatta Park is significant as a natural landscape within an urban setting and as a landscape that showcases the evolution and development of its landforms over time. Values include:

- Native flora, fauna and ecological communities including a Grey-headed flying fox colony, Cumberland Plain Woodland, Shale Sandstone Transition Forest, River-flat Eucalypt Forest, Parramatta River, ancient trees and sandstone outcrops.

Aboriginal heritage – Parramatta Park is significant for the large section of the Parramatta Sand Body within its boundaries which is the ancient riverbed and banks of the late Pleistocene / early Holocene River. Values include:

- Ancient archaeological landscapes
- Sites and landscape settings routinely used by and important to Aboriginal people.

Early colonial and Vice-Regal heritage – Parramatta Park with Old Government House is of World Heritage Significance as an organisational and social centre of convict transportation from 1788-1840. Values include:

- Archaeological landscapes
- Views and settings
- Buildings and structures including The Dairy and Ranger’s cottage, gatehouses, transit stones and memorials.

People’s Park heritage – Parramatta Park is significant as one of the earliest gazetted parks in Australia in 1858. It was designed as a Victorian-era People’s Park following lengthy lobbying for its creation from the 1840s. Values include:

- Archaeological landscapes
- Views and settings
- Buildings, monuments, fences and other structures.

The Proposal aligns with Objectives of Your Parramatta Park 2030 with specific reference to the following objectives:

Objective 2 by ensuring that community participation, engagement and activation is provided. The footpath lighting would provide for further opportunity for park users to use the park at low light hours. The path lighting is anticipated by Your Parramatta Park 2030.

Objective 3 requires the creation of linkages and connections within the Precinct. The proposed path lighting provides a key linkage from Parramatta CBD to Westmead.

Objective 4 requires the management of the park in a sustainable way. The path lighting would not adversely impact the quality of Park, while maintaining the integrity of the landscape setting by conserving and enhancing the remnant plantings in the Precinct.

3. Proposed Activity

3.1. Description of the Activity

The Proposal seeks to construct lighting, bollards and conduits for future CCTV adjacent to existing pathways in the park. The proposed works stretch from the George Street Gatehouse at O'Connell Street to the junction of Park Avenue and Jessie Street in Westmead. There are also works along paths to the corner of Macquarie Street and Pitt Street, Parramatta and Railway Parade, Westmead. The are proposed is shown in Figure 1-1.

Detailed design for the Proposal is provided in Appendix A. The Proposal would involve trenching for cabling and the installation of light poles. Some cable would be bored underground, reducing surface disturbance along several sections of the Proposal. Light poles would be installed with an option to house CCTV cameras in the future. Site clearing works would remain minimal, restricted to trenching works 600mm wide. The design of the Proposal has been drafted in a way that no tree removal would be required and with minimal impacts to the heritage significant landscapes, monuments and gatehouses.

Construction could be carried out in sections in order to limit the extent of impact to the whole area. Completed construction areas will be rehabilitated as the construction is completed. Any finished area will be open to public if safe to do so which will limit the extent of impact to the park users.

Several environmental safeguards and mitigation measures are included to minimise and mitigate the impact and can be found summarised in Section 7.

The activities proposed include:

- Establishment of construction compounds
- Site preparation including clearing vegetation (grass) along the trench path
- Trenching, boring and electrical connection works
- Erecting new lighting poles along the path
- Cleaning the construction zone and landscaping the disturbed land

Pre-construction

Pre-construction works would include public notification, utility adjustment, establishment of construction compounds and barricading work areas. Ground markings would be placed and areas for trenching and boring would be marked. This stage would also include removal of topsoil and any vegetation in the areas marked for trenching.

Construction

This stage would include the actual construction of the Proposal. This would include trenching and boring for laying out electrical connections, preparing footings for lighting poles, erecting lighting poles and filling out trenches.

Post-construction

Post-construction works would include landscaping all disturbed areas, clearing out barricades, cleaning the pathways and removal of construction compounds.

Construction hours and duration

Construction of the Proposal is anticipated to commence in February 2024 and would take approximately three to four months to complete (weather permitting).

All construction work would occur within the construction hours:

- Monday to Friday: 7:00am to 6:00pm
- Saturday: 8:00am to 1:00pm

Construction workforce

About 4-8 construction staff are expected to be working on site. However, the workforce would fluctuate depending on the stage and final numbers would be identified by the construction contractor.

Plant and equipment

General equipment used during construction is likely to include the following:

- Excavators
- Front end loaders
- Scraper
- Vibrating rollers
- Power tools including drills, grinders, and welders
- Tipping trucks
- Delivery trucks
- Water carts
- Crane
- Light vehicles

Traffic and Site access

The Proposal site will have vehicles entering and exiting through the western entry/exit point via Park Avenue (refer Figure 3-1).

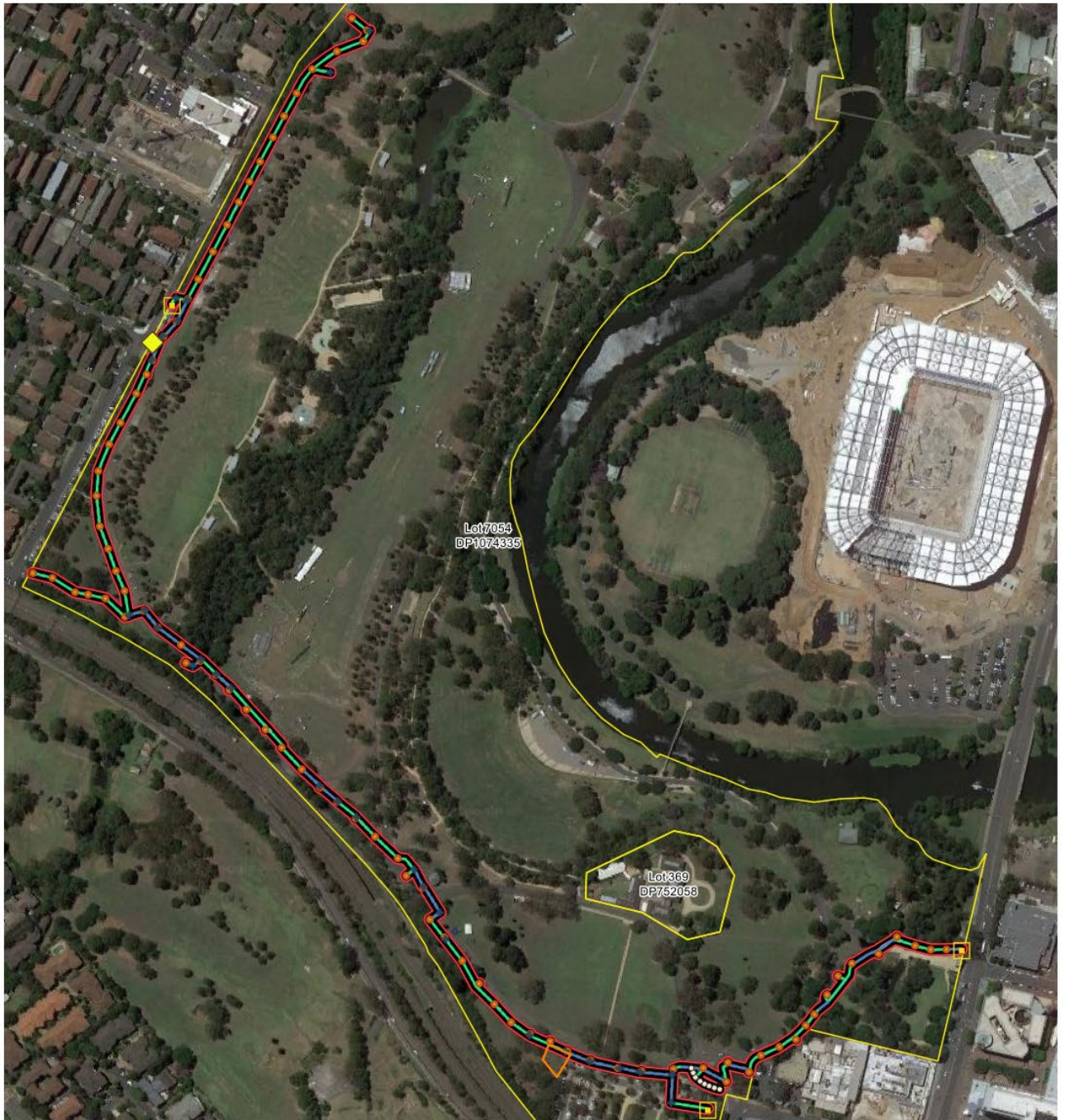
Railway Parade and West Domain Avenue are trafficable by motor vehicles around the park. The new path lighting will be along these roads. These internal roads are one lane and one way with in a clockwise direction around the park. The speed limit for these park roads is 30km per hour. All vehicles have to abide by Parramatta Park traffic regulations. All roads in Parramatta Park will remain open during the works unless specifically required under *Work Health and Safety Act 2011*.

Parking will be either in the temporary site compound or in existing designated parking areas. Unauthorised parking on other open space is prohibited.

Construction compound

A construction compound with a stockpile area and site office would be established within the Park in the zone highlighted in Figure 3-1. The proposed construction compound is only indicative and might be adjusted based on the operational needs of the Park and requirements deemed appropriate by the GSP Operation and Heritage teams.

The compound area would be temporarily used throughout the construction phase and would be rehabilitated to the pre-construction conditions after the construction works are completed.

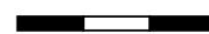


Parramatta Park New Path Lighting Project Components

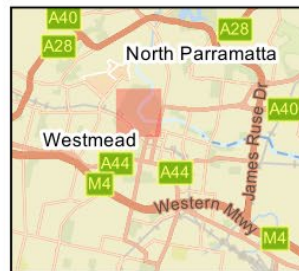
Legend

- | | |
|-----------------------|--------------------------------|
| Proposal site | Electrical connection |
| Development footprint | Bore |
| Light pole | Trench |
| Bollard | Proposed Construction compound |
| Electrical Pit | Proposal Lot |
| Distributor Board | Site Access |

0 50 100 150 m



Data Attribution
 © NGH 2023
 © PPT 2023
 © Google Satellite 2023



Ref: Parramatta Park New Path Lighting_REF
 20230823\1 Project Components
 Author: bishal.g
 Date created: 23.10.2023
 Datum: GDA94 / MGA zone 56



Figure 3-1. Plans of Proposal

3.2. Design

Light poles: 83 light poles will be installed as a part of the Proposal. The light poles are designed to be minimal structures so as not to detract from the visual amenity of the site. A typical light pole will be 7.5m high above ground and will stand on a concrete footing 1.25m deep. The light poles will generally be 1.1m from the edge of road surface. A typical light design and its footing is shown in Figure 3-2 and Figure 3-3 respectively.

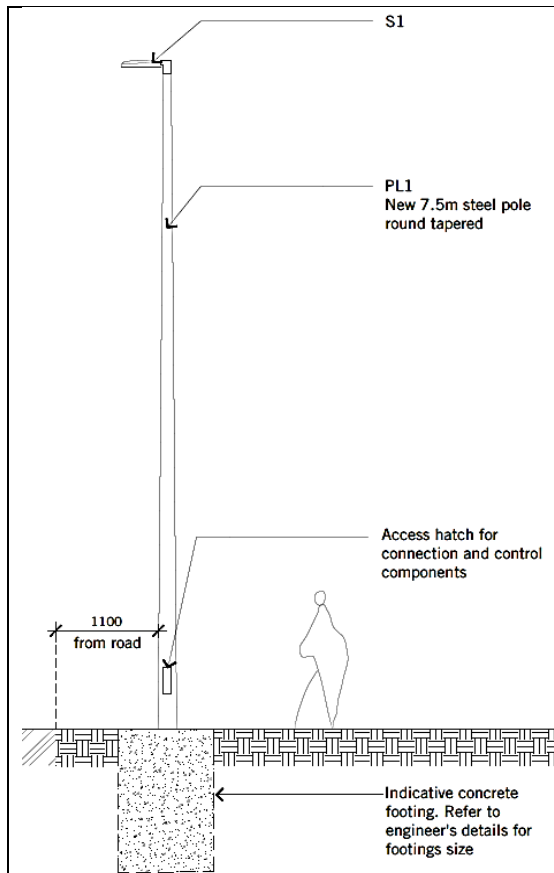
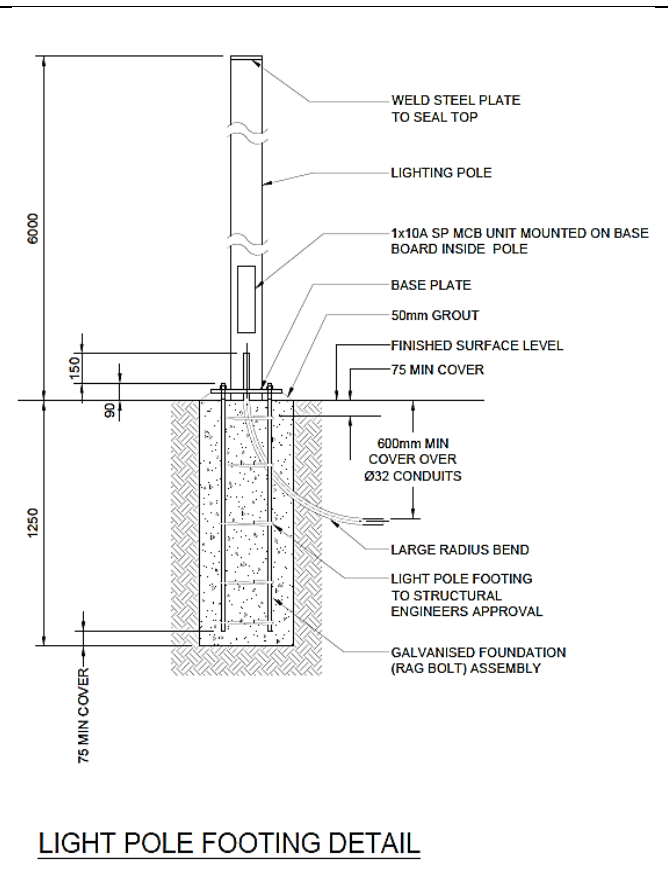


Figure 3-2. Light pole indicative design



LIGHT POLE FOOTING DETAIL

Figure 3-3. Light pole footing indicative design

Bollards: Eight timber bollards will be installed as shown in Figure 3-1. The bollards will be consistent with the aesthetic of existing bollards and will include lights. They will serve the same purpose as existing bollards; restricting vehicle access to formal carparking areas only.

Trenches: Installation of the electrical cabling will involve trenching. The trenches will be up to 600mm wide and 1200mm deep. The location of the trenches is shown in detailed design provided in Appendix A. Trenches would be designed to the specifications shown in Figure 3-4.

Connection to the grid: Five electricity connection points have been nominated for the connection to the grid. Three are located along Park Avenue, one along Pitt Street and one along O’Connell Street. Location of connection point/points are shown in detailed design in Appendix A.

3.3. Alternatives and Preferred Option

Multiple options were considered for the Proposal which are detailed in Table 3-1.

Table 3-1. Proposal Alternatives

Option	Assessment
Do-Nothing	The do-nothing option would not impact status quo therefore will not improve path lighting for pedestrians and hence not make the park safer during low-light hours.
Alternative Design	<p>In order to minimise ground disturbance hence minimize impact on heritage and vegetation, an alternative option to use solar powered lights was also considered. This option would reduce the disturbance footprint of the project.</p> <p>However, this option would require larger overground fittings which would have a negative impact on the heritage significance of the area and would also be visually unappealing to the park users and surrounding residents.</p>
Preferred Design	In order to preserve the parks heritage significance, the preferred option chosen includes underground power cables and standing light poles with minimalistic design.

3.4. Proposal Justification

The Proposal directly satisfies objectives from both the Your Parramatta Park 2030 Plan of Management and the NSW Government’s Safer Cities Women and Girls Program. The Proposal has been carefully designed to minimise any potential impacts of the Proposal on the heritage and landscape significance of Parramatta Park. In addition, as shown in Section 6, Construction of this Proposal would not result in major environmental impacts. Any impact that is a direct or indirect result of this Proposal is minimised through implementation of mitigation measures proposed in Section 7.

4. Legislative and Planning Framework

This section includes an assessment of the Proposal against the applicable legislative and planning framework.

4.1. Planning Approval Pathway

Pursuant to clause 2.73(2)(b) of SEPP (Transport and Infrastructure) 2021, development for any purpose may be carried out without consent –

b) On trust lands within the meaning of the Parramatta Park Trust Act 2001, by or on behalf of the Parramatta Park Trust.

if the development is for the purposes of implementing a plan of management adopted for the land under the Act referred to above in relation to the land or in accordance with the Local Government Act 1993 in relation to Crown managed land managed by a council.

The Proposal is within the lands of PPT and consistent with the plan of management as described in section 4.11. Therefore, the Proposal is permissible without consent. The Proposal is not State Significant Infrastructure or State Significant Development. The Proposal can be assessed under Division 5.1 of the EP&A Act.

PPT is the determining authority for the Proposal. This REF fulfils the obligation under section 5.5 of the EP&A Act including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity as directed by section 171 of EP&A Regulation.

4.2. Environmental Planning and Assessment Act 1979

Division 5.1 of the EP&A Act applies to activities that are permissible without consent and are generally carried out by a public authority (excluding State significant infrastructure). Activities under Division 5.1 of the EP&A Act are assessed and determined by a public authority, referred to as the determining authority. PPT is a public authority and is the proponent and determining authority for the proposed works.

For the purpose of satisfying the objects of the EP&A Act relating to the protection and enhancement of the environment, a determining authority, in its consideration of an activity shall examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.

4.3. Environmental Planning and Assessment Regulation 2021

Section 170 of the EP&A Regulation provides for the issue of Department of Planning and Environment (DPE) Guidelines for Division 5.1 assessments (DPE, 2022) in relation to factors to be taken into account when considering the likely impact of an activity and the form of the document required to be prepared by a determining authority. This REF is consistent with the Guidelines.

Section 171 of the EP&A Regulation provides a list of environmental factors that must be taken into account for an environmental assessment under Division 5.1 of the EP&A Act. These requirements are considered at section 6.1 of this REF.

The EP&A Regulation (clause 171(4)) requires publication for activity with:

- a capital investment value of more than \$5 million or,
- an approval or permit for activity that requires approval under:

-
- *Fisheries Management Act 1994* (FM Act) sections 144, 200, 205 or 219, or
 - *Heritage Act 1977* section 57, or
 - *National Parks and Wildlife Act 1974* section 90 or
 - *Protection of the Environment Operations Act 1997* (POEO Act) sections 47-49 or 122, or
 - if the determining authority considers it to be in the public interest.

The proposed activity has an estimated capital investment value of \$2.5m, which does not require publication of the REF. However, the proposed activity requires an approval or permit listed above (specifically an Aboriginal Heritage Impact Permit (AHIP) that is issued under the *National Parks and Wildlife Act 1974* and Section 60 permit under *Heritage Act 1977*), therefore, requiring publication of the REF.

4.4. Environment Protection and Biodiversity Conservation Act 1999

Under the EPBC Act, a referral is required to the Australian Government for proposed actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. These are considered in Section 6.1.2 and 6.1.4 of the REF.

The EPBC Act also includes a Conservation agreement with the NSW Government and Parramatta City Council for the protection and conservation of the World Heritage Values and National Heritage Values of the Australian Convict Sites, Old Government House and Domain, Parramatta New South Wales (Australian Department of the Environment, 2012). These sites have been assessed in Section 6.1.2. With consideration of the recommended mitigation measures this Proposal will not significantly impact any items listed in the agreement.

Findings - matters of national environmental significance

The assessment of the Proposal's impact, on matters of national environmental significance and the environment of Commonwealth land, found that there is unlikely to be a significant impact on relevant matters of national environmental significance or on Commonwealth land. Accordingly, the Proposal has not been referred to the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the EPBC Act.

4.5. Parramatta Park Trust Act 2001

Schedule 1 of the *Parramatta Park Trust Act 2001* identifies land which forms Parramatta Park and Part 3 sets out the objects and functions of the Trust.

The objects of the Trust are:

- to maintain and improve the trust lands
- to encourage the use and enjoyment of the trust lands by the public by promoting the recreational, historical, scientific, educational and cultural heritage value of those lands
- to ensure the conservation of the natural and cultural heritage values of the trust lands and the protection of the environment within those lands
- such other objects, consistent with the functions of the Trust in relation to the trust lands, as the Trust considers appropriate.

Part 5 Clause 15 of the *Parramatta Park Trust Act 2001* provides for a plan of management for the Trust's land. (Refer s. 4.11 for statutory management framework which demonstrates consistency of the Proposal with the approved plan of management and sub-plans)

4.6. Greater Sydney Parklands Trust Act 2022

Part 1-3 of *Greater Sydney Parklands Trust Act 2022* (GSPT Act) sets out the objects as following:

- a) to maintain and improve the parklands estate across Greater Sydney and ensure the parklands estate is effectively managed and operated to deliver world-class and ecologically sustainable parklands for the public,
- b) to enable the Greater Sydney Parklands Trust to facilitate a connection to Country for First Nations peoples that—
 - (i) recognises and conserves First Nations peoples’ cultural heritage and values through the use of the parklands estate, and
 - (ii) establishes long-term and mutually beneficial partnerships that give effect to the ongoing relationships of First Nations peoples with Country,
- c) to ensure the conservation of the natural and cultural heritage values of the parklands estate and the protection of the environment within the parklands estate,
- d) to advocate for a long-term vision to achieve the outcome of quality parklands across Greater Sydney, particularly connectivity of green corridors and public access to open space,
- e) to encourage the use and enjoyment of the parklands estate by the community by promoting and increasing the recreational, historical, scientific, educational, cultural and environmental values of lands within the parklands estate,
- f) to ensure the parklands estate may be used by the community in a way that is adaptive and recognises and responds to the diverse needs of the community,
- g) to provide increased opportunity for community engagement to shape regionally significant parklands in response to diverse community needs.

This Proposal is in line with the objects of the GSPT Act as it recognises and protects heritage value, enhances the park for the benefit of the community using it.

4.7. Parramatta Park (Old Government House) Act 1967

Considering the proximity of the Proposal to the Old Government House, the *Parramatta Park (Old Government House) Act 1967* clause 7- ‘access through Parramatta Park’ applies to the Proposal. The Proposal has been designed in a way which will not obstruct access to the Old Government House at any time.

4.8. Parramatta Local Environmental Plan 2023

The PLEP identifies and protects heritage conservation areas and listed buildings/items, identifies environmentally sensitive land, and prescribes land use practices. In brief, Clause 5.10 of the PLEP details how heritage is to be conserved and managed with identified heritage items included under Schedule 5.

Parramatta Park and Old Government House is included under Item I611(PLEP 2023 Schedule 5). The listing for Parramatta Park and Old Government House contains numerous heritage items and archaeological sites. Parramatta Archaeological Management Units are included, with PAMU 2998 relevant to this Proposal (PLEP Schedule 5 #418) (Please refer to Section 6.1.2 for details on the impact to these heritage items).

Table 4-1. PLEP heritage items in the Proposal site

Item name	Location and proximity to the proposed works	SHI listing ID	Potential for impact by proposed works
Parramatta Park and Old Government House	In the Proposal site	I611	Yes

4.9. Other Relevant Legislation

The following table lists any additional legislation that should be considered.

Table 4-2 Other relevant legislation

State Legislation	Purpose of Legislation	Relevance to the Proposal and Approval Requirements
<i>Biodiversity Conservation Act 2016 (BC Act)</i>	The BC Act aims include to 'maintain a healthy, 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'. It provides for the listing of threatened species and communities, establishes a framework to avoid, minimise and offset the impacts of proposed development, and establishes a standard method for assessing the likely impacts on biodiversity values and calculating measures to offset those impacts.	This Proposal is not likely to significantly affect threatened species and a Species Impact Statement (SIS) or Biodiversity Impact Assessment Report (BDAR) are not considered to be necessary. No areas of outstanding biodiversity values exists within the Proposal site. Refer to section 6.2 for an assessment of potential impacts of the Proposal on biodiversity
<i>Rural Fires Act 1997</i>	Under Section 63 public authorities must take all practicable steps to prevent the occurrence and spread of bush fires on or from land vested in or under its control or management.	The Proposal is not within areas identified as bushfire prone land. Introduction of this Proposal in this area will not elevate fire risk.
<i>Fisheries Management Act 1994</i>	The objects of this Act are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.	This Proposal does not affect any key fish habitat. Proposed mitigation measures will be able to safely manage water pollution and sedimentation impacts.
<i>Contaminated Land Management Act 1997 (CLM Act)</i>	The CLM Act provides the framework for the management of contaminated land in NSW and requires that the nature and extent of any potential contamination be investigated and demonstrated.	Historical contamination has been suspected in the Proposal site (please refer to section 6.1.3 and Appendix I for potential impacts related to contamination). The REF recommends detailed site investigation to understand the nature and impact of this possible contamination.

4.10. State Environmental Planning Policies

4.10.1. State Environmental Planning Policy (Transport and Infrastructure) 2021

Division 12 Clause 2.73 (2)(b) of SEPP (Transport and Infrastructure) provides that development for any purposes may be carried out without consent, on Trust land within the meaning of the *Parramatta Park Trust Act 2001* (PPT Act), by or on behalf of the PPT, if the development is for the purposes of implementing a plan of management adopted for the land.

The proposed works have been considered under the statutory management framework (refer to Section 4.11 for further detail) under the following documents:

- *Development in Parramatta City and the Impact on Old Government House and Domain's World and National Heritage Listed Values – Technical Report*
- *Your Parramatta Park 2030 Conservation Management Plan and Plan of Management.*
- *Old Government House and Domain, Parramatta Park Management Plan 2009*

The proposed activity is found to be consistent with the above framework.

Your Parramatta Park 2030 Conservation Management Plan and Plan of Management identifies ways to manage the Park as a cultural landscape across eight precincts. It establishes objectives that aim to balance the Park's cultural and natural heritage values with our ambitions for an active, well-loved and well-utilised natural, recreational and cultural space for a growing population at the heart of Greater Sydney.

The Proposal helps the PPT meet the following objectives as outlined in the plan of management (POM):

- Identify and celebrate natural and cultural heritage values
- Increase community participation
- Create linkages and connections
- Manage the Park in a sustainable way.

4.11. Statutory Management Framework

Parramatta Park is listed with Old Government House on the UNESCO World Heritage List as one of 11 Australian Convict Sites. It is listed on the World and National Heritage Lists of the EPBC Act, and the State Heritage Register of the *Heritage Act 1977*. A statutory management framework has been adopted by the Trust to meet the requirements of these Acts and the PPT Act.

The proposed activity is consistent with the statutory management framework under the following documents:

- *Development in Parramatta City and the Impact on Old Government House and Domain's World and National Heritage Listed Values – Technical Report*
- *Your Parramatta Park 2030 Conservation Management Plan and Plan of Management.*
- *Old Government House and Domain, Parramatta Park Management Plan 2009*

Future development in the area is guided by three design principles, specifically: visual prominence and symbolism, landscape setting and layering of cultural heritage elements. These design principles are from Your Parramatta Park 2030 Conservation Management Plan and Plan of Management. The Proposal is considered to satisfy these principles. Part 3 of the 'Development in Parramatta City and the Impact on Old Government House and Domain's World and National Heritage Listed Values –

Technical Report' outlines future development guidelines. The section provides guidance for the nature and form of development to reduce impacts on the heritage values and significance of the site. The minor nature of the work is considered to satisfy this guidance.

The Potential impacts of the Proposal are assessed in Chapter 6. The assessment concludes that the Proposal is consistent with the relevant plans and is development without consent (in accordance with clause 2.73(2)(b) of SEPP (Transport and Infrastructure)).

5. Engagement

5.1. SEPP (Transport and Infrastructure) consultation

Part 2.2 Division 1 of the SEPP (Transport and Infrastructure) contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. This assessment is provided in Table 5-1 below.

Table 5-1 Assessment of items of SEPP (Transport and Infrastructure) Part 2.2 Division 1

SEPP (Transport and Infrastructure) section 2.10 – 2.14 and 2.110	Is consultation with Council required?	
2.10 (1)(a) Are the works likely to have a substantial impact on the stormwater management services which are provided by council?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
2.10 (1)(b) Are the works likely to generate traffic to an extent that will strain the capacity of the existing road system in a local government area?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
2.10 (1)(c) Will the works involve connection to a council owned sewerage system? If so, will this connection have a substantial impact on the capacity of the system?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
2.10 (1)(d) Will the works involve connection to a council owned water supply system? If so, will this require the use of a substantial volume of water?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
2.10 (1)(e) Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a minor or inconsequential disruption to pedestrian or vehicular flow?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
2.10 (1)(f) Will the works involve more than a minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
2.11 Is there a local heritage item (that is not also a state heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the heritage significance of the item/area are more than minor or inconsequential?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
2.12 Are the works located on flood liable land? If so, will the works change flooding patterns to more than a minor extent?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
2.14 Is the Proposal within the coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No/NA
2.110 Does the Proposal include a car park intended for the use by commuters using regular bus services?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
2.110 Does the project propose a bus depot?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

2.110 Does the project propose a permanent road maintenance depot or associated infrastructure, such as garages, sheds, tool houses, storage yards, training facilities and workers amenities?

Yes

No

SEPP (Transport and Infrastructure) section 2-13 – 2.16 **Is consultation with a public authority (other than Council) required?**

2.13 Are the works located on flood liable land? If so, do the works comprise more than minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance?

Yes

No

2.15 (2)(a) Are the works adjacent to a national park, nature reserve or other area reserved under the National Parks and Wildlife Act 1974, or on land acquired under that Act?

Yes

No

2.15 (2)(b) Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?

Yes

No

2.15 (2)(c) Are the works comprising a fixed or floating structure in or over navigable waters?

Yes

No

2.15 (2)(d) Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)

Yes

No

2.15 (2)(e) Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in clause 5.15 of Lockhardt LEP 2012, Narrandera LEP 2013 and Urana LEP 2011).

Yes

No

2.15 (2)(f) Are the works on land in a mine subsidence district within the meaning of the Coal Mine Subsidence Compensation Act 2017?

Yes

No

2.16 (1) Are the works for the purpose of residential development, a health services facility, a correctional facility or group home in bush fire prone land?

Yes

No

The assessment concludes that consultation with council is not required for the Proposal. However consultation was undertaken as outlined in section 5.3.1.

5.2. Community trustee board consultation

The Proposal is part of a broader NSW Government initiative that was substantially developed prior to the establishment of the Community trustee board. The board will be briefed on the Proposal prior to works commencing.

5.3. Agency consultation

5.3.1. City of Parramatta Council

Extensive consultation was carried out with the City of Parramatta Council regarding future integration with their security and wayfinding strategies, policies and procedures. The proposed

conduits are to be installed to the City of Parramatta's specification to facilitate future CCTV onboarding to the City of Parramatta network.

5.3.2. Other NSW Government Agencies

Consultation was also carried out with other NSW Government Agencies as part of the shared delivery of the broader Safer Cities program including Transport for NSW Cities, Revitalisation and Place team, NSW Health, Greater Cities Commission, Department of Planning and Environment Smart Cities team.

5.4. Aboriginal community consultation

The First Nations community consultation that has been undertaken for the Aboriginal Cultural Heritage Assessment Report (ACHAR) has followed the methods outlined in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010) and has involved:

- a) getting the word out there to Aboriginal people
- b) providing information to those interested
- c) providing opportunities for the Aboriginal people to provide feedback
- d) seeking, incorporating, and acknowledging shared cultural knowledge from Aboriginal people.

At the initiation of the Proposal in December 2022, a public notice for the Safer Cities Proposal was placed in the *Koori Mail* and a list of First Nations people and government agencies to notify and invite to be involved in the ACHAR consultation process was provided by the Department of Premier and Cabinet (Heritage NSW). The following six government agencies were notified:

- Department of Premier and Cabinet (Heritage NSW)
- Office of the Registrar, *Aboriginal Land Rights Act 1983*
- National Native Title Tribunal
- Native Title Services Corp
- City of Parramatta Aboriginal Advisory Committee
- Cumberland City Council Advisory Committee

Parramatta Park is situated within the administration boundaries of Deerubbin Local Aboriginal Land Council. The following three Local Aboriginal Land Councils were notified:

- Deerubbin Local Aboriginal Land Council (DLALC)
- Gandangara Local Aboriginal Land Council (GLALC)
- Metropolitan Local Aboriginal Land Council (MLALC)

Dominic Steele Consulting Archaeology (DSCA) also wrote to each of the Aboriginal community groups and individuals on a consultation list provided by Heritage NSW (HNSW) for the City of Parramatta Local Government Area¹ and invited expressions of interest from people about being involved in the development of the cultural heritage assessment for the Proposal.

¹ List of Aboriginal Stakeholders held by Department of Premier and Cabinet for purposes of OEH Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010.

Details of consultation with the relevant Registered Aboriginal Parties can be found in the attached ACHAR, Appendix F.

5.5. Local community consultation

Community consultation was carried out prior to the design development of the works over a series of walks within the park and a design charette with girls from a local high school. The outcomes of this consultation directly informed the development of the Proposal.

Community will be updated on the commencement, progress and completion of the works through the PPT's social media channels.

6. Environmental Impact Assessment

This chapter provides an assessment of the potential impacts of the Proposal. This chapter will detail construction and operation impacts and outline mitigation measures. The mitigation measures required to manage the impacts of the proposed works are summarised in Chapter 7.

6.1. Consideration of Key Issues

The following section includes a description of those aspects of the environment that are likely to be affected during construction and operation and the likely significance of the impact. It includes consideration of biodiversity, heritage, waste, visual, hydrological, soil, air, noise and transport impacts. It also considers cumulative impacts and ecologically sustainable development, with respect to the potential impacts.

Supporting detail can be found in the attached appendices:

- Preliminary site investigation, habitat evaluations and assessments of significance, Appendices I, C, D respectively.
- Aboriginal Cultural Heritage Assessment Report, Appendix G.
- Noise calculations, Appendix H.
- Heritage Impact Statement, Appendix J.

6.1.1. Aboriginal Heritage impacts

Methodology

An Aboriginal Cultural Heritage Assessment Report (ACHAR) has been prepared by Dominic Steele Consulting Archaeology (attached as Appendix G) in consultation with First Nations people. The aim of the ACHAR is to understand the cultural heritage values of the land to be affected by the Proposal. The information present in this REF is a summary of the ACHAR that included in its development desktop and field investigations as well as Aboriginal community consultation (as described in Chapter 5).

To help understand where archaeological impact may occur and where impact is not expected, and to incorporate this understanding into the discussions with the First Nations cultural advisory group, the lighting path electrical service route is divided into following Archaeological Management Zones (AMZ's) based on geology, landform, and soils:

- AMZ 1: George Street Promenade to Railway Parade
- AMZ 2: Railway Parade south (southern slope)
- AMZ 3: Railway Parade Observatory/Bath House area (crest)
- AMZ 4: Railway Parade north (northern slope)
- AMZ 5: Domain Creek crossing
- AMZ 6: West Domain Avenue (south)
- AMZ 7: West Domain Avenue (north)
- AMZ 8: Coleman Oval

The AMZ's are shown in Figure 6-1.



Figure 6-1. AMZ's for the Proposal

The landscape mapping and Aboriginal heritage research for this Project, including consideration of the findings reported by previous Aboriginal (and historical) archaeological investigations that have been undertaken within or in close proximity of each AMZ enables the identification of locations with potential archaeological sensitivity.

Existing environment

Parramatta Park has formed part of the traditional lands of the Burramattagal clan of the Darug Nation for possibly 60,000 years and comprises a significant subsurface archaeological landscape, including the Parramatta Terrace Sands and Holocene Floodplain sand, that provides evidence of their pre-contact lifestyle. Known evidence of Aboriginal occupation also exists within the Park along the ridgeline of the Crescent and around Domain Creek.

Parramatta Park forms a small part of a large Aboriginal cultural landscape that comprised the lands and peoples of many clan estates in addition to the Burramattagal and this landscape was one of the first Aboriginal places that was taken by the British soon after Invasion. Parramatta Park has a complex, ongoing, and culturally significant post-Invasion Aboriginal history.

Parramatta Park is located within an ancient river valley whose natural and cultural evolution can be traced back to the Late Pleistocene via archaeological and environmental evidence that is contained within the Parramatta Sand Body (PSB). Cultural materials leftover by repeated past people's visitation and use of the place have been archaeologically excavated and scientifically dated to over 30,000 years Before Present (BP) on the Parramatta River in Parramatta Park (George Street café) and further downstream in the City CBD and older evidence for the formation of the PSB and for the wider landscape evolution of Parramatta date to c.58,000 BP.

The PSB that is mapped to occur at the George Street entrance to the park and which underlies most of the City CBD to the east is likely to contain, as a whole floodplain depositional unit, potentially

very old (Pleistocene) and regionally rare archaeology and paleoenvironmental history evidence. The PSB has significant cultural and environmental research value.

The commencement point for the Proposal is located on the edge of the mapped extent of the PSB and is within proximity of a previous archaeological investigation that identified and dated significant Aboriginal cultural materials (GML Heritage 2018). The river floodplain is narrow in this location and is positioned at the base of a shale hill where alluvium thins out as it onlaps the underlying shale geology. The location has also been disturbed by past construction for the gatehouse and additions and from various historical phases of ground alteration including those undertaken for the current paved/gravel surfacing.

The shale terrain in the park located away from the river is unlikely to retain in situ soils with potential to contain Aboriginal objects but rather the soils are disturbed, twentieth century (and later) sediment profiles that may contain isolated Aboriginal objects in secondary archaeological contexts that are culturally important and of Local heritage significance.

The western edge of the alluvial flat of Domain Creek is likely to comprise colluvial sediments with potential for buried and undisturbed soils to survive below historic disturbance levels that may contain Aboriginal objects and archaeological deposits with cultural significance and considerable scientific value.

Away from the River floodplain however, the shale hill slope and ridge landforms contained within the parkland have far more limited potential and likelihood to retain intact soils with likelihood to contain/retain significant subsurface archaeology. The shale terrain is likely to contain, outside of anomalous circumstances, generally uniform colluvial sediment blanket profiles that have been historically deposited over highly truncated residual soils. The colluvium may contain isolated and out-of-context Aboriginal objects but in situ finds are not expected. These potential archaeological profiles speak to the environmental and cultural impact legacy of historic-period land use of Parramatta Park.

AHIMS searches have been completed for the Proposal (refer to Appendix F). The search accounted for change in status of one previously recorded Aboriginal heritage site location. AHIMS recording (AHIMS ID 45-5-5714) previously identified on proposed electrical service route alignment had been archaeologically salvaged and was destroyed (under AHIP approval).

Results

Analysis of soil mapping data, the findings of previous Aboriginal and historical archaeological investigations, and field survey that have been undertaken across those areas of the park that will be affected by the Proposal has identified two specific locations with potential Aboriginal archaeological sensitivity. The first area is located at the George Street entrance to the park and comprises an area extending from the Gatehouse in the east to the western side of Murray Garden Creek where there is likely to be subsurface soils and sediments present with the potential to contain Aboriginal objects. The second location comprises a small section of West Domain Avenue that also is likely to contain potential archaeological deposit (PAD).

At George Street (AMZ 1) (refer to Figure 6-1) it is unlikely that the Proposal will extend to sufficient depth to impact undisturbed PSB deposits. Historic-period road and demolition deposits, most likely dating to late nineteenth or early twentieth century, and modern fills are expected, and no significant Aboriginal archaeological impacts are anticipated. An archaeological management framework for this location is appended (Attachment C).

Test excavation has been completed on West Domain Avenue as the likelihood of impact to Aboriginal objects was notable following desktop assessment by Dominic Steele Consulting Archaeology. The excavation revealed colluvial sediments and no complete soil profiles were encountered with intact topsoil. A common subsurface profile observed was pale, silty clay material which showed signs of being a transitional unit as opposed to a standalone A-horizon such as an A1 or A2. These soils are described as an A3 unit - which would have originally been at the base of an A-horizon topsoil before transitioning into the clay rich B-horizon units. The upper deposits have been truncated and removed by historic land use and erosion down to this lower unit.

Potential impacts

The Proposal requires subsurface excavations for the installation of light poles and for electrical services and future works may disturb soils and sediments with the potential to contain Aboriginal objects.

The results of testing at West Domain Avenue indicated that only WDA Area A (refer to Figure 6-2) produced conditions that would result in the discovery of Aboriginal objects. Following excavation a number of objects of potential Aboriginal cultural significance were discovered.

Elsewhere along the lighting path route the likelihood of impact to Aboriginal objects is low. Works on shale-only geology (Railway Parade to Domain Creek crossing) can be managed by undertaking pre-construction heritage inductions with project managers and contractors and by implementing unexpected heritage finds management procedures.

The Proposal has been designed to limit the potential for archaeological impact to occur by routing the path along existing road verges and placing light poles within previously disturbed locations. The First Nation consultation, the results of archaeological investigations and the mitigation measures indicate that the Proposal is not likely to have a significant or cumulative adverse impact on the parklands archaeological resources.

An Aboriginal Heritage Impact Permit (AHIP) is required to impact areas within WDA Area A (refer to mitigation measures in the section below and Figure 6-2 indicating the extent of WDA Area A).



Figure 6-2. Areas of test excavation

Safeguards and mitigation measures

Impact	Environmental safeguard	Responsibility	Timing
Aboriginal Heritage	PPT will apply to Heritage NSW for an Aboriginal Heritage Impact Permit (AHIP) under the <i>National Parks and Wildlife Act 1974</i> (NPW Act) for the 'WDA Area A' location as identified in the accompanying AHIP application map.	PPT	Pre-construction
	Works can proceed with caution following the issuance of the AHIP approval and compliance with the terms and conditions of the permit.		
	The WDA test excavation report and a site card for the Aboriginal objects recovered at WDA Area A will be lodged with the Aboriginal Heritage Information Management System.		
	The Aboriginal objects recovered by archaeological test excavation on West Domain Avenue will be retained by Parramatta Park Trust for short-term storage while the transfer to the Deerubbin Local Aboriginal Land Council Keeping Place is arranged.	PPT	Pre-construction
A copy of ACHAR will be forwarded to the project First Nations cultural advisory group, to the Registrar of the Aboriginal Heritage Information Management System, and to the Heritage NSW Library.			

	A heritage induction should be undertaken with contractors and managers before works commence to explain the significance of the park, their obligations under the NPW Act, and the procedures to follow if unexpected Aboriginal objects are discovered during future works.	PPT / Contractor	Pre-construction / Construction
--	---	------------------	---------------------------------

6.1.2. Post 1788 Cultural Heritage

Post 1788 cultural heritage is the historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic heritage value of a place, building, work, relic, moveable object or precinct that has been assessed and identified as having heritage significance.

Approach

Considering the presence of cultural heritage in the area and its significance, a Heritage Impact Statement (HIS) has been prepared by NGH attached as Appendix G. The HIS assesses the potential impact of the proposed works and has been prepared in accordance with the following guidelines:

- *Statements of Heritage Impact* (Heritage Office and DUAP, 2002)
- *Assessing Heritage Significance* (Heritage Office, 2001)
- *Archaeological Assessment Guidelines* (Heritage Office, 2001)
- Australia's ICOMOS *Burra Charter* (ICOMOS Australia, 2013). The Charter sets the standard of practice for providing advice or making decisions about of undertaking works at places of heritage or cultural significance, including owners, managers and custodians (ICOMOS 1999).
- Australia's ICOMOS *Burra Charter Practice Note: Cultural landscapes* (2022)

Parramatta Park has been the subject of numerous heritage studies and management plans, with the comprehensive *Your Parramatta Park 2030* the most recent. The inclusion of Old Government House and The Domain on the World Heritage List (WHL), National Heritage List (NHL) and State Heritage List (SHL) has ensured an exhaustive assessment and detailed heritage listings and heritage studies. The summary from Statement of Heritage Impact (SOHI) report has relied on those listings and accompanying research for background information.

A site visit was carried out by Laraine Nelson, (Principal, Nelson Heritage Consulting) on behalf of NGH on 12 July 2023 to determine the existing physical aspects of the Proposal site, the heritage items within proximity, and any conservation areas.

It was determined that the proposed works would not impact heritage items outside the park boundary. Therefore, this study has focused only on those heritage items and potential archaeological sites within the park.

Existing environment

At the Commonwealth level, the EPBC Act provides for the management and protection of Australia's heritage places, including World Heritage properties. The table below shows heritage items listed on the WHL and NHL.

The Australian Heritage Database (AHD) includes the WHL, NHL and Commonwealth Heritage List (CHL). The WHL records World Heritage Sites that are deemed to be of 'Outstanding Universal Value' by the World Heritage Committee. The NHL includes the natural, historic and indigenous places that are of outstanding national heritage value to the Australian nation. The CHL, includes places on Commonwealth lands and waters, or under Australian Government control, which possess heritage

value. Items on these lists are protected under the EPBC Act. Old Government House and the Domain are listed on the WHL (Australian Convict Sites) and the NHL.

Table 6-1. Places listed under the EPBC Act 1999

Item name	Location and proximity to the proposed works	Listing ID	Potential for impact by proposed works
Old Government House and the Government Domain	Proposal site is within the curtilage.	NHL ID105957	Yes
Australian Convict Sites (Old Government House and Domain ("Old Government House"))	Proposal site is within the curtilage.	UNESCO Dossier 1306-002; And WHL 106209	Yes

The Proposal site incorporates two items listed on the State Heritage Register (SHR) (Refer to Figure 6-2).

**Parramatta Park New Path Lighting -
Heritage Impact Statement
World Heritage Items within and in
proximity to the Project Area**

- Legend**
- Study Area
 - Bore
 - Trench
 - Light Locations
 - Distributor Board Locations
 - Electrical Pit Locations
 - WHA Australian Convict Sites -
Australian Convict Sites -
(Old Government House and Domain)
 - Australian Convict Sites -
(Old Government House and Domain Buffer Zone)



0 100 200 m

Data Attribution
© NGH 2023
© Parramatta Park Trust 2023
© Department of Climate Change, Energy, the Environment and Water 2022, © ESRI 2023
Ref: Parramatta Park New Path Lighting_Heritage_20230427
World Heritage Items within and in proximity to the Project Area
Author: clair.d
Date created: 17.08.2023



Figure 6-3. Heritage items in proximity to the Proposal site (WHL, NL)



**Parramatta Park New Path Lighting -
Heritage Impact Statement
State and Local Heritage Items within
and in proximity to the Project Area**

- Legend**
-  Project Area
 -  Electrical trench
 -  Bore
 -  Trench
 -  Bollard
 -  Light poles
 -  Distributor Board Locations
 -  Electrical Pit Locations
 -  Parramatta Park and Old Government House
SHR Curtilage
 -  Local Heritage Listing



Data Attribution
 © NGH 2023
 © Parramatta Park Trust 2023
 © Heritage NSW 2023, © ESRI 2023

Ref: Parramatta Park New Path Lighting_Heritage_20230427
 \ State and Local Heritage Items within and in proximity to the
 Project Area
 Author: clair.d
 Date created: 28.09.2023



Figure 6-4 Heritage items in proximity to the Project Area (SHR and PLEP)

The State Heritage Register (SHR) was created under the *Heritage Act 1977* to provide permanent protection for State Significant heritage defined as a place, building, work, relic, moveable object or precinct which is of historical, scientific, cultural, social, archaeological or natural significance to the State (Section 4A(1) of the Act).

Table 6-2. Places listed under the *Heritage Act 1977*

Item name	Location and proximity to the proposed works	SHR listing ID	Potential for impact by proposed works
Parramatta Park	O'Connell Street, Parramatta Proposal site is inside the SHR curtilage.	00596	Yes
Old Government House	Parramatta Park, Parramatta Proposal site is inside the SHR curtilage.	00596	Yes

In 2020, *Your Parramatta Park 2030* was developed to inform the direction of the park for the next decade. That document comprised a: **Conservation Management Plan** developed to manage heritage significance; and a **Plan of Management** with a vision, objectives, and key strategies to help guide and inform day-to-day planning, activation and management.

Approval from NSW Heritage is required when excavating any land in NSW where there is potential that works will disturb an archaeological relic (of non-Aboriginal origin). Under the *Heritage Act 1977* a 'relic' is defined as any deposit, artefact, object or material evidence that:

- a. *relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and*
- b. *is of State or local heritage significance.*

Archaeological sites may be deemed of State significance where they are considered of importance to the heritage of NSW, or, of local significance, where they are considered important to the heritage of the local area. The application type required to gain approval is dependent on whether the site is of local or State significance.

The SHR 00596 entry for Parramatta Park and Old Government House and curtilage has been identified (as shown in Figure 6-2) as having a high potential for archaeological deposits to exist.

The HIS provides a more detailed description of heritage significance in the Park (refer to Appendix J).

Potential impact

Parramatta City Centre Development Control Plan (DCP) 2011

Planisphere's 2012 technical report (Planisphere, 2012), *Development in Parramatta City and the impact on the Old Government House and Domain's World and National Heritage Listed Values*, was prepared with reference to the Parramatta City Centre Development Control Plan (DCP) 2011 providing development guidelines to retain and enhance the World and National Heritage Values of Old Government House and Domain. The 2012 report contained 'three guiding principles' to provide the overall vision and direction for future development of World Heritage listed Old Government House and its Domains, the area in which this Proposal site is located. The following table (Table

6-3) outlines the DCP controls in relation to the works and makes suggestions on how to adhere to the current regulations during the design and development phase:

Table 6-3. Objectives and controls in Planisphere (2012) relating to the Proposal site

Principle	Description	Relevance to the proposed works
#1	<p>visual prominence and symbolism</p> <p>The backdrop of the buildings in the City of Parramatta should provide a setting for Old Government House compatible with the commanding spirit of the place.</p> <p>New development should not detract from the setting of Old Government House as the former seat of colonial power.</p>	<p>The Proposal is at a minimum 130 metres from Old Government House.</p> <p>The visual prominence and symbolism of Old Government House, which sits high in the landscape, will not be impacted by the proposed works at a lower elevation.</p>
#2	<p>landscape setting</p> <p>New development should not dominate the landscape setting of Old Government House and Domain or detract from the mostly 'green' outlook north, allowing the Domain to retain its existing landscape character.</p> <p>New development should not dominate the landscape setting of Old Government House and Domain, including the inter relationship between landscape elements.</p>	<p>The landscape setting will be retained and enhanced by the Proposal. The addition of sympathetic lighting will allow an appreciation of the setting over a wider timeframe.</p> <p>The proposed lighting structures, vertical in form, will blend with the existing vista of trees.</p>
#3	<p>layering of cultural heritage elements</p> <p>New development should retain and enhance views to, from and between the cultural heritage elements that highlight the layered history of the place.</p> <p>New development should retain views that demonstrate the multi-layers of built and landscape elements, which contribute to the story of the place.</p>	<p>The layering of cultural heritage elements will be retained and benefit from lighting that enhances those elements.</p>

Built heritage items

Table 6-4 lists known built heritage sites, the potential for impact and addresses mitigation measures. The location of built heritage items is shown in Figure 6-2.

Table 6-4. Built heritage items – potential impact and consideration of need for mitigation measures

Item	Proximity to works	Potential impact	Mitigation considerations
<p>1</p> <p>Old Government House and the Government Domain (WHL 1306-002 NHL ID105957) Recorded also as:</p> <p>Parramatta Park and Old</p>	<p>Proposal site is within the curtilage</p>	<p>Visual impact.</p>	<p>Visual impact -The Street Lights are a minimum of 130 metres from Old Government House. With regard to visual impact, a mitigating factor for the vistas and views is the substantial number of trees in the view lines, these would mask the lighting infrastructure.</p>

Item	Proximity to works	Potential impact	Mitigation considerations
	Government House (SHR00596) and Parramatta Park and Old Government House (I611)		The Government Domain and Parramatta Park are the Proposal site. Lighting has been designed to ensure minimal impact on the landscape.
2	Governor Brisbane's observatory (1822). Transit Stones and Observatory Memorial 1822 and 1880 including marker pines (<i>Pinus roxburghii</i>)	Remnants are 5 metres northeast of Proposal site. The Memorial is in the Proposal site. Not presumed to be in the vicinity of works as they were not found as a part of site visit.	Visual impact. Physical impact. Visual impact – Street Light PP029 and PP030 on different diagonals, are approximately 10 m southwest/ northwest and across Railway Parade from the Observatory Memorial (the closest heritage object). Street Light PP031 is 15 m to the north. The heritage value of the Observatory and Memorial should remain foremost with the lighting used to illuminate it. Physical impact – buffer zones in place during works in the vicinity to prevent inadvertent impact on the Observatory, Transit Stones and the Memorial. Marker pines (<i>Pinus roxburghii</i>) *Advice must be sought from an arborist for the potential for physical impact on the marker pines (<i>Pinus roxburghii</i>). Also -see. Item #6.
3	The George Street Gatehouse (1885) is a key entry point for the Park and an iconic local landmark.	In the Proposal site.	Visual impact. Physical impact Visual impact – Street Light PP001 and PP002 are approximately 7 m and 15 m respectively north of the Gatehouse. Lighting should improve the amenity of this area, which already has a café and related additions. The heritage value of the Gatehouse should remain foremost with the lighting used to illuminate it. Physical impact – buffer zones in place during works in the vicinity to prevent inadvertent impact on the Gatehouse.
4	Boer War Memorial 1904	Approx. 43 metres northeast of Proposal site	Visual impact. The heritage item would not be adversely impacted by the Proposal.
5	Governor Brisbane's bath house (1823). In 1886 the bath house was converted to the current pavilion.	Approx. 5 metres northeast of Proposal site	Visual impact. Physical impact. Visual impact – Street Light PP031 and PP032, approximately 22 m southwest 7 m west respectively, are the closest to the bath house. Both lights are close to large trees which will mitigate visual impact. The heritage value of the bath house should remain foremost with the lighting used to illuminate it.

Item	Proximity to works	Potential impact	Mitigation considerations
			Physical impact – buffer zones in place during works in the vicinity to prevent inadvertent impact on the bath house. Also -see Item #7.
6	Billy Hart Memorial (also known as William Ewart Hart Memorial)	Approx. 45 metres northeast of Proposal site	Visual impact. The heritage item would not be adversely impacted by the Proposal.
7	Gipps Boundary Stone and alternately recorded as ‘Relocated town boundary stone’	In the Proposal site.	Visual impact. Physical impact. Visual impact – Street Light PP045, appears to be in the immediate vicinity of the Boundary Stone. Given the stone is masked by shrubs and trees there is unlikely to be significant visual impact . Physical impact – buffer zones in place during works in the vicinity to prevent inadvertent impact on the Boundary Stone. Also -see. Item #10.
8	Queens Road Gatehouse 1860s (also known as Western Domain Gatehouse)	In the Proposal site.	Visual impact. Physical impact. Visual impact – Street light PP067, PP068 and PP069 are in the vicinity of the Gatehouse. Given recent restoration and modern additions, placement of lights in this area will not impact on heritage values. The heritage value of the Gatehouse should remain foremost with the lighting used to illuminate it. Physical impact – buffer zones in place during works in the vicinity to prevent inadvertent impact on the Gatehouse.
9	Bridge (before 1850) over Domain Creek in vicinity of what is now Railway Parade. Also, potential archaeological site.	There is no existing evidence of the bridge, and its exact location is unknown.	Physical impact. See Item # 10
10	Redoubt Memorial	Approx. 43 metres east of the Proposal site.	Visual impact. The heritage item would not be adversely impacted by the Proposal.
11	Macquarie Street Gatehouse (1848) and garden.	Located adjacent the Proposal site.	Visual impact. Physical impact. Visual impact – Street Light PP016 (19 m east), PP017 (15 m north) and PP018 (15 m west) approximate distances, are closest to the gatehouse. Large trees in the area will mitigate the visual impact. The heritage value of the Gatehouse should remain

Item	Proximity to works	Potential impact	Mitigation considerations
			<p>foremost with the lighting used to illuminate it.</p> <p>Physical impact – buffer zones in place during works in the vicinity to prevent inadvertent impact on the Gatehouse.</p> <p>Also -see. Item #12.</p>
12	Sandstone and iron railing fencing, gates and gate posts to Pitt Street, Macquarie and O’Connell Street incl. Wisteria Gardens Boundary	These features at Pitt, Macquarie and O’Connell Street are between 5 – 10 metres from the Proposal site.	<p>Visual impact.</p> <p>Physical impact.</p> <p>Visual impact – Light poles are traditionally associated with entrance gates, it is considered the Proposal is in keeping with that concept. The placement of lights in this area will not impact on heritage values.</p> <p>Physical impact – buffer zones in place during works in the vicinity to prevent inadvertent impact on heritage items.</p>
13	Lady Mary Fitzroy Memorial (also known as the Obelisk)	In the Proposal site.	<p>Visual impact.</p> <p>Physical impact.</p> <p>Visual impact – Street Light PP003 (11 m south) and PP004 (11 m north), approximate distances, are closest the memorial. The position of the lights, close to existing trees should minimise the visual impact of the light poles. The heritage value of the Memorial should remain foremost with the lighting used to illuminate it.</p> <p>Physical impact – buffer zones in place during works in the vicinity to prevent inadvertent impact on the Lady Mary Fitzroy Memorial.</p> <p>Also -see. Item #1.</p>
14	Old Government House, carriage drive, outbuildings and fences	Old Government House 36eretic. 130 metres north of Proposal site, the carriageway is now Railway Parade.	<p>Visual impact.</p> <p>Physical impact.</p> <p>Visual impact – the potential for visual impact on Old Government House and outbuildings is minimal.</p> <p>Physical impact – The carriageway, present-day Railway Parade, will be impacted by the Proposal, however, this is in keeping with its present-day role as a thoroughfare.</p>
15	Governor Macquarie-era convict sandstone bridge over Murray Gardens Creek.	In the Proposal site.	<p>Visual impact.</p> <p>Physical impact.</p> <p>Visual impact – Street Light PP003 (8 m south) and PP004 (13 m north) approximate distances, are closest the bridge. The position of the lights, close to existing trees should minimise the visual impact of the light poles. The heritage value of the Bridge should remain foremost with the lighting used to illuminate it.</p> <p>Physical impact – buffer zones in place during works in the vicinity to prevent</p>

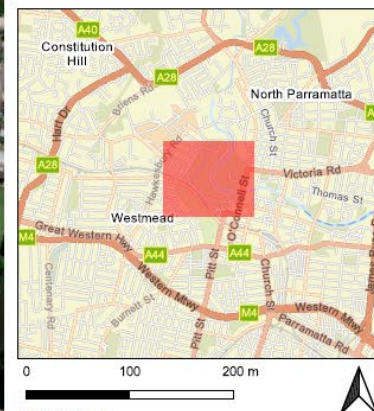
Item	Proximity to works	Potential impact	Mitigation considerations
			inadvertent impact on the bridge. Also -see . Item #1.
16	Remnant oaks (<i>Quercus robur</i>) at the George Street entrance (associated with the death of Lady Fitzroy)	Not presumed to be in the vicinity of works as they were not found as a part of site visit.	Visual impact. Physical impact. * Advice must be sought from an arborist for the potential for physical impact on the remnant oaks (<i>Quercus robur</i>).
17	Moreton Bay fig (<i>Ficus macrophylla</i>) at the south-west corner of the Western Domain.	Adjacent the Proposal site	Visual impact. Physical impact. *Advice must be sought from an arborist for the potential for physical impact on the Moreton Bay Fig (<i>Ficus macrophylla</i>).
18	Original convict lumber year c1790-1819), demolished 1880s Bowling Club site and associated Canary Island Palm plantings (<i>Phoenix canariensis</i>)	The Canary Island Palms are approximately 65 metres southwest of the Proposal site.	Visual impact. Physical impact. The Canary Island Palms would not be adversely impacted by the Proposal. Also -see. Item #4.
19	Coronation Hill plantings including figs, pines and eucalypts (<i>Ficus macrophylla</i> , <i>Pinus roxburghii</i> , <i>Araucaria Cunninghamii</i> , <i>Eucalyptus citriodora</i> and <i>Eucalyptus tereticornis</i>).	Location of the plantings to be determined by arborist.	Visual impact. Physical impact. *Advice must be sought from an arborist for the potential for physical impact on the Coronation Hill plantings as described.
20	Avenue of Hoop pine (<i>Araucaria cunninghamii</i>) leading from Coronation Hill to the railway underpass in the Western Domain.	Not presumed to be in the vicinity of works as they were not found as a part of site visit.	Visual impact. Physical impact. *Advice must be sought from an arborist for the potential for physical impact on the Avenue of Hoop pine.
21	Triangular plantation areas at major junctions of Park roadways.	Several triangular plantations areas are in the Proposal site.	Visual impact. Physical impact. *Advice must be sought from an arborist for the potential for physical impact on the trees.
22	Murray Gardens, intact Parramatta Sand Body soil profiles and remnant <i>Eucalyptus tereticornis</i> (forest red gum).	Proposed route will skirt the northern boundary of the Murray Gardens.	Visual impact. Physical impact. Visual impact – PP005 to PP010 are placed adjacent the Railway Parade bitumen. The position of the lights, close to existing trees should minimise the visual impact of the lights. Physical impact – see. Item #1.

Item	Proximity to works	Potential impact	Mitigation considerations
			*Advice must be sought from an arborist for the potential for physical impact on the remnant Eucalyptus 38 ereticornis (forest red gum).
23	Mapped 'significant views' incl. views to /from Old Government House, George Steet Vista to/ from Gatehouse, and the Observatory to May's Hill Vista.	The views to/ from Old Government House. The George Street vista to/from the George Street Gatehouse. The Observatory site to May's Hill vista.	Visual impact. Visual impact – Significant views should be enhanced by the proposed works. The lighting of views and heritage items allows for appreciation over a longer timeframe and to a wider group of park users.



**Parramatta Park New Path Lighting -
Heritage Impact Statement
Heritage Items within and in proximity
to the Project Area**

- Legend**
- Study Area
 - Bore
 - Trench
- Inspection Areas**
- Area 1
 - Area 2
 - Area 3
- ▶ Historical Heritage Items (Varman 1997)



Data Attribution
 © NGH 2023
 © Parramatta Park Trust 2023
 © ESRI 2023

Ref: Parramatta Park New Path Lighting_Heritage_20230427
 \ Heritage Items within and in proximity to the Project Area
 Author: clair.d
 Date created: 17.08.2023
 Datum: GDA94 / MGA zone 56



Figure 6-5 Built heritage items

Archaeological sites


The following assessment relates to the potential for archaeological sites to be impacted by ground disturbance works.

Potential archaeological sites in the area of proposed works are listed in Table 6-5 and Figure 6-4 shows areas of archaeological sensitivity area based on the work of Varman (1997), with an additional area labelled *Areas of Archaeology Sensitivity identified during survey* to cover archaeological potential around the Gipps Boundary Stone (Item #10) and Domain Creek (Item #11).

**Parramatta Park New Path Lighting -
Heritage Impact Statement
Areas of Archaeological Sensitivity
within and in proximity to the Project
Area**

- Legend**
- Study Area
 - Bore
 - Trench
 - Historical Heritage Items (Godden Mackay 2016)
 - Historical Heritage Items
 - Historical Roads (Parramatta Park Trust)
 - Areas of Archaeological Sensitivity - inclusive of 10 m buffer (Godden Mackay 2001)
 - Areas of Archaeological Sensitivity identified during survey
- Inspection Areas**
- Area 1
 - Area 2
 - Area 3

0 100 200 m



Data Attribution
 © NGH 2023
 © Parramatta Park Trust 2023
 © ESRI 2023
 Ref: Parramatta Park New Path Lighting_Heritage_20230427
 \Areas of Archaeological Sensitivity within and in proximity to the Project Area
 Author: clair.d
 Date created: 22.08.2023



Figure 6-6. Areas of archaeological sensitivity within and in close proximity to the Proposal site

Table 6-5. Archaeological sites - potential impact and consideration of requirement for mitigation measures

#	#2998 PAMU listing for Proposal site	Items (Varman 1997) (PP CMP 2020:79)	Mitigation considerations
1	Site of western part of George Street and guardhouses and convict huts along it, resumed closed by Macquarie c1810, possibly overlaid an earlier Aboriginal track.	Site 10 Site 15 (Varman, 1997)	Due to the potential for relics to occur application for an excavation permit under s.60 of the <i>Heritage Act</i> 1977 is required. The application should include a supporting archaeological research design and excavation methodology developed by an accredited excavation director.
2	Porter's Lodge, c1817 on O'Connell Street at new entrance from George Street (Site No. 37)	Site 37 (Varman 1997)	Due to the potential for relics to occur application for an excavation permit under s.60 of the <i>Heritage Act</i> 1977 is required. The application should include a supporting archaeological research design and excavation methodology developed by an accredited excavation director.
3	Possible site of the first stables – a) between Government House and the Observatory site, Site 28) and b) site of Government Stables built c1821, destroyed by the building of the Great Western Railway line in 1860 (Site 30). c) convict allotment and hut (Site 27)	Site 27 Convict allotment and hut Site 28 Stables (Varman 1997)	Due to the potential for relics to occur application for an excavation permit under s.60 of the <i>Heritage Act</i> 1977 is required. The application should include a supporting archaeological research design and excavation methodology developed by an accredited excavation director.
4	Original convict lumber year c1790-1819), demolished 1880s Bowling Club site.	Site 5 (Varman 1997)	Due to the potential for relics to occur application for an excavation permit under s.60 of the <i>Heritage Act</i> 1977 is required. The application should include a supporting archaeological research design and excavation methodology developed by an accredited excavation director.
5	Northern extent of Bridge, now Pitt Street, probably dating from 1788 or 1789 (Site 9)	Site 9 (Varman 1997)	Outside the Proposal site.
6	Site of Governor Brisbane's Observatory and associated structures and trig markers, with surviving Transit Stones, built 1821–1822 and demolished 1848, and adjacent cottage in use until 1860s, demolished 1876 (Site 35, 44)	Site 35 Observatory marker stone and trig station. Site 44 Observatory (Varman 1997)	Due to the potential for relics to occur application for an excavation permit under s.60 of the <i>Heritage Act</i> 1977 is required. The application should include a supporting archaeological research design and excavation methodology developed by an accredited excavation director.

#	#2998 PAMU listing for Proposal site	Items (Varman 1997) (PP CMP 2020:79)	Mitigation considerations
7	Site of Governor Brisbane's Bath House, built in 1823 and converted to a bandstand in 1886, nearby trees and site of public toilet (in place by 1887) (Site Nos. 34, 95, 127) .	Site 34 Governor's bath house. Site 95 public toilet (1887) Site 127 Significant trees (Varman 1997)	Due to the potential for relics to occur application for an excavation permit under s.60 of the <i>Heritage Act</i> 1977 is required. The application should include a supporting archaeological research design and excavation methodology developed by an accredited excavation director.
8	Early ceramic scatter and rows of bricks (Site 133)	Site 133 Artefacts (Varman 1997)	Due to the potential for relics to occur application for an excavation permit under s.60 of the <i>Heritage Act</i> 1977 is required. The application should include a supporting archaeological research design and excavation methodology developed by an accredited excavation director.
9	Several roads, tracks, paths and associated plantings, many thought to date from the 1790s, or Macquarie's time of relevance Site 125, 128.	Site 125 Gravel path to Old Government House. Site 128. Bathhouse triangle. Site 138 Western Domain Road. (Varman 1997)	Due to the potential for relics to occur application for an excavation permit under s.60 of the <i>Heritage Act</i> 1977 is required. The application should include a supporting archaeological research design and excavation methodology developed by an accredited excavation director.
10	Gipps Boundary Stone (Site 38)	Site 38 Gipps boundary stone (Varman 1997)	While it is unlikely there is sub-surface associated with the stone, the presence of a potential pre-1850s bridge (see below) nearby requires an excavation permit under s.60 of the <i>Heritage Act</i> 1977. That will require a supporting archaeological research design and excavation methodology developed by an accredited excavation director.
11	Bridges, causeways, weirs, retaining walls, swimming areas, waterholes, ponds and other river features along Parramatta River and Domain Creek. South bridge over Domain Creek is relevant to this report (Site 58).	Site 58 Domain Creek bridge (Varman 1997)	Due to the potential for relics to occur application for an excavation permit under s.60 of the <i>Heritage Act</i> 1977 is required. The application should include a supporting archaeological research design and excavation methodology developed by an accredited excavation director.
12	Sites of gatehouses relevant to this report are George Street Gatehouse	Site 37 George Street Gatehouse Site 46	Due to the potential for relics to occur application for an excavation permit under

#	#2998 PAMU listing for Proposal site	Items (Varman 1997) (PP CMP 2020:79)	Mitigation considerations
	(Site 37); Macquarie Street Gatehouse (Site 46) and Queen Street Gatehouse (Site 48)	Macquarie Street Gatehouse Site 48 Queen Street Gatehouse (Varman 1997)	s.60 of the <i>Heritage Act</i> 1977 is required. The application should include a supporting archaeological research design and excavation methodology developed by an accredited excavation director.
13	Furrows (agricultural)	Furrows (PP CMP 2020:79)	Given ground disturbance from car parks and roadways in the proposed Proposal site, it is unlikely archaeological evidence would remain. However, under s.60 of the <i>Heritage Act</i> 1977 an application is required. That should include supporting archaeological research design and excavation methodology developed by an accredited excavation director.

Conclusion

The assessment of potential impact and mitigation measures is based on the available documents [Parramatta Parklands. Electrical Services (19.07.2023) and Electrolight. Parramatta Lighting Design Strategy Vers. A. 2023].

The potential for visual impact stems from the placement of infrastructure, light poles in proximity to heritage items. Overall, however, that impact is lessened by the Park's role as a busy pedestrian and vehicular thoroughfare. Throughout the Proposal site there are numerous mature trees, it is considered their linear form would assist in masking the presence of the light poles.

Any potential for physical impact on a heritage item must be addressed using buffers during works in the vicinity. Given the difficulty that poses in some areas (identified in Table 6-5) extreme caution must be used with heritage inductions supporting compliance of contractors and sub-contractors.

With regard to archaeological resources, the previously identified areas of archaeological sensitivity highlight the potential for impact on those resources. A suitably designed archaeological research design and excavation methodology developed by an accredited excavation director should mitigate against that risk.

Safeguard and mitigation measures

Impact	Environmental safeguard	Responsibility	Timing
Cultural Heritage	<ul style="list-style-type: none"> An application under s.60 (<i>Heritage Act 1977</i>) must be made to the Heritage Council of NSW and approval obtained prior to works commencing. This SoHI will form a component of the application. As there is known historical archaeology, the application must include an archaeological research design and excavation methodology developed by an accredited excavation director. Enhancing heritage items and park features through illumination should be considered a positive feature. This would permit appreciation of the items by an expanded audience over a wider time frame. In the event any heritage finds are identified, works must cease temporarily, and the 'Unexpected Finds Procedure' described in Appendix E of the HIS. A heritage induction must be instigated for all contractors and sub-contractors explaining the significance of the place and statutory obligations for cultural heritage under the <i>Heritage Act 1977</i>. All locations where built heritage items or archaeological potential is identified in, or adjacent to works, that area will be temporarily demarcated using t-top bollards and flagging tape until construction work is completed. All mitigation measures proposed for individual items in Table 6-4. and Table 6-5 is to be followed. 	Contractor	Pre-Construction and Construction
	<ul style="list-style-type: none"> A suitably designed archaeological research design and excavation methodology developed by an accredited excavation director should be implemented. 	Contractor	Pre-Construction and Construction

6.1.3. Soils and contamination

Landform and topography

Land within Parramatta Park consists of gently undulating rises on Wianamatta Group shales, with local relief 10 – 30m and slopes generally >5% but occasionally up to 10% (NSW Government, 2023). Elevation within the Proposal site varies from 8m Australian Height Datum (AHD) in the south, to 28m AHD in the south west, refer to Figure 6-5.

Soils

The Proposal site is mapped as containing Kurosols, which are described as gently rolling to rounded hilly country with some steep slopes and broad valleys. Chief soils are hard acidic red soils (Dr2.21) with hard neutral and acidic yellow mottled soils (Dy3.42 and Dy3.41) on lower slopes and in valleys (Lotsearch Pty Ltd, 2023).

Limitations associated with these soils include local seasonal waterlogging, localised water erosion hazards, moderately reactive highly plastic subsoils and localised surface movement potential (NSW Government, 2023).

Soil mapping from the SEED data portal identifies the Greater Soil Group (GSG) associated with the subject land as Yellow Podzolic soils (less fertile) (NSW Government, 2022).

The Project is located within land mapped as Class 5 acid sulphate soils area. The class 5 area does not typically include acid sulphate soils. Class 5 is located 500m from adjacent class 4 – 1 land which do typically include acid sulphate soils at varied depths.

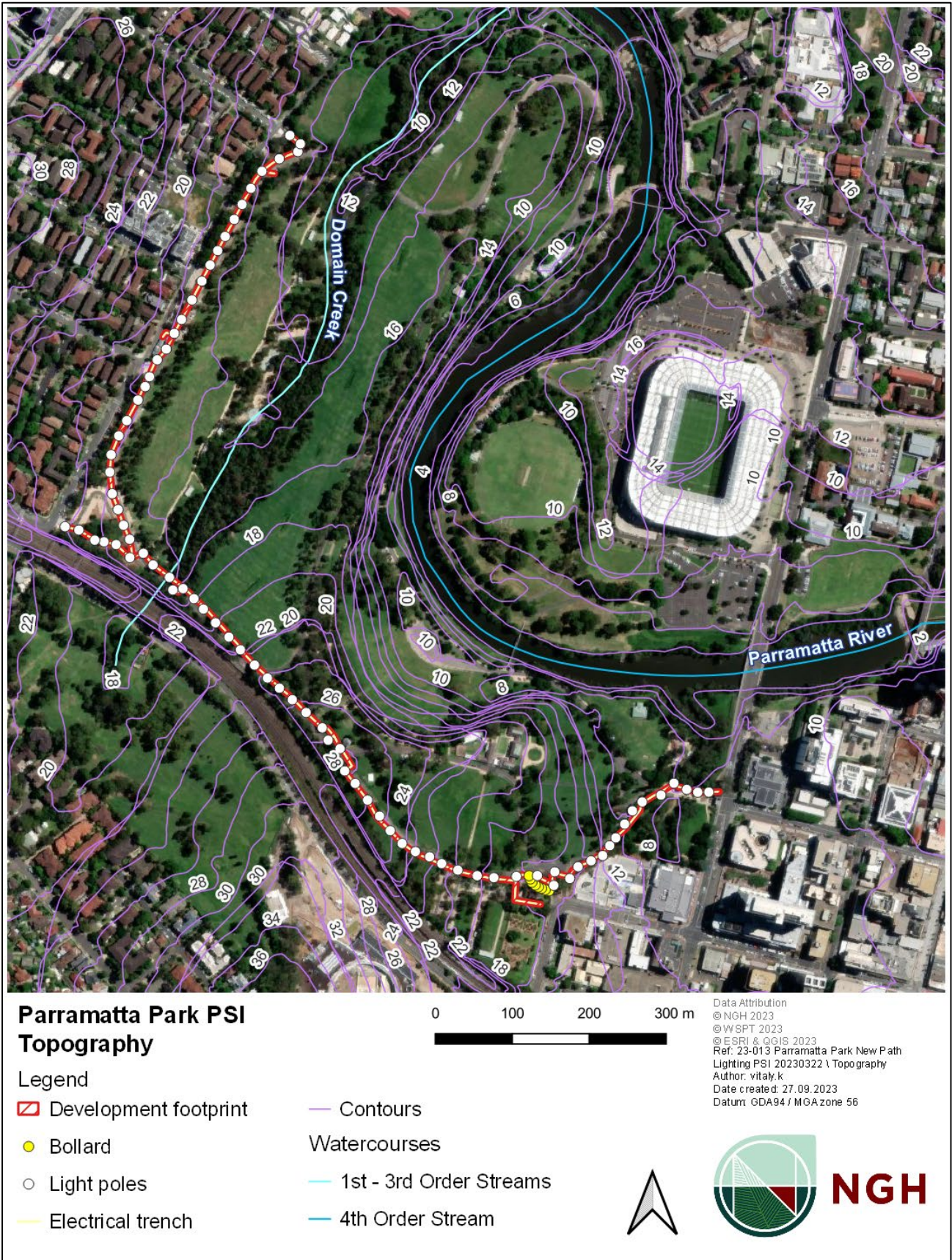


Figure 6-7. Site topography

Preliminary Site Investigation

A Preliminary Site Investigation (PSI) was completed by NGH to inform PPT of any identified potential soil contamination associated with the Proposal site and/or adjoining properties.

The objectives of the PSI were to:

- Identify past and present potentially contaminating activities (based on available information)
- Identify potential contamination sources and types
- Discuss the site condition including any external observations of potentially hazardous materials
- Provide a preliminary assessment of potential site contamination
- Assess the need for further investigations.

The PSI was undertaken in general accordance with the following guidelines:

- *Australian Standard AS 4482.1-2005 Guide to investigation and sampling of sites with potentially contaminated soil* (AS 4482.1-2005, 2005)
- *National Environment Protection (Assessment of Site Contamination) Measure 1999, Schedules* (NEPM, 2013)
- *Consultants Reporting on Contaminated Land – Contaminated Land Guidelines* (NSW EPA, 2020)
- *Contaminated Land Management: Guidelines for the NSW site Auditor Scheme* (NSW EPA, 2017)
- *Duty to Report Contamination under the Contaminated Land Management Act 1997* (NSW EPA, 2015)
- *NSW Government State Environmental Planning Policy (Resilience and Hazards) 2021*

The full report is provided as Appendix I and summarised below.

Background searches

Lotsearch was engaged to complete an Enviro Pro database search report, available as Appendix A of the PSI. The results of the searches are summarised below.

NSW EPA Contaminated Land Record

No records occur within the Proposal site. Two records occur within proximity to the site:

- Coleman Oval Embankment, located immediately north of the Proposal site
- Parramatta Park Toilet demolition located 125m east of the Proposal site.

Contaminated land – records of notice

No records occur within the Proposal site.

EPA – other sites with contamination issues

Three former James Hardie asbestos waste sites occur within proximity to the Proposal site:

- Cumberland Oval, located 194m to the north east of the Proposal site
- Parramatta Showground, located 317m to the north west of the Proposal site
- Catt & Goldsmith Pty Ltd, located 591m to the east of the Proposal site.

Licensed activities under the POEO Act 1997

One licenced activity, Metro Trains Sydney Pty Ltd, occurs within the Proposal site, under the POEO Act.

Delicensed and former licenced EPA Activities

One surrendered licence activity, Luhrmann Environment Management Pty Ltd (application of herbicides), associated with Domain Creek, intersects the Proposal site.

Site inspection

NGH Environmental Consultants, Martin Kim and Marcus Hoskin, attended the site on 30 March 2023. The site inspection involved a walkover within the Proposal site and was limited to external and accessible areas of the site and adjacent surroundings.

Observations identified during the site inspection are outlined below:

- Grass covered most of the site; however, occasional patches of bare earth / leaf litter were observed underneath overstorey tree species. Ornamental gardens were also observed, which contained decorative rock installations
- No obvious odours or discoloured soils were observed
- A number of drains, grates and other access ports were present onsite
- Buildings and other manmade constructions (e.g. gazebos, culverts, bridges) were observed to be in good condition
- No offsite contamination sources were observed
- No waste or debris were observed.

An exposed, uncapped cement pipe was observed in the southern portion of the site (refer Figure 6-6). A visual inspection of the pipe indicated that it may contain bonded asbestos fragments.



Figure 6-8. Exposed cement pipe

Potential areas of environmental concern

The site history review identified that the site has been used for the purposes of a park since at least 1857. No previous investigations have been conducted within the subject land to date.

The PSI identified five potential Areas of Environmental Concern (AECs) within and nearby to the Proposal site, including:

- AEC1 – Suspected asbestos containing material, in the form of an exposed and damaged cement pipe, was observed during the site walkover. Further assessment would be required to confirm whether it is asbestos containing fibre cement pipe and whether fibres are present within in situ soils surrounding the pipe.
- AEC2 – Off-site contamination sources, including asbestos fibres and heavy metals, TRHs, PAHs and heavy metals (copper and zinc) have been identified during soil sampling, to support the Western Sydney (CommBank) Stadium redevelopment. Further assessment would be required to determine whether these contaminants are present onsite.
- AEC3 – A historic steam-powered tram line is known to have operated within Parramatta Park. There is the potential for contaminants, such as creosote and heavy metals (including arsenic) to be present within the subject land.
- AEC4 - The results of the PSI indicate that asbestos is a contaminant of potential concern (CoPC) for the Coleman Oval Embankment site. Additional soil testing is required, to verify the contaminants present, identify exposure pathways and provide and updated risk rating for this site.
- AEC5 - The site history review did not provide information on CoPC for Parramatta Toilet Block site. Further testing is required, to determine potential contaminants, exposure pathways and provide and updated risk rating for this site.

Refer to Figure 6-7 for AECs identified within and nearby to the Proposal site.

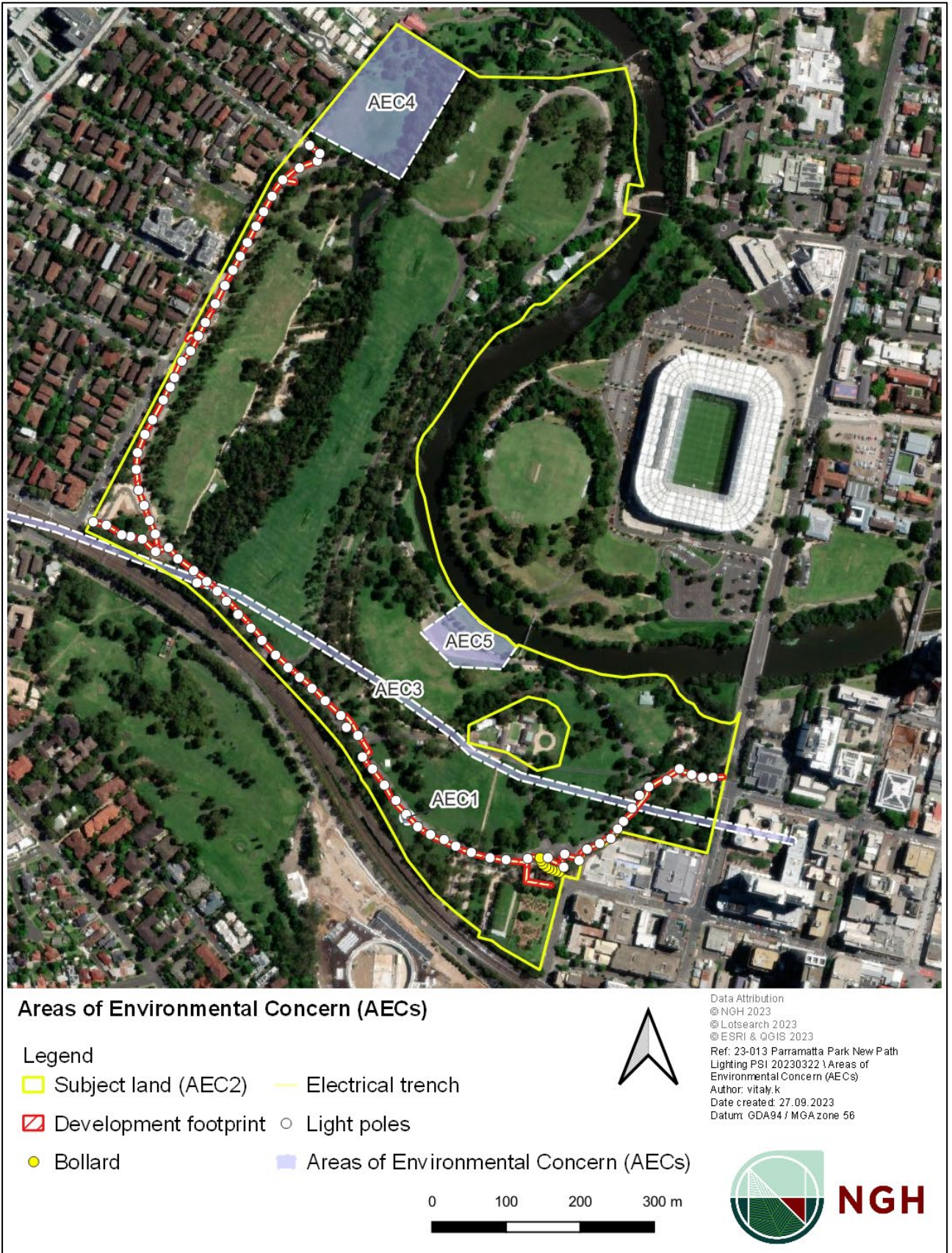


Figure 6-9. AECs identified within and nearby to the Proposal site

Conclusion

Based on the findings of the PSI, the following data gaps were identified:

- The site inspection was limited to external and accessible areas of the site within a 20 m buffer of the Proposal site
- The presence and depth of fill material across the site is unknown
- The history of the site is limited to the information provided in sources described in this PSI
- The site history review indicates that asbestos is a CoPC for the Coleman Oval Embankment site. Additional soil testing is required, to determine whether additional CoPCs are present within this location
- The site history review did not provide information on CoPC for Parramatta Toilet Block site. At the time of writing this report, the Client was not aware of any environmental reports involving the Parramatta Park land.

As such, mitigation measures are provided to ensure these data gaps can be addressed in managing the potential impacts of the works.

Safeguard and mitigation measures

Impact	Environmental safeguards	Responsibility	Timing
<ul style="list-style-type: none"> • Soil and contamination 	<ul style="list-style-type: none"> • In accordance with NSW EPA Consultants Reporting on Contaminated Land – Contaminated Land Guidelines 2020, additional investigations would be required to: • Determine the extent of asbestos containing materials (AEC1) within the Proposal site • Establish whether historical off-site (AEC2) and on-site (AEC3) activities have resulted in contamination occurring within the Proposal site • Determine the type, extent and likely risk of contamination within the two sites (the Coleman Oval Embankment (AEC4) and Parramatta Park Toilet Demolition (AEC5) sites) that are on the list of NSW contaminated sites notified to the EPA. • A Detailed Site Investigation (DSI) will be completed, inclusive of an intrusive test pitting program, to determine whether contamination is present within the Proposal site. The findings of the DSI assessment would inform the best approach for the Proposal. 	PPT	Pre-Construction
	<ul style="list-style-type: none"> • Stockpiles will be appropriately controlled by sediment fencing or other materials identified in the Managing Urban Stormwater - Soils and Construction Vols 1 and 2, 4th Edition (Landcom, 2004) -Blue Book to ensure sediments do not enter a waterway. • Following the construction phase, the site will be cleaned up including remediating soils if required, removing rubbish, restoring profiles and decompacting soils in the construction areas. 	Contractor	Construction and rehabilitation

Impact	Environmental safeguards	Responsibility	Timing
	<ul style="list-style-type: none"> Monitor Bureau of Meteorology forecast heavy rainfall events in order to allow sufficient time to vacate and prepare the site prior to the commencement of heavy rainfall and flood events 		
<ul style="list-style-type: none"> Erosion and sediment control 	<ul style="list-style-type: none"> The Construction Environmental Management Plan (CEMP) will include the measures below as part of the Erosion and Sediment Control Plan (ESCP), in accordance with the requirements of Landcom’s “Managing Urban Stormwater: Soils and Construction, 2004”: Install and maintain erosion and sediment controls on a regular basis during construction to prevent sediment moving offsite and sediment laden water entering drainage lines. Details of controls specific to the open drainage channel east of SP1c must be considered. Stabilised access is to be established to prevent mud tracking prior to exiting onto public roads. Stabilise disturbed areas progressively. Minimise soil disturbance from vehicle use onsite. Inspect and maintain sediment and erosion controls until the site has been stabilised post construction. The ESCP will be prepared in conjunction with the CEMP. Include an unexpected finds procedure. 	Contractor	Construction and rehabilitation
	<ul style="list-style-type: none"> All servicing, refuelling, stockpiles, waste disposal and storage areas will be located as far as possible from stormwater drains to reduce potential of pollution via spillage. No hazardous material will be stockpiled. Induction training shall be undertaken for employees to increase their awareness of chemical management protocols including proper handling and storage of chemicals, and emergency response and contingency plans. 	Contractor	Construction and rehabilitation

6.1.4. Biodiversity

Methodology

Background searches

Database searches were undertaken using the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) and State (NSW Government BioNet Atlas) databases to determine whether any threatened flora and fauna species, populations, ecological communities, migratory species, and Areas of Outstanding Biodiversity Value (AOBV) as detailed in State and Commonwealth legislation, occur or are likely to occur within the Study area (March 2023).

The species identified by database searches were evaluated for their potential to occur within the study area based on habitat assessments undertaken in the field (Appendix C). This approach assumes that if suitable habitat is present within the study area, and local records of species occur, the study area has the potential to harbour those species. The habitat evaluation approach increases

the integrity of the survey to determine presence or absence of threatened species and reduces limitations relating to survey timing for cryptic species that are difficult to detect in surveys.

A review of existing vegetation mapping of the Cumberland Plain (NSW Department of Planning and Environment, 2022) via the NSW SEED Data Portal was undertaken to identify vegetation communities, including Threatened Ecological Communities (TECs) with the potential to occur within the study area. Current and preliminary listings under the BC Act and the EPBC Act have been considered. Database searches via the NSW Department of Primary Industries (DPI) NSW WeedWise were undertaken to identify potential priority weeds in the locality of the study area.

A summary of the database searches (included in full in Appendix F) is provided in Table 6-6 below.

Table 6-6. Background searches undertaken

Resource	Target	Search date	Search area
BioNet (website for the Atlas of NSW Wildlife)	Threatened flora and fauna, populations and endangered ecological communities	20/03/2023	a. Study area. b. Predicted species in Cumberland IBRA subregion.
EPBC Act Protected Matters Search	Threatened flora and fauna, endangered populations and ecological communities and migratory species	20/03/2023	Study area.
NSW Government SEED (Sharing and Enabling Data) Mapping.	Existing vegetation mapping	20/03/2023	Development Footprint
DPI (Fisheries) Spatial Habitat Portal	Threatened species, populations and ecological communities listed under the FM Act and their distributions and mapped Key Fish Habitat (KFH).	20/03/2023	Proposal site
Department of Primary Industries (DPI) WeedWise database	Priority weeds declared in the relevant LLS area.	20/03/2023	Local Government Area (LGA)

Field Survey

A field survey was undertaken by an NGH ecologist on the 28 March 2023 to assess the biodiversity values of the site. The survey was undertaken over a period of 6 hours between 9 am and 3 pm. Weather conditions during the survey were overcast with showers and a maximum temperature of 25°C.

The Proposal site was surveyed for native flora, vegetation communities and fauna habitat features. Vegetation was assessed using the random meander method (Cropper, 1993). This method provides good coverage in terms of area and microhabitats and maximises opportunities for detecting rare or sparsely distributed species.

Incidental fauna sightings were recorded and an assessment of habitat values was conducted alongside the vegetation survey. Signs of fauna activity and key habitat features were recorded, including:

- Hollows and fissures in standing trees and stags
- Large woody debris

- Signs of fauna presence such as, nests, scratches, glider bark incisions, burrows and scats
- Microhabitat features

All mature trees were individually inspected for trunk or limb hollows and any signs of occupation or use. Any disturbances and active threats to fauna or habitats were also recorded during the survey.

Results

Desktop assessment

The NSW BioNet search identified 97 threatened species (36 birds, 10 mammals, 3 amphibian, 2 gastropods, 2 reptiles and 35 flora species) that have been recorded within 10km of the Development Footprint. Several marine species were identified and ruled out of the assessment due to the distance of the site from the ocean and the absence of suitable habitat.

The EPBC search indicated 12 TECs, 35 threatened flora species and 62 threatened fauna species (36 birds, 5 fish, 3 amphibians, 1 insect, 10 mammals and 7 reptiles) have the potential to occur in the study area (based on predictive habitat modelling, not records of occurrence).

A habitat assessment and further details of the threatened species generated from the background searches can be found in Appendix D, Appendix C and Appendix F.

KFH is mapped (NSW Department of Planning and Environment, 2022) as occurring within the Parramatta River between 300 and 400 m to the east and north of the Development Footprint. The Proposal will employ safeguards to manage erosion and sedimentation preventing impacts to water quality. Considering these mitigation measures and the distance from the Proposal site, works are not expected to impact these areas of KFH (see Figure 6-8).

There are no AOBV within 10km of the Development Footprint. There is no Biodiversity Values (BV) mapped land within the Proposal site. There are two BV types mapped within 100 m of the Development Footprint, they are: Threatened species and communities with potential for Serious And Irreversible Impacts (SAIL) and Biodiverse riparian land (see Figure 6-8). The SAIL in this case represents state mapped Cumberland Shale Plains Woodland TEC and the Biodiverse riparian land is the Parramatta River and associated habitat.

The search of DPI WeedWise database revealed 128 species within the LGA (groups of species i.e. genera) that are; prohibited matters, prohibited on certain dealings, excluded from LGAs, subject to Biosecurity Zone controls or subject to a Control Order.

A search of the NSW SEED Data Portal showed that two (2) vegetation communities occur within the Proposal site and within a 2km radius (see Figure 6-8):

- Plant Community Type (PCT) 4024 *Cumberland Blue Box Riverflat Forest*: This PCT has associated TEC listings for River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Endangered BC Act), and River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Critically Endangered EPBC Act).
- PCT 3320 *Cumberland Shale Plains Woodland*: This PCT has associated TEC listings for Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered BC Act), Shale Gravel Transition Forest in the Sydney Basin Bioregion (Endangered BC Act), and Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Critically Endangered EPBC Act).

A habitat assessment and further details of the threatened species generated from the background searches can be found in Appendix D, Appendix E and Appendix F.



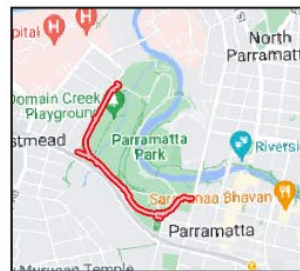
Background Searches

Legend

- | | |
|---------------------------------|--|
| Development footprint | BioNet Records |
| Bollard | Flora |
| Electrical trench | State Vegetation Type Map |
| Light poles | PCT 3320: Cumberland Shale Plains Woodland |
| Biodiversity Values Mapped Land | PCT 4024: Cumberland Blue Box Riverflat Forest |
| Key Fish Habitat | |

0 100 200 300 m

Data Attribution
 © NGH 2023
 © Greater Sydney Parklands 2023
 © LPI, Google 2023



Ref: Parramatta Park New Path Lighting_REF and HIS 1 Background Searches
 Author: vitay.k
 Date create: 27.09.2023
 Datum: GDA94 / MGA zone 56



Figure 6-10. Results of desktop assessment

Field assessment

The field assessment confirmed that the Development Footprint, which is a 3 m buffer either side of the lighting design route (see Figure 6-18 to Figure 6-21), is comprised of cleared and landscaped vegetation with a total area of 1.25 ha. There is a mix of planted native and exotic canopy trees along either side of the road corridor with a largely absent midstorey and exotic groundcover composed primarily of Couch (*Cynodon sp.*) and Kikuyu (*Pennisetum clandestinum*) lawn.

Two vegetation types were recorded within the Proposal site, PCT 4024 Cumberland Bluebox Riverflat Forest and PCT 0 an urban planted matrix of native and exotic vegetation (Figure 6-12 to Figure 6-15). An unclassified vegetation type was created to account for paved areas not consisting of vegetation. Table 6-7 outlines the area occupied by each surface type within the Development Footprint.



Figure 6-11. PCT 0 within a landscaped area and unclassified vegetation type in foreground



Figure 6-12. PCT 0 within an area of grassed lawn



Figure 6-13. PCT 4024 within the Proposal site

Table 6-7. Extent of vegetation/surface types surveyed within the Development Footprint

Vegetation Type	Area within Development Footprint (ha)
PCT 4024 Cumberland and Blue Box Riverflat Forest	0.043
PCT 0 Urban/Exotic matrix	0.981
Unclassified	0.16
Total	1.184

Plant Community Types (PCTs)

The Proposal site is characteristic of typical managed suburban parklands with vegetation profiles comprised of a combination of native and exotic groundcover, some landscaped areas and roadside trees (refer to Figure 6-12 to Figure 6-15).

Given the long history of disturbance of the site, unusual species composition, and absent mid/ground strata in most parts, no PCTs or TECs have been allocated for planted/landscaped areas. The only area that contains a PCT is the riparian corridor of Domain Creek which intersects the Proposal site in the southwest of the site. PCT 4024: Cumberland Blue Box Riverflat Forest was considered the best fit for this area given the mixed canopy of Eucalyptus and Casuarina together with characteristic species such as *Melaleuca decora*, *Breynia oblongifolia*, *Acacia floribunda*, *Cayratia clematidea*, and *Clematis glycinoides*. A total of 0.043 ha of PCT 4024 occurs within the Development Footprint.

PCT 3320 Cumberland Shale Plains Woodland was only recorded in the desktop assessment. The field assessment determined that none of this PCT occurs within the Proposal site or the Development Footprint.

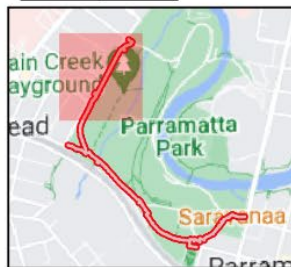


**Survey Results
Map 1 of 4**

Legend

- | | |
|--------------------------|--|
| Development footprint | Strahler
1st Order Stream |
| Flora Threatened Species | Threatened Ecological Community |
| Hollow Bearing Trees | Plant Community Types |
| Heritage Tree | PCT 4024: Cumberland Blue Box Riverflat Forest |
| | PCT 0: Urban/Exotic |
| | Unclassified |

0 25 50 m

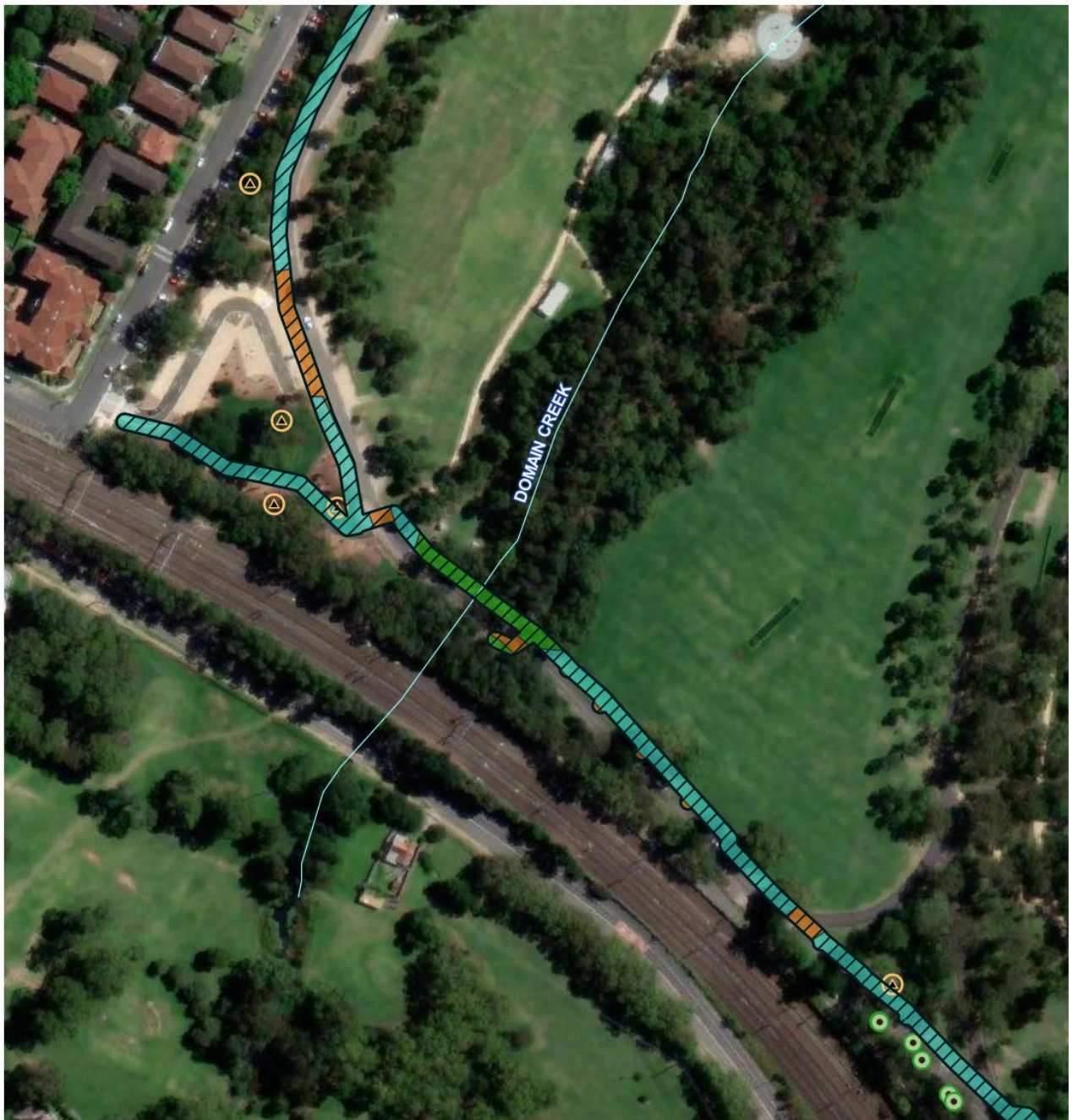


Data Attribution
© NGH 2023
© Greater Sydney Parklands 2023
© LPI, Google 2023

Ref: Parramatta Park New Path Lighting_REF
and HIS \ Survey Results
Author: vitaly.k
Date created: 27.09.2023
Datum: GDA94 / MGA zone 56



Figure 6-14. Map 1 of 4 showing results from field assessment in March 2023

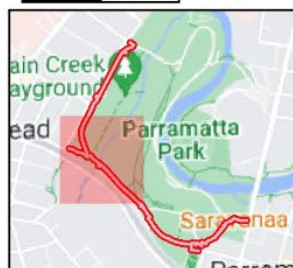


Survey Results
Map 2 of 4

Legend

- | | |
|--------------------------|--|
| Development footprint | Strahler 1st Order Stream |
| Flora Threatened Species | Threatened Ecological Community |
| Hollow Bearing Trees | Plant Community Types |
| Heritage Tree | PCT 4024: Cumberland Blue Box Riverflat Forest |
| | PCT 0: Urban/Exotic |
| | Unclassified |

0 25 50 m



Data Attribution
© NGH 2023
© Greater Sydney Parklands 2023
© LPI, Google 2023

Ref: Parramatta Park New Path Lighting_REF
and HIS \ Survey Results
Author: vitaly.k
Date created: 27.09.2023
Datum: GDA94 / MGA zone 56



Figure 6-15. Map 2 of 4 showing results from field assessment in March 2023

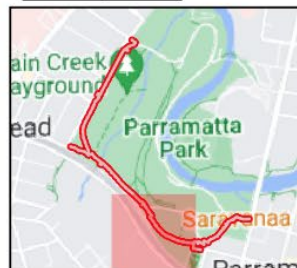


Survey Results
Map 3 of 4

Legend

- | | |
|--------------------------|--|
| Development footprint | Strahler |
| Flora Threatened Species | 1st Order Stream |
| Hollow Bearing Trees | Threatened Ecological Community |
| Heritage Tree | Plant Community Types |
| | PCT 4024: Cumberland Blue Box Riverflat Forest |
| | PCT 0: Urban/Exotic |
| | Unclassified |

0 25 50 m



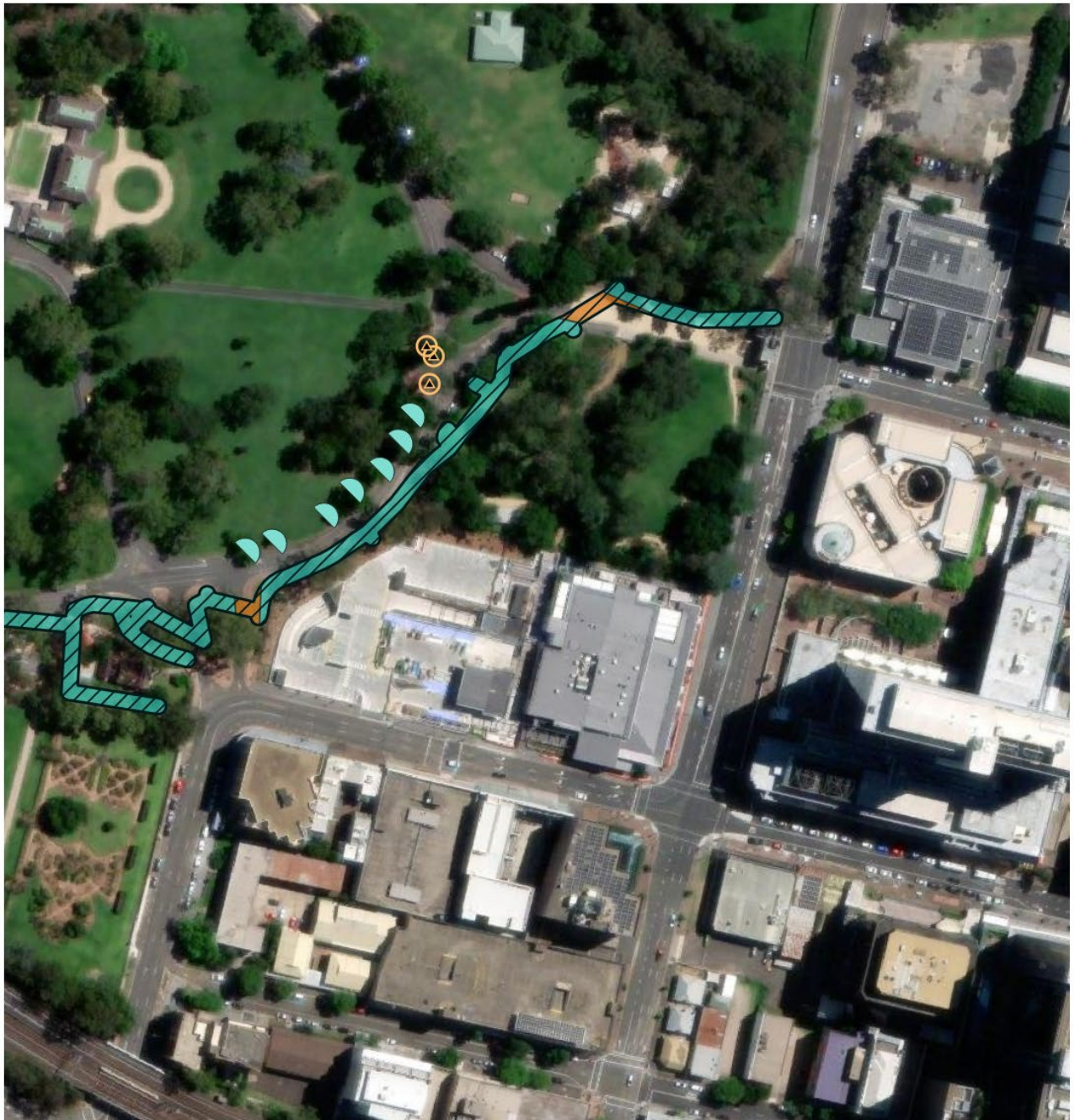
Data Attribution
© NGH 2023
© Greater Sydney Parklands 2023
© LPI, Google 2023

Ref: Parramatta Park New Path Lighting_REF
and HIS \ Survey Results
Author: vity.k
Date created: 27.09.2023
Datum: GDA94 / MGAzone 56



NGH

Figure 6-16. Map 3 of 4 showing results from field assessment in March 2023

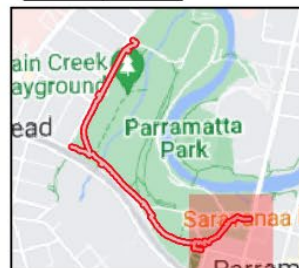


**Survey Results
Map 4 of 4**

Legend

- | | |
|--------------------------|--|
| Development footprint | Strahler 1st Order Stream |
| Flora Threatened Species | Threatened Ecological Community |
| Hollow Bearing Trees | Plant Community Types |
| Heritage Tree | PCT 4024: Cumberland Blue Box Riverflat Forest |
| | PCT 0: Urban/Exotic |
| | Unclassified |

0 25 50 m



Data Attribution
© NGH 2023
© Greater Sydney Parklands 2023
© LPI, Google 2023

Ref: Parramatta Park New Path Lighting_REF
and HIS \ Survey Results
Author: vitaly.k
Date created: 27.09.2023
Datum: GDA94 / MGA zone 56



Figure 6-17. Map 4 of 4 showing results from field assessment in March 2023

Hollow Bearing Trees

Fourteen (14) hollow bearing trees (HBTs) were mapped during the field assessment (refer to Figure 6-12 to Figure 6-15). Four species were recorded with tree heights ranging from 4 to 20 m and diameters of 40 to 80 cm (Table 6-8). An example of a HBT recorded onsite is given in Figure 6-16 below. Eight (8) of the fourteen (14) HBTs mapped fall within the Proposal site, although these trees will remain additional measures will be put in place to prevent accidental impacts occurring.

The eight (8) HBTs recorded within the Proposal site will require an adequate tree protection zone (TPZ) to be established for the duration of works. Details for calculating TPZs are provided within Australian Standard 4970-2009 – Protection of trees on development sites. The remaining trees occur outside of the Proposal site and will be retained. These trees may not require TPZ as they will be far enough from the impacted works area.

Table 6-8. HBT details recorded during site assessment, bold entries represent trees within the Proposal site

ID	Species	Height (m)	Diameter (cm)	Small Hollows	Medium Hollows	Large Hollows	Fissures (Y/N)
1	Stag	15	60	-	3	-	Y
2	Stag	15	60	-	6	-	N
3	Stag	5	50	-	-	-	Y
4	Stag	4	40	-	-	-	Y
5	Eucalyptus tereticornis	18	60	-	2	3	Y
6	Eucalyptus fibrosa	20	80	-	2	1	N
7	Stag	10	80	2	2	1	N
8	Eucalyptus saligna	22	80	-	1	-	N
9	Eucalyptus punctata	20	80	-	2	2	Y
10	Eucalyptus tereticornis	20	80	-	2	1	N
11	Eucalyptus tereticornis	15	80	1	1	2	N
12	Stag	15	50	2	1	1	N
13	Eucalyptus saligna	20	80	-	2	-	N
14	Eucalyptus tereticornis	10	40	-	1	1	N



Figure 6-18. *Eucalyptus tereticornis* HBT mapped during field assessment

Threatened flora species

One threatened flora species was detected within the Proposal site: the BC Act listed (V) Juniper-leaved Grevillea *Grevillea juniperina ssp. juniperina*. Six individuals were located in a small patch and were likely to have been planted or re-colonised from the adjacent rail corridor (Figure 6-17). See Figure 6-13 for location.



Figure 6-19. *Grevillea juniperina* ssp. *juniperina* recorded during field assessment

Weeds

No listed priority weeds were identified within the Proposal site.

Fauna

Threatened fauna species

No threatened fauna species were recorded within the Proposal site during the site visit. A total of 14 HBTs were identified along the road corridor and existing paths that would provide suitable breeding habitat for threatened fauna. These trees contained hollows with a range of sizes suitable for threatened species with potential to occur within the Proposal site. Some of these species include Powerful Owl and several species of microbats. None of these HBTs would be removed by the proposed works.

More mobile threatened fauna such as Grey-headed Flying-fox may forage on the eucalypts as part of a broader foraging range but are unlikely to be solely reliant on the resources within the Proposal site. There is a flying fox camp located in Parramatta Park approximately 150 m northeast of the Development Footprint. In 2021 the camp was estimated to have 2,500 – 9,999 Grey-headed Flying Fox (EPBC: V) individuals and 1 – 499 Black Flying Fox individuals (DCCEEW, 2015).

A habitat assessment was undertaken for threatened species, populations and communities listed under the BC Act (Appendix C) that came up in the background searches (Appendix D). Suitable habitat for seven (7) threatened fauna species occurred on site. Assessment of significance were undertaken for these species as listed below:

- Green and Golden Bell Frog *Litoria aurea* – BC (E), EPBC (V)
- Powerful Owl *Ninox strenua* – BC (V)

- Eastern False Pipistrelle *Falsistrellus tasmaniensis* – BC (V)
- Eastern Coastal Free-tailed Bat *Micronomus norfolkensis* – BC (V)
- Large Bent-winged Bat *Miniopterus orianae oceanensis* – BC (V)
- Little Bent-winged Bat *Miniopterus australis* – BC (V)
- Southern Myotis *Myotis macropus* – BC (V)

For ease of assessment all bat species have been grouped into one category.

The BC Act 5-part tests concluded that with the proper implementation of the safeguards and mitigation measures outlined in Chapter 7, none of the listed species were considered likely to incur significant impacts (see Appendix F). Specific to the Powerful Owl *Ninox strenua*, the assessment found that if breeding bats were occurring during construction, breeding success may be affected. For this reason, a recommendation includes to either limit works within the breeding season OR survey to establish breeding is not occurring during the proposed construction period.

Incidental fauna sightings

Incidental fauna recorded includes common urban adapted birds such as Noisy Miner, Rainbow Lorikeet, Sulphur-crested Cockatoo, Pied Butcherbird, Corella, Magpie, and Northern Mallard.

Aquatic habitat

No aquatic habitat would be impacted by the Proposal. Areas of KFH mapped within the study area would not be directly impacted, safeguards and mitigation measures will be put in place to prevent indirect impacts to aquatic habitat such as erosion and sedimentation.

EPBC matters of national environmental significance

The following matters of national environmental significance (MNES) relevant to biodiversity are considered to apply to the Proposal:

- The critically endangered community River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria.
- The vulnerable Green and Golden Bell Frog *Litoria aurea*

The EPBC assessment of significance found that the Green and Golden Bell Frog would not be likely to be significantly impacted by the Proposal with the proper implementation safeguards and mitigation measures outlined in Chapter 7. No assessment of significance was conducted for the TEC mentioned above as the habitat evaluation (Appendix C) concluded an impact was not be likely to occur.

Migratory species

The EPBC Protected Matters Search Tool (PMST) identified 10 migratory species as having the potential to occur within the study area. The habitat assessment (Appendix C) showed none of these species are likely to be significantly impacted due to the proposed works and therefore no significant impact assessments were undertaken for these species.

Existing environment

The Proposal is located within Parramatta Park in the suburb of Parramatta, 21 km west of the Sydney central business district. The Proposal is located within the Sydney Basin IBRA region and the Cumberland IBRA subregion in the Ashfield Plains Mitchell landscape.

The Proposal site is comprised of cleared and landscaped areas (see Figure 6-18 to Figure 6-21). There is a mix of planted native and exotic canopy trees along either side of the road corridor and exotic groundcover composed primarily of Couch and Kikuyu lawn. The midstorey is largely absent.

The mix of planted tree species include *Eucalyptus microcorys*, *E. moluccana*, *E. fibrosa*, *E. robusta*, *E. nicholii*, *E. punctata*, *Angophora bakeri*, *Casuarina glauca*, *C. cunninghamiana*, *Melaleuca decora*, *Araucaria heterophylla*, *Ficus macrophylla*, *Corymbia citriodora*, *C. maculata*, *Quercus robur*, *Q. palustris* and *Pinus pinaster*. Some landscaped areas contained planted native midstorey and groundcover species including *Acacia decurrens*, *Lomandra spp. cv.*, *Indigofera australis*, *Bursaria spinosa*, *Dianella caerulea* and *Carex appressa*.

Domain Creek, a 1st order tributary of the Parramatta River intersects the Proposal site with a riparian corridor containing remnant vegetation associated with the threatened ecological community (TEC) River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act).

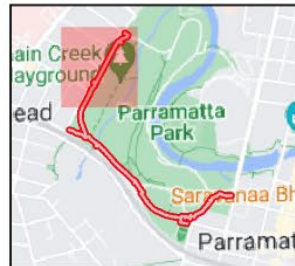


Site Layout

Legend

- Development footprint
- Electrical Pit Locations
- Bollard
- Electrical trench
- Light poles
- Bore
- Distributor Board Locations
- Trench

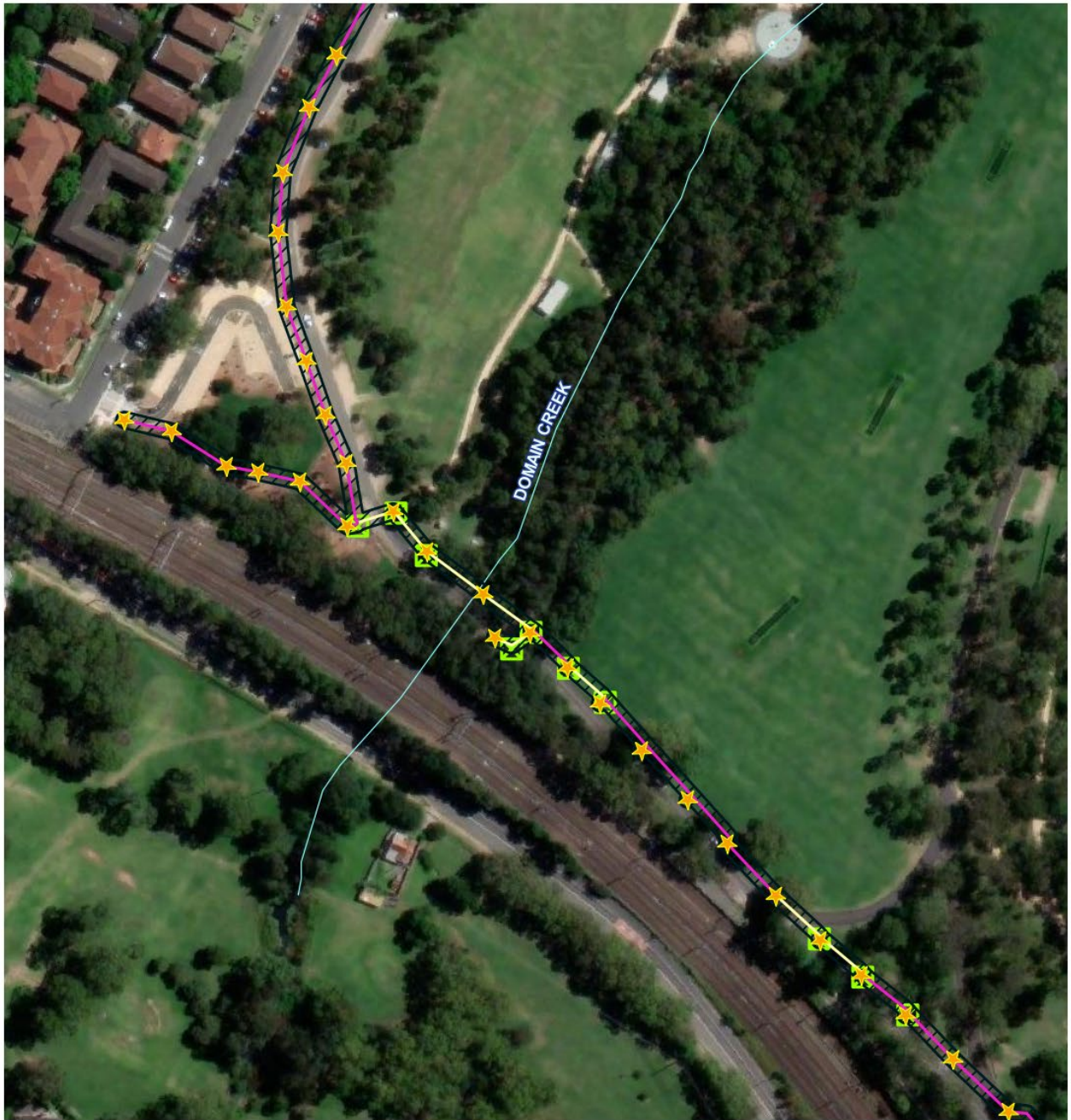
0 25 50 m



Data Attribution
 © NGH 2023
 © [INSERT CLIENT/CORRECT REFERENCE HERE] [YEAR]
 © [INSERT ANY OTHER DATA SUPPLIERS HERE] [YEAR]
 Ref: Parramatta Park New Path Lighting_REF and HIS \ Site Layout
 Author: vitaly.k
 Date created: 28.09.2023
 Datum: GDA94 / MGA zone 56









Figure 6-20. Map 1 of 4 showing location of Development Footprint and Proposal site

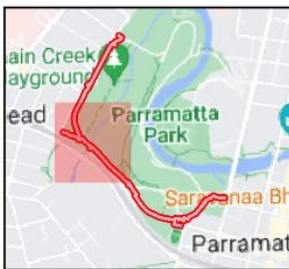


Site Layout

Legend

-  Development footprint
-  Light poles
-  Distributor Board Locations
-  Electrical Pit Locations
-  Bore
-  Trench

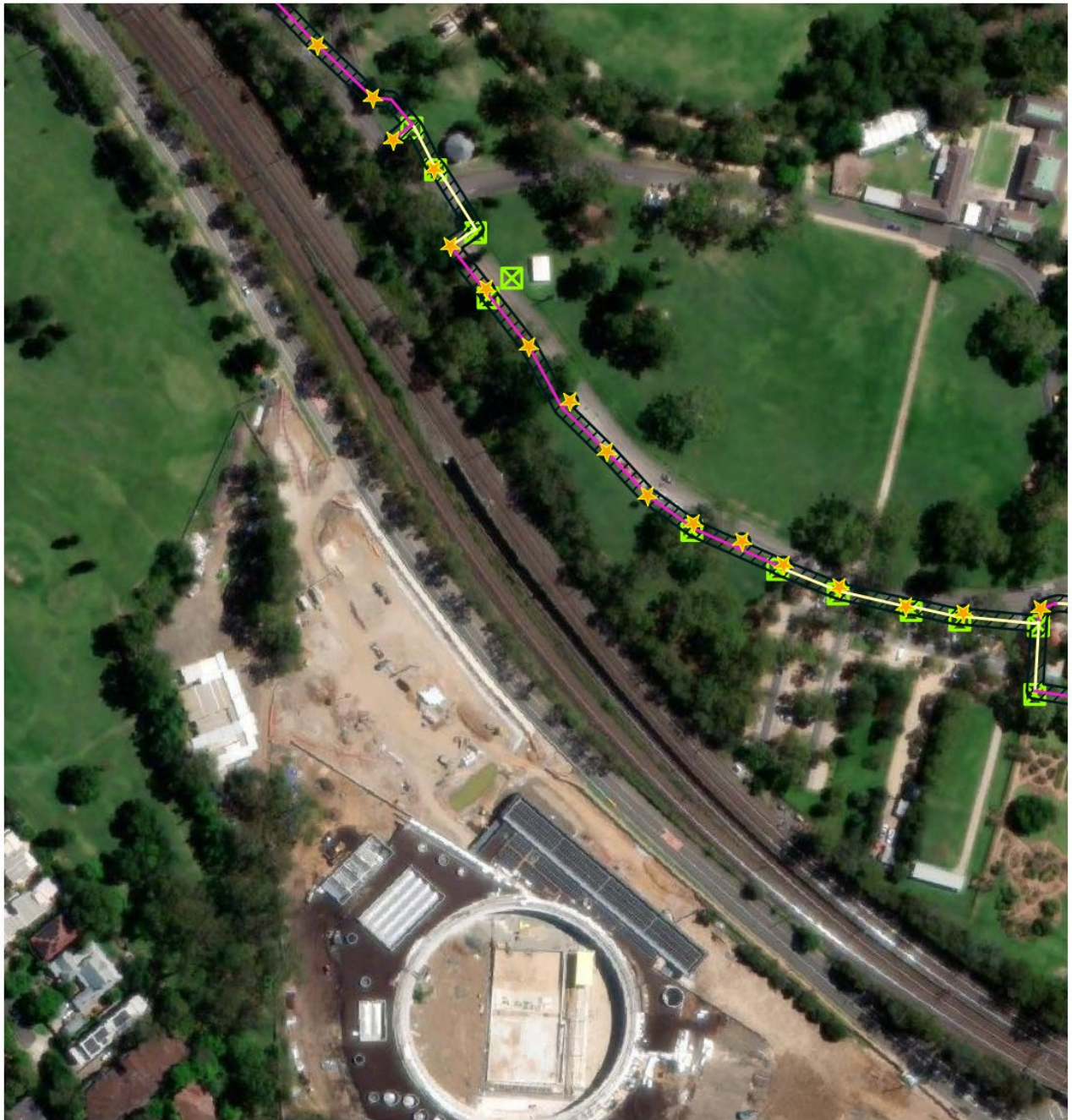
0 25 50 m



Data Attribution
 © NGH 2023
 © [INSERT CLIENT/CORRECT REFERENCE HERE] [YEAR]
 © [INSERT ANY OTHER DATA SUPPLIERS HERE] [YEAR]
 Ref: Parramatta Park New Path Lighting_REF and HIS \ Site Layout
 Author: vitally.k
 Date created: 28.09.2023
 Datum: GDA94 / MGA zone 56











Figure 6-21. Map 2 of 4 showing location of Development Footprint and Proposal site

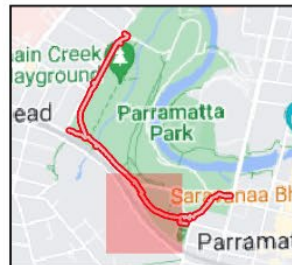


Site Layout

Legend

-  Development footprint
-  Bollard
-  Light poles
-  Distributor Board Locations
-  Electrical Pit Locations
-  Electrical trench
-  Bore
-  Trench

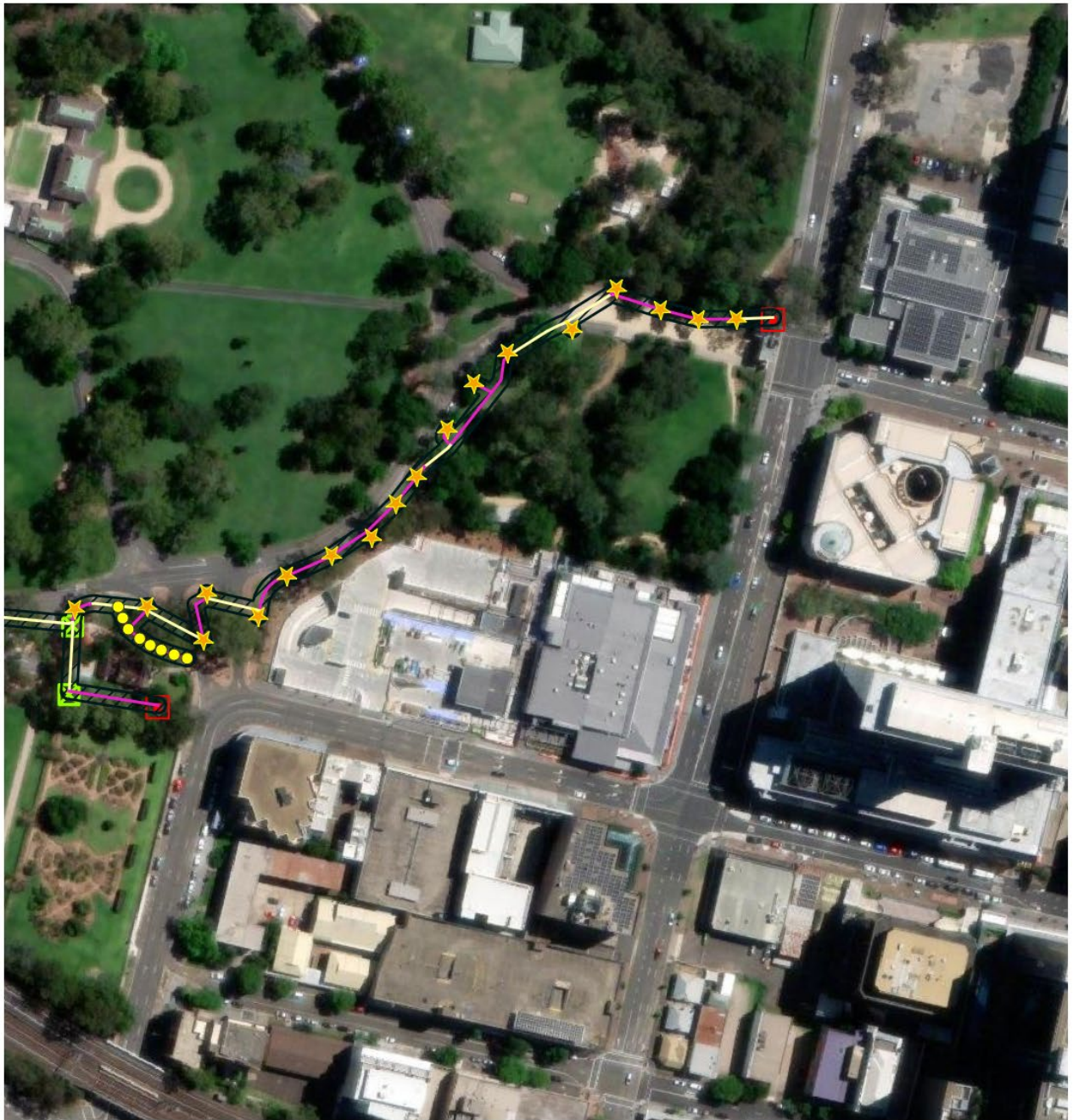
0 25 50 m



Data Attribution
 © NGH 2023
 © [INSERT CLIENT/CORRECT REFERENCE HERE] [YEAR]
 © [INSERT ANY OTHER DATA SUPPLIERS HERE] [YEAR]
 Ref: Parramatta Park New Path Lighting_REF and HIS \ Site Layout
 Author: vitay.k
 Date created: 28.09.2023
 Datum: GDA94 / MGA zone 56



Figure 6-22. Map 3 of 4 showing location of Development Footprint and Proposal site

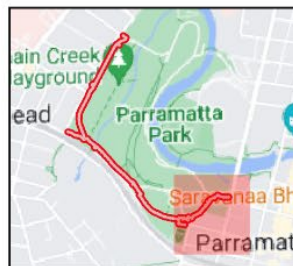


Site Layout

Legend

- | | |
|-----------------------------|--------------------------|
| Development footprint | Electrical Pit Locations |
| Bollard | Electrical trench |
| Light poles | Bore |
| Distributor Board Locations | Trench |

0 25 50 m



Data Attribution
 © NGH 2023
 © [INSERT CLIENT/CORRECT REFERENCE HERE] [YEAR]
 © [INSERT ANY OTHER DATA SUPPLIERS HERE] [YEAR]
 Ref: Parramatta Park New Path Lighting_REF and HIS \ Site Layout
 Author: vitay.k
 Date created: 28.09.2023
 Datum: GDA94 / MGA zone 56



Figure 6-23. Map 4 of 4 showing location of Development Footprint and Proposal site

Potential impact

Construction

Construction of the Proposal would involve the excavation of electrical pits, light poles and trenches, as well as boring. A total of 1.98 km of trenches would be constructed with 566m trenched using a boring method that would not disturb the ground surface and the remaining 1415.8 m as an open cut trench (Figure 6-18 to Figure 6-21).

Vegetation to be cleared and/or modified from the proposed works is 0.89 ha in total and occurs where standard open trenches, electrical pits and light poles would be constructed. This 0.89 ha consists of landscaped areas comprising native and exotic plantings but primarily exotic groundcover species such as Kikuyu and Couch lawn. Approximately 0.043 ha of PCT 4024 is intersected by the Development Footprint where it crosses Domain Creek. It is understood that no vegetation within this patch would be impacted directly because the area would not be subject to open trenching and services would follow the existing infrastructure without excavation (bridge over Domain Creek).

All eight (8) HBTs recorded within the Proposal site would require an adequate tree protection zone (TPZ) to be established for the duration of works. The buffer will protect tree roots from compaction and protect the health of the trees. As well it will provide some protection for species using the trees as habitat.

All mapped Juniper-leaved Grevilleas occur outside the Development Footprint and would be avoided by the Proposal. Distances range from 3-7 m from the boundary of the Development Footprint. Additional safeguards are outlined in Chapter 7.

All vegetation within the Proposal site has some potential to be used as habitat by native fauna species, including those listed in Appendix C.

It is understood that minimal vegetation disturbance would occur due to the proposed works and that vegetation impacted would consist mostly of exotic lawn. Some trimming or pruning of vegetation including trees may be required to safely conduct works. No tree removal would be required.

Potential direct and indirect impacts during the construction phase will be minimised and mitigated with the measures described in Chapter 7.

Operation

The operation of the Proposal would involve the lighting of approximately 2 km of pathway within Parramatta Park. The Park contains a number of mature and hollow-bearing trees that could provide habitat for threatened species.

Although Parramatta Park is located within a densely occupied urban area there where generally speaking there is a large amount of artificial light the creation of a new lighting scheme has potential impact on threatened species particularly nocturnal fauna.

Birds

Anthropogenic disturbance caused by artificial light has been found to alter bird song timing with potential negative consequences including exposure or predator attraction (Spoelstra, 2015). Further, artificial light has been found to play a part in reducing the abundance of birds (Wilson, 2021). Wilson *et al.* (2021) state that in some cases anthropogenic disturbance involving artificial light has led to nest abandonment in some species. Additionally, effects of artificial light changing faunal perception of day length may cause mis-timing of yearly reproduction, moult and migration (Spoelstra, 2015).

Terrestrial mammals require foraging areas to meet their energy requirements, when artificial light spills into these areas it may expose them to increased predation risk (DCCEEW, 2023a). This can cause terrestrial mammals to discontinue using these areas for foraging (DCCEEW, 2023a). This can lead to increased predation opportunities for nocturnal raptors however in the long-term decrease the availability of prey (DCCEEW, 2023a).

The impacts of artificial light on birds within Parramatta Park may involve a decrease in overall abundance and may cause abandonment of some existing nests.

Bats

Artificial light may also stop nocturnal animals from feeding in lit areas because they risk being eaten by predators (DCCEEW, 2023). Because the lights would be set in a linear pattern over approximately 2 km this may also lead to the fragmentation of habitat within Parramatta Park for bats who may need to alter their flight path to avoid well-lit areas (DCCEEW, 2023a).

Bat roosting can also be impacted by artificial light which can interfere with emergence routes, juvenile growth rates, roost abandonment and death (DCCEEW, 2023a). Dusk is usually a cue for bats to emerge from hollows, a delay in emergence can reduce foraging times or cause bats to miss peak insect times during those hours (DCCEEW, 2023a). Where a roost site is directly impacted by artificial light increased predation rates by feral animals such as cats can occur (DCCEEW, 2023).

Some bat species commute to foraging areas from roost sites. Light avoidant bats can be impacted by artificial light when commuting, leading to habitat fragmentation (DCCEEW, 2023a). Artificial light may also affect the abundance of food resources leading to a compromised ability to obtain resources (DCCEEW, 2023a). It may also concentrate food resources, such as insects, affecting the area's current species composition. Echolocating bats are likely impacted by artificial light by changes in prey availability given that insects are generally very light sensitive (DCCEEW, 2023a).

The Proposal has potential to impact on bats within Parramatta Park in several ways, through fragmenting habitat, changed food resource abundance, increased predation and degrading roost quality where lights directly impact roosts.

These impacts are considered able to be mitigated acceptably with the measures described below. They aim to contain the impacts and protect habitat resources in the area.

Safeguards and mitigation measures

Impact	Safeguards and mitigation measures	Responsibility	Timing
Vegetation removal	<ul style="list-style-type: none"> Prior to the commencement of any works, a physical clearing boundary is to be clearly marked and maintained. Prior to any vegetation disturbance or removal, two nights of stag watching (spotlighting HBT) are to be conducted to provide information on species presence and ensure that no threatened hollow dependent fauna will be disturbed or impacted by construction noise or activity. 	Contractor	Pre-construction and construction

	<ul style="list-style-type: none"> • Utilise areas already impacted by previous clearing or disturbance for access purposes, stockpiles or the establishment of compound sites. • No clearing of vegetation can occur outside the Development Footprint without ecological assessment and approval. • All Trees are to be retained. Trees adjacent but outside of the Proposal site, require the establishment of a tree protection zone (TPZ) (including fencing and signage) for the duration of works. Details for calculating TPZs are provided within Australian Standard 4970-2009 – Protection of trees on development sites. • Any encroachment into the TPZ that is >10% may lead to the decline of health of the tree. Any encroachment within 10% of the TPZ requires an arborist assessment and an arborist on site during any proposed works. • No works may occur in the Structural Root Zone (SRZ). Details for calculating the SRZs are provided within Australian Standard 4970-2009 – Protection of trees on development sites. • Where underground components of native trees (or exotic heritage trees) are encountered by trenching machinery a qualified arborist is to inspect the roots to properly trim and seal the wound. • Where trees need to be pruned or trimmed qualified arborists should be employed. • Construction areas would be stabilised as soon as practicable (progressively where possible). • All areas containing mapped Plant Community Types to be demarcated as ‘No Go Zones’ and avoided, except where works would not impact any vegetation e.g. for the routing of cable over the Domain Creek Bridge. • Area of Juniper-leaved Grevillea (<i>Grevillea juniperina</i> ssp. <i>Juniperina</i>) to be demarcated as ‘No Go Zones’ and avoided. 		
Weed and pathogen management	<ul style="list-style-type: none"> – A Weed Management Plan will be developed for the site to minimise risk of spread of weeds. – PPT will notify the Contractor of all declared Priority Weeds identified on site. – All declared Priority Weeds within the work area are to be cleared and managed according to the 	Contractor	Pre-construction and construction

	<p>Weed Management Plan and the requirements stipulated by the <i>Biosecurity Act 2015</i>. To fulfil this requirement, all priority weeds requiring removal will need to be disposed of at a registered waste management facility.</p> <ul style="list-style-type: none"> • All machinery (e.g., bulldozers, excavators, trucks, loaders etc.) will be cleaned using a high-pressure washer (or other suitable device) prior to entering and exiting work sites. 		
Impacts to threatened fauna	<ul style="list-style-type: none"> • A pre-works tool-box meeting is to be completed detailing all threatened species that have been assessed to be likely to utilise the area (Appendix C) so that workers are aware of what to look for during construction. • A stop-works procedure is to be implemented should an unexpected threatened species be found during construction. An appropriately trained ecologist is to be consulted and complete relocation to appropriate habitat. • The Green and Golden Bell Frog undertakes large dispersal movements after rain and a pre-clearance survey should be undertaken prior to works commencing, where works coincide with these weather conditions. • To manage potential impacts on breeding Powerful Owl <i>Ninox strenua</i> either: <ul style="list-style-type: none"> ○ Carry out a pre-construction/ clearance survey targeting these trees and period to verify no Powerful Owls are breeding. If breeding activity is detected, the construction works restrictions must apply. • Sodium or LED streetlights will be used to limit nighttime fatalities of nocturnal foragers. • Avoid the use of high-intensity, elevated and upward-facing lights that have the strongest negative impact on fauna. • Avoid the use of 'white' coloured lights. • Angle lights away from bushland or HBTs. • All trenches that are left open are to be inspected every morning prior to works commencing and in the evening prior to leaving site so as to release any trapped fauna. When not in use open trenches should be covered where practical. 	Contractor, Greater Sydney Parklands	Pre-construction, Construction and operation
Aquatic habitat and	<ul style="list-style-type: none"> • All stockpile sites to be appropriately fenced with silt traps to prevent sedimentation of waterways. 	Contractor	Construction

**water
quality**

- Erosion controls to be put in place for areas subject to ground cover disturbance.
- Chemical spills kit to be available onsite for any accidental spills involving potentially harmful chemicals.

6.1.5. Waste management

Policy setting

Waste management would be undertaken in accordance with the *Waste Avoidance and Resource Recovery Act 2001* (NSW). The objectives of this Act are:

- (a) to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development,
- (b) to ensure that resource management options are considered against a hierarchy of the following order:
 - i) avoidance of unnecessary resource consumption,
 - ii) resource recovery (including reuse, reprocessing, recycling and energy recovery),
 - iii) disposal,
- (c) to provide for the continual reduction in waste generation,
- (d) to minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste,
- (e) to ensure that industry shares with the community the responsibility for reducing and dealing with waste,
- (f) to ensure the efficient funding of waste and resource management planning, programs and service delivery,
- (g) to achieve integrated waste and resource management planning, programs and service delivery on a State-wide basis,
- (h) to assist in the achievement of the objectives of the *Protection of the Environment Operations Act 1997* (POEO Act).

Potential impacts

Waste would be created through:

- Trenching, boring and topsoil removal
- Leftover material and off cuts of wires and pipes
- Steel pins and bolts
- Packaging materials
- Asphalt from the road surface (if trenching is required over surface)
- Vegetation from minor clearing.

None of these waste streams are considered likely to lead to any problems in handling, storage or disposal considering the small scope of work and the quantity of waste that this Proposal might generate. The disposal of waste material must be in accordance with the EPA *Waste Classification Guidelines Part 1: Classifying Waste* (NSW EPA, 2014).

During operation light fittings may be replaced from time to time. Spent fittings would be disposed of in accordance with the EPA *Waste Classification Guidelines Part 1: Classifying Waste* (EPA, 2014)

Safeguard and mitigation measures

Impact	Environmental safeguard	Responsibility	Timing
Waste Management	<p>Resource management hierarchy principles are to be followed: Avoid unnecessary resource consumption as a priority. Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery). Disposal is undertaken as a last resort. (in accordance with the <i>Waste Avoidance & Resource Recovery Act 2001</i>).</p> <p>Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working shift.</p> <p>Waste material is not to be left on site once the works have been completed.</p>	Contractor	Construction
Storage of waste	Waste should be stored in an appropriate location. For example; spoil is to be stored in a stockpile with adequate erosion and sedimentation control measures. General litter to be stored in bins.	Contractor	Construction

6.1.6. Visual impacts

Approach

A visual impact assessment of the Proposal on sensitive receivers has been undertaken with reference to Transport’s *Guideline for Landscape Character and Visual Impact Assessment* (Transport for NSW, 2020).

The potential landscape character and visual impact of the Proposal has been assessed in relation to the key viewpoints. The assessment considered the magnitude of visual change and the distance from the viewer, as well as the sensitivity. The sensitivity refers to the quality of the view and how sensitive it is to the proposed change. The magnitude refers to the overall size of the proposed change and number of affected receivers. The assessment is kept objected through the use of existing landscape character assessment.

The combination of sensitivity and magnitude then provides an overall landscape character and visual impact rating based on the grading matrix shown in Table 6-9. This table has been reproduced from Transport (2020).

Table 6-9. Landscape character and visual impact grading matrix (Transport, 2020)

		Magnitude			
		High	Moderate	Low	Negligible
Sensitivity	High	High Impact	High-Moderate Impact	Moderate Impact	Negligible Impact
	Moderate	High-Moderate Impact	Moderate Impact	Moderate-Low Impact	Negligible Impact

Magnitude					
	Low	Moderate Impact	Moderate-Low Impact	Low Impact	Negligible Impact
	Negligible	Negligible Impact	Negligible Impact	Negligible Impact	Negligible Impact

Existing environment

The visual environment in the vicinity of the Proposal can be summarised as follows:

- Located within an urban landscape with remnant vegetation
- Usually traversed by a single lane road and adjacent to rail line
- Park area filled with greenery and scenic environment
- Scattered heritage items and monuments that provide the greatest visual significance and have been assessed separately in Section 6.1.2 and Appendix G.

Site photographs are provided in Appendix B

Potential impact

The assessment of impact is based on the identification of key viewpoint sensitive receivers, which were determined from site investigations, and are listed below:

- Residential apartments located along Park Avenue
- Old government house
- Retail and business district along Pitt, Macquarie and O’Connell Streets
- Impact for rail users

Refer to Table 6-10. for a summary of visual impacts from the nearest sensitive receivers.

Table 6-10. Summary of landscape character and visual impact of the Proposal

Viewpoint	Visual sensitivity	Magnitude	Overall impact (unmitigated)	Comments
Views from residence along Park Avenue	Moderate	Low	Moderate-Low Impact	<p>Viewpoint sensitivity from residents along Park Avenue would be moderate as construction activities would be undertaken across the road. These residences are approximately 50m west of the Proposal site.</p> <p>Due to existing vegetation screening along Park Avenue between the Proposal site and residences, there is limited direct lines of sight to the Proposal site. Construction activities are expected to be staged and would not result in large construction areas exposed simultaneously. However, the magnitude was designated as low due to the scattered view.</p> <p>Boundary fencing, exclusion tape, construction vehicle movements and other construction site-</p>

Viewpoint	Visual sensitivity	Magnitude	Overall impact (unmitigated)	Comments
				related features would have negative visual impacts and deemed to be moderate-low if unmitigated. Visual impacts would be temporary during construction and negligible upon completion of the Proposal. Safeguards would be implemented to minimise these impacts.
Views from Old Government House	High	Low	Moderate Impact	Viewpoint sensitivity from Old Government House would be High due to the nature of this World heritage listed building. However, existing natural screening (vegetation and terrain) coupled with the distance from the Old Government House (The magnitude was designated as Low as a result of this combination and the temporary nature of the works. The lighting design has also been adjusted to be on the further side of the path along the Old Government House visual impact zone. Visual impacts would be temporary during construction and negligible upon completion of the Proposal. Safeguards would be implemented to minimise these impacts.
Retail and business district along Pitt, Macquarie and O'Connell Streets	Low	Low	Low Impact	Viewpoint sensitivity from business and retail precinct would be low due to the nature of landuse. Existing natural screening (vegetation and terrain) coupled with the distance from these receivers resulted in low magnitude. Result of this combination and the temporary nature of the works deemed visual impact as low. Visual impacts would be temporary during construction and negligible upon completion of the Proposal. Safeguards are not recommended to minimise these impacts.
Impact for rail users	Negligible	Negligible	Negligible Impact	Viewpoint sensitivity from rail users would be negligible as the view would be for a short period of time from a moving train. Existing natural screening (vegetation and terrain) and short exposure resulted in negligible magnitude. Result of this combination and the temporary nature of the works deemed visual impact as negligible. Visual impacts would be temporary during construction and negligible upon completion of the Proposal. Safeguards are not recommended to minimise these impacts.

Construction activities would be temporary and associated visual impact would be minimised upon implementation of safeguards. Visual impacts regarding removal of vegetation would be negligible upon completion of landscape works to revegetate ground cover.

Upon completion, the pathway will be more visible at night. No daytime discernible visual impacts of the Proposal are expected. The Proposal would have a positive impact related to the increased night lighting, with the park's pathways lit offering pedestrian safety. This achieves the key goal of the Proposal to create a safer route for pedestrians at night.

Safeguard and mitigation measures

Impact	Environmental safeguards	Responsibility	Timing
Minimise visual and landscape impact during construction	<p>Proposal work sites, including construction areas will be managed to minimise visual impact. A site arrangement plan showing at minimum the following:</p> <ul style="list-style-type: none"> • Storage areas for equipment and materials • All construction areas will be fenced off with construction fence • Colour for construction fence will be chosen to minimise contrast with the surrounding as far as practicable • Sufficient parking areas are available at the work sites • Waste storage areas, and ensure waste is collected and sorted at the end of each day. 	Contractor	Pre-Construction Construction
Minimise visual and landscape impact upon completion	All work sites including the compound area are to be demobilised and rehabilitated to its previous condition as best as practicable.	Contractor	Post-construction

6.1.7. Hydrology, catchment and water quality

Existing environment

The Proposal is located within the Parramatta River catchment. The Parramatta River is one of Sydney's most iconic waterways. The river extends from Blacktown Creek in the west to where it meets the Lane Cove River in the east and flows into Sydney Harbour. Approximately 21 km in length, the headwaters of the river are freshwater up until the Parramatta CBD at the Charles Street weir, where the river becomes estuarine. The river is about 40-45m wide near the Proposal site.

The catchment area covers 266 km². A network of streams and creeks traverse the upper and lower parts of the catchment that all eventually flow into Parramatta River (Parramatta Catchment Group, 2023).

Domain Creek (First order Strahler stream) is one of the tributaries of Parramatta River which intersects the Proposal site. Being within the Proposal site, this creek has a potential to be impacted by construction activities. It also has a potential to carry contaminants to Parramatta River if the Proposal is not managed properly.

The Proposal site is not mapped as flood prone under the Environmental Planning Instrument (EPI) data.

Potential impact

During construction there is potential for sediment laden runoff to be generated during the trenching process, earthworks and from stockpiled material, in particular during rain events. This has

the potential to increase turbidity and reduce water quality in the Domain Creek and then to Parramatta River. Erosion and sedimentation mitigation measures are detailed below to manage this potential impact.

Chemical spills and fuel spills from construction vehicles have the potential to pollute runoff and in turn pollute Domain Creek and further on into the Parramatta River. Chemicals likely to be used during the construction work are limited to concrete curing compounds and small quantities of household chemicals. Fuels and oils would be stored on site in small quantities, with bulk fuel delivered to site for refuelling plant and equipment. Overall, the Proposal would not require the storage or handling of large quantities of chemicals or fuels.

Once operational, the drainage regime at the site would be largely unchanged as a result of the Proposal and therefore any impacts to the movement of water would be negligible. The Proposal would also not bring any significant changes to ground levels and therefore not bring changes to flooding patterns.

Safeguard and mitigation measures

Impact	Safeguards and mitigation measures	Responsibility	Timing
Water quality	Chemicals/fuel stored at the Proposal site would be stored in an impervious bunded area at the compound site.	Contractor	Construction
Water quality	Spill kits should be located on site at all times during construction. All staff would be inducted into the incident emergency spill procedures and made aware of the location of emergency spill kits.	Contractor	Construction
Water quality	An incident emergency spill plan will be prepared prior to start of works. Should a spill occur during construction, the incident emergency spill plan will be implemented.	Contractor	Construction
Water quality	The refuelling of plant and maintenance of machinery will be undertaken in impervious bunded areas off site or at the temporary compound/stockpile site at least 40m from Domain Creek.	Contractor	Construction

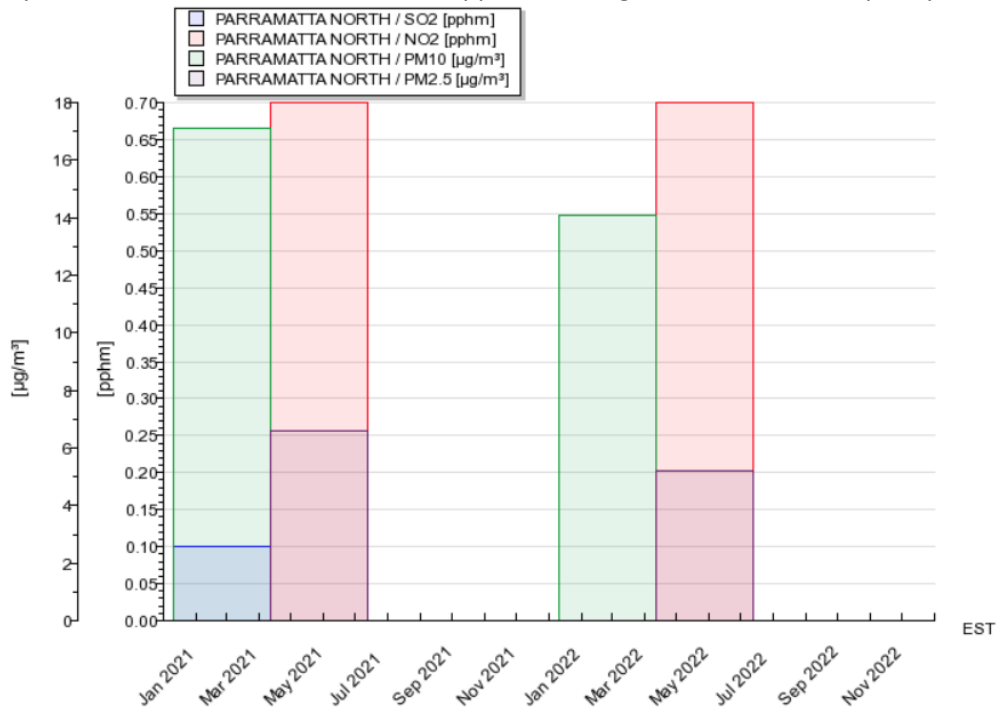
6.1.8. Air quality

Existing environment

Parramatta Park is situated in the urban fringe of Greater Sydney. The park is surrounded by residential zoned land and multipurpose land. No heavy industrial area is located in the proximity of the park. Being in an urban area, air quality is likely to fluctuate based on the weather. Since the site isn't near any heavy industry, the emissions would mostly be from vehicles and extreme events such as fires.

The existing air quality at North Parramatta station which is located approximately 675m northwest of the Proposal site is good. Figure 6-22. shows levels of Sulphur dioxide, Nitrogen dioxide, Particulate Matter (PM) 10 and PM2.5 and Figure 6-23 shows annual exceedance of same pollutants in the same time frame. Which shows that there have only been three occasions of exceedance in

the past 2 years of PM2.5 in this area. Which supports the argument that the air quality in this area



is good.

Figure 6-24. Air quality at North Parramatta monitoring station (NSW Government, 2023)

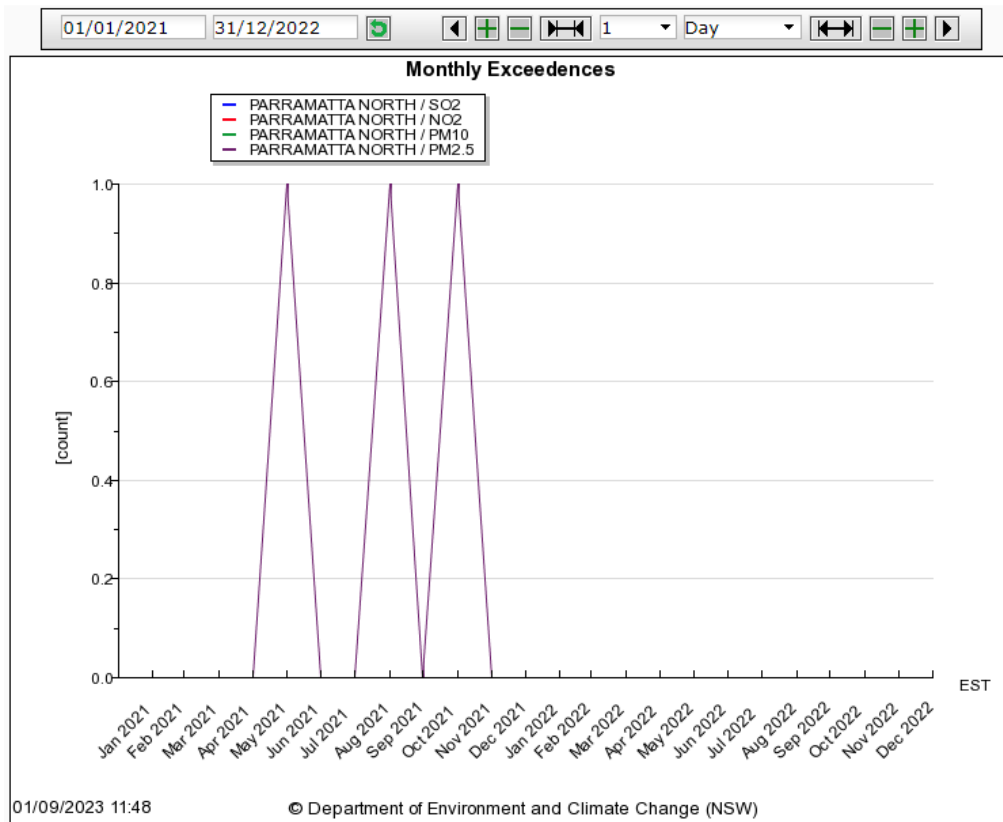


Figure 6-25, Annual exceedances at North Parramatta monitoring station for same pollutants (NSW DPIE, 2023)

Potential impact

Construction

Atmospheric pollutants generated during the construction phase would include dust from the operation of earth moving machinery and transportation of excavated materials, and exhaust emissions from construction vehicles. High levels of dust can suppress vegetation growth, impact on park uses, and affect nearby residences. Overall, the Proposal is not expected to generate much dust or emissions as the works would be concentrated to a small footprint of works.

Given the low impact footprint for earthworks, air quality impacts from construction work is likely to be low.

Operational

No additional emissions or air quality impacts are anticipated during operation.

Safeguard and mitigation measures

Impact	Environmental safeguards	Responsibility	Timing
Air quality	<ul style="list-style-type: none">All loads will be covered during transportLimit exposed surfaces areas to the minimum area requiredMaintain plant to manufacturers standardsMachinery will not be left running when idleWater carts are to be used on stockpile sites or temporary access roads to reduce dustEnsure that all plant and equipment comply with Part 4 of the Protection of the Environment Operations (Clean Air) Regulation 2002Where levels of dust become unacceptable, appropriate action must be taken. This may include suspending works during periods of high windSmokey emissions from construction plant and vehicles will be maintained to Australian Standards. The POEO Act requires that no vehicle shall have continuous smoky emissions for more than 10 secondsVegetation or other materials will not be burnt on site.	Contractor	Construction

6.1.9. Noise and vibration impacts

Policy setting

The Proposal has the potential to affect the community due to noise and vibration during construction. The Interim Construction Noise Guideline (DECC, 2009) was applied to set qualitative parameters for a quantitative application of the TfNSW Construction Noise Estimator Tool (CNET) to assess the worst-case noise impact scenario during construction.

The following key factors were identified during assessment:

- Appropriate background noise levels
- Noise management levels (NMLs)

- Noise catchment areas (NCAs)
- Potential noise and vibration impacts
- Reasonable safeguards and mitigation measures.

The CNET was used to identify these factors for the Proposal's worst-case construction duration. The noise area category is a mixture of "R3" and "R2". Noise area category "R2" was chosen as the representative noise area for the Proposal due to the following factors to determine background noise levels:

- Urban residential area next to local road and near a busy train line
- High vehicle movement in the roads due to the area surrounded by health business district
- Generally flat topography and direct line of sight to the Proposal site from sensitive receivers.

As per the ICNG, NMLs are set to be 10 dB(A) above the background noise level during standard hours:

- Monday to Friday: 7am – 6pm
- Saturday: 8am – 1pm (due to proximity to residential premises)
- No work on Sundays and Public Holidays.

The CNET was applied to assess potential worst-case noise impacts during construction. The selected distance-based noise impact scenario as modelled by the CNET was 'Drainage Infrastructures' due to the closest fit of potential construction plant and equipment.

Based on the variables above, the following conditions would apply to the Proposal:

- Background noise level (rating background level (RBL)):
 - 50 dB(A) during standard hours
 - 40 dB(A) outside standard hours
- Noise management level (NML):
 - 60 dB(A) during standard hours
 - 45 dB(A) outside standard hours
- Noise environment: 'Urban Settlements'
- Noisiest scenario: "Utility, property, service adjustment" (LAeq 116 dB(A)). This scenario involves use of following equipment all running at the same time at the closest point to the receiver:
 - Excavator (tracked) 35t
 - Dump truck
 - Franna crane 20t
 - Pneumatic hammer
 - Concrete saw
 - Vacuum truck
 - Backhoe
 - Power generator
 - Road truck

Sensitive receivers were grouped into NCAs to assist with assessment based on their distance range and line of sight from the Proposal site.

It is to be noted the construction is only permitted during standard construction hours and no nightworks is proposed.

Refer to Figure 6-24 for map of NCAs relative to the Proposal site during standard hours.

Existing Environment

The Proposal is located in an urban park which is bounded by a train line to the south, medium density residential areas on the west, Parramatta River in the north and a commercial/business area in the east. Due to the nearby health and business district, there is significant road and foot traffic in the vicinity. The Park is also situated between two railway stations which attract substantial traffic to the area.

Potential impacts

Noise

Construction noise

A summary of potential noise-affected sensitive receivers to the Proposal site were found to be the following:

- Residents within 25 metres during standard hours (Highly intrusive)
- Residents within 45 metres during standard hours (Moderately intrusive)
- Residents within 125 metres from the Proposal site outside standard hours.

There are no educational premises, hospitals and places of worship within the affected distances.

Noise would be generated by construction vehicles bringing materials to site and the operation of plant and machinery. Application of the CNET assumed the worst-case scenario of continuous construction activities with simultaneous plant/equipment usage. However, it is unlikely that this would occur for extended periods across the Proposal site. Table 6-11. summarises the worst-case CNET results during standard hours.

Table 6-11. Summary of NCAs during ‘construction’ during standard hours

NCA	Receivers affected	RBL, dB(A)	NML, dB(A)	Mitigation level, dB(A)	Recommended additional mitigation measures
NCA1 (25m) <i>in line of sight</i>	<ul style="list-style-type: none"> • Residents • Park users 	50	60	75	Notification, Phone calls and Respite Offer "Highly intrusive"
NCA2 (45m) <i>in line of sight</i>	<ul style="list-style-type: none"> • Residents • Park users 	50	60	70	Notification, Phone calls and Respite Offer "Moderately intrusive"



**Parramatta Park New Path Lighting
Noise impact**

Legend

- Proposal site
- NCA 1 (25m)
- NCA 2 (45m)

0 50 100 150 m



Data Attribution
© NGH 2023
© PPT 2023
© Google Satellite

Ref: Parramatta Park New Path Lighting_REF
20230823 \ Noise impact
Author: bishal.g
Date created: 23.10.2023
Datum: GDA94 / MGA zone 56



Figure 6-26. Noise Catchment Areas for the Proposal

Given the distance to sensitive receivers, most construction activities would be likely be on the borderline to exceed the Noise Management Level for daytime works at the nearest receiver. However, he residents at 1 and 3 Queens Road and 1, 13 and 16 Park Avenue are on the borderline of highly intrusive noise levels which would warrant phone calls and respite as a mitigation measure on top of notification. Works would be conducted during standard working hours.

Operational Noise

There would be no change to the operational noise environment as a result of this Proposal.

Vibration

Plant and equipment used for construction activities such as roadside earthworks and may have vibration impacts on nearby buildings. Table 6-12 details minimum working distances recommended for vibration-intensive plant that may be used for the Proposal.

The nearest buildings to the Proposal site range 7-40 metres from areas which may involve vibration-intensive works. While the final construction plant and equipment list would be determined by the successful contractor, it is recommended that appropriately sized items are selected for smaller cosmetic damage radii to minimise potential vibration impacts to buildings adjacent to the Proposal.

Table 6-12. Recommended minimum working distances for vibration-intensive plant from sensitive receivers (Transport for NSW, 2020)

Plant item	Rating / Description	Minimum working distance	
		Cosmetic damage (BS 7385)	Human response (OH&E Vibration guideline)
Vibratory Roller	< 50 kN (Typically 1-2 tonnes)	5 m	15 m to 20 m
	< 100 kN (Typically 2-4 tonnes)	6 m	20 m
	< 200 kN (Typically 4-6 tonnes)	12 m	40 m
	< 300 kN (Typically 7-13 tonnes)	15 m	100 m
	> 300 kN (Typically 13-18 tonnes)	20 m	100 m
	> 300 kN (> 18 tonnes)	25 m	100 m
Small Hydraulic Hammer	(300 kg - 5 to 12t excavator)	2 m	7 m
Medium Hydraulic Hammer	(900 kg – 12 to 18t excavator)	7 m	23 m
Large Hydraulic Hammer	(1600 kg – 18 to 34t excavator)	22 m	73 m
Vibratory Pile Driver	Sheet piles	2 m to 20 m	20 m
Pile Boring	≤ 800 mm	2 m (nominal)	4 m
Jackhammer	Hand held	1 m (nominal)	2 m

Note: More stringent conditions may apply to heritage or other sensitive structures

Safeguard and mitigation measures

Impact	Safeguard and mitigation measures	Responsibility	Timing
Construction noise	<ul style="list-style-type: none"> To assist the community in appreciating potential noise levels, the residents along Park Avenue in the NCA1 and NCA 2 noise catchment must be advised of the proposed works and anticipated noise impacts at least a week prior to the commencement of construction works. Mitigation measures for receivers within 'highly intrusive' catchment area (NCA1): <ul style="list-style-type: none"> * Notification (letterbox drop or equivalent) a minimum of 7 days prior to the commencement of works. * Phone calls detailing relevant information made to identified/affected stakeholders within 7 days of proposed work. * Respite offer to receivers within NCA1 should be provided should there be any noise complaints received. Where feasible the planning and scheduling of construction works should limit the simultaneous operation of noisy plant within a discernible range of a sensitive receptor. Non-tonal broadband reversing alarms or beepers should be fitted on all construction vehicles and mobile plant. Carrying out loading and unloading away from noise sensitive areas. To minimise vibration impact risks, scheduling construction works to manage potential impacts and apply safe working distances for vibration generating plant. 	Contractor	Pre-Construction/ Construction

6.1.10. Transport, traffic, access and parking

Existing environment

The area surrounding Parramatta Park is often busy with local traffic. Park road on the western side of the park serves local traffic consisting of majority of park users and residents living nearby. Pitt Street, Macquarie Street and O'Connell Street are on the eastern side of the park. These streets service mainly business and retail traffic.

There are two entrances to the park. The eastern entrance is from the intersection of Pitt Street and Macquarie Street. The other one is from western side i.e., the intersection of Park Avenue and Queens Road.

Railway Parade and West Domain Avenue service motor vehicles around the park. The Proposal is along these roads. These internal roads are one lane and one way with vehicles only being allowed to move in a clockwise direction. Speed limit for these park roads is 30km per hour.

The Proposal site would have vehicles entering and exiting through the western entry/exit point via Park Avenue.

Park avenue is a two-lane urban road managed by council. This road is mostly used by locals and park users. The road has kerb side parking on one side and there are multiple parking bays towards the park end.

Potential impact

Construction

During construction, there would be construction vehicles using the park road to deliver personnel and materials to and from the Proposal site. A typical vehicle movement would consist of 4-6 light vehicles and 2-3 heavy vehicles per day. Construction works would also require temporary closures of Railway Parade and West Domain Avenue from time to time during delivery of equipment. These closures would be temporary and would not significantly impact road users.

Construction vehicles will only be parked in designated parking areas within the construction compound. No construction vehicles will be allowed to be parked in public car spaces.

Pedestrian access to the Proposal site would be limited during the construction. This might impact access to a particular side of the park for a period of time. Contractors would need to ensure that all the park except the Proposal site would be accessible to the public and signs will be placed for any diversions.

To minimise disruption to park users and vehicles, PPT proposes to construct the Proposal in stages so that any disruption would be localised and would only affect a portion of the park and park users. The proposed staging has not been finalised. This will be determined in consultation with the contractor.

Operation

During the operation phase, there would be positive impacts on both vehicular and pedestrian traffic with the introduction of night lighting. It would improve safety for pedestrians to walk from Parramatta to Westmead or vice versa during nighttime hours.

Safeguard and mitigation measures

Impact	Environmental safeguard	Responsibility	Timing
Traffic and access	A Traffic Management Plan in accordance with Transport's <i>Traffic Control at Worksites Technical Manual</i> (version 6.1, 2022) would be developed and implemented in consultation with Parramatta Council.	Contractor	Pre-construction/ Construction
	Variable message signs would be in place well in advance, detailing traffic arrangements before the start of works.		
	Pedestrian and vehicular access to the park will be maintained throughout construction.		
	A staging plan to be developed in consultation with PTT. All construction vehicles will follow the traffic arrangements at the park		

Impact	Environmental safeguard	Responsibility	Timing
Road congestion	Construction vehicles will not be permitted to use public carpark. All construction vehicles to be parked within designated construction compounds.		
	Heavy vehicles to avoid peak hours between 7:30 AM – 9:30 AM and 3 PM to 6 PM for bulk deliveries (for example delivery of light poles that require larger truck movement).		

6.1.11. Cumulative Impacts on the environment

Cumulative environmental impacts of the proposed works include the combined effect of individual impacts associated with the Proposal in addition to the impacts of other activities in the area. The surrounding region is characterised as parkland and residential and commercial areas dominating the land use beyond the park boundaries. A search of the Parramatta Council DA application check and the Major Projects Website was undertaken on 28 July 2023. There are a number of Projects in planning phase and some are ongoing construction phase. Most notably the Sydney Metro West and Parramatta Light Rail Projects are underway in the vicinity. Considering the smaller scale of this Proposal and short 2-3 month construction time frame, no major cumulative impact is anticipated.

6.1.12. Ecologically sustainable development and sustainability

The PPT aims to pursue sustainability as a “whole of life” approach for facilities planning and implementation. The PPT Plan of Management adopts the United Nations definition of sustainable development being development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

The precautionary principle

Namely that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. This REF has been prepared using the precautionary principle. That is, if threats are perceived as possibly leading to serious or irreversible environmental damage, then either the non-development of the Proposal would occur, or the development modified to ensure that such threats do not exist.

Inter-generational equity

The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. The proposed works would improve safety of the track in Parramatta Park during dark hours this would be of benefit to both present and future generations. The majority of other impacts would be minor and temporary.

Conservation of biological diversity and ecological integrity

There would be some clearing and trimming of vegetation, and this would not impact the biological diversity and ecological integrity of the area.

Improved valuation of environmental factors

There are ongoing safety concerns for pedestrians walking this track during dark hours as there is not enough lighting and there are less people using this track during darker hours for this reason. This Proposal aims to change this and allow for an increase in foot traffic through the park during the evening and with increased activity in the area, safety would be enhanced.

6.1. EP&A Regulation 2021 – Environmental Factors to be considered

The environmental factors that the determining authority must take into account in accordance with the Guideline and Section 171(2) of the EP&A Regulation are considered below.

Table 6-13. Factors to be considered

Relevant Factor	Comment	Impact rating
(a) the environmental impact on the community,	After completion, this Proposal would help people utilise the park after business hours.	Positive impact Moderate impact
(b) the transformation of the locality,	The Proposal would transform the locality in a positive manner.	Positive impact Minor impact
(c) the environmental impact on the ecosystems of the locality,	The Proposal has potential to impact on bats within Parramatta Park in several ways, through fragmenting habitat, changed food resource abundance, increased predation and degrading roost quality where lights directly impact roosts.	Moderate impact
(d) reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality,	There would be minor visual impact during construction but the Proposal would result in positive overall visual impact during operation.	Positive impact Minor impact
(e) the effects on any locality, place or building that has— (i) aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance, or (ii) other special value for present or future generations,	No Direct impact on any buildings or any items of heritage significance. Indirect impact includes minor visual impacts on heritage listed item.	Minor impact
(f) the impact on the habitat of protected animals, within the meaning of the BC Act 2016,	This Proposal is not likely to significantly affect threatened species.	Negligible impact

(g) the endangering of a species of animal, plant or other form of life, whether living on land, in water or in the air,	The Proposal would not remove any threatened species habitat therefore it is expected that it would not impact any threatened entities. Only impact to the threatened species would be as a result of lighting once the Proposal is operational. This impact can be safely managed through implementation of mitigation measures discussed in section 6.1.4.	Negligible impact
(h) long-term effects on the environment,	Long term positive impact as people can enjoy the park on weekdays after business hours.	Positive impact Moderate impact
(i) degradation of the quality of the environment,	There would be minor degradation of quality environment as a result of the Proposal during construction. No impacts are anticipated for the operation phase.	Negligible impact
(j) risk to the safety of the environment,	The Proposal would not pose any risk to the safety of the environment.	Negligible impact
(k) reduction in the range of beneficial uses of the environment,	The Proposal would improve usability of the park.	Positive impact
(l) pollution of the environment,	The Proposal would not result in significant pollution of the environment. Any minor impacts would be associated with short construction period which can be safely dealt with the mitigation measures proposed in Chapter 7.	Negligible impact
(m) environmental problems associated with the disposal of waste,	Any waste would be disposed at a licensed waste facility	Negligible impact
(n) increased demands on natural or other resources that are, or are likely to become, in short supply,	Nil	Negligible impact
(o) the cumulative environmental effect with other existing or likely future activities,	There is unlikely to be a cumulative environmental effect.	Negligible impact
(p) the impact on coastal processes and coastal hazards, including those under proposed climate change conditions,	The Proposal would not impact on coastal processes and coastal hazards, including those under proposed climate change conditions	Negligible impact

(q) applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1,	The Proposal aligns with applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1	Positive impact
(r) other relevant environmental factors.	All environmental impacts have been assessed in Chapter 6 of this REF.	

6.2. Consideration of National Environmental Significance

Under the environmental assessment provisions of the EPBC Act, the following MNES and impacts on Commonwealth land are required to be considered to assist in determining whether the Proposal should be referred to the DCCEEW.

Factor	Impact
<p>a. <i>Any impact on a World Heritage property?</i> Old Government House is a world heritage site close to the Proposal site. However, there will be minimal indirect impact to the site. This impact has been discussed in section 6.1.2 and a SoHI has been prepared attached as Appendix J</p> <p>b. <i>Any impact on a National Heritage place?</i> There are multiple national heritage listed places located near the Proposal site. None of these would be directly affected as part of the Proposal. This impact has been discussed in section 6.1.2 and a SoHI has been prepared attached as Appendix J</p>	Negligible
<p>c. <i>Any impact on a wetland of international importance?</i> There are no wetlands of international importance within 10km of the Proposal.</p>	Nil
<p>d. <i>Any impact on a listed threatened species or communities?</i> Although a number of listed threatened species and communities have been recorded within a 10-km radius of the Proposal site, the works would not affect any of these species.</p>	Nil
<p>e. <i>Any impacts on listed migratory species?</i> Although a number of migratory species have been recorded within a 10-km radius of the Proposal site, the works would not affect any of these species.</p>	Nil
<p>f. <i>Any impact on a Commonwealth marine area?</i> There are no Commonwealth marine areas located near the Proposal.</p>	Nil

<p>g. <i>Any impact on the Great Barrier Marine Park?</i> The Proposal would not impact on the Great Barrier Marine Park.</p>	<p>Nil</p>
<p>h. <i>Does the Proposal involve a nuclear action?</i> The Proposal does not involve a nuclear action.</p>	<p>Nil</p>
<p>i. <i>Does the Proposal impact on any Commonwealth land?</i> The Proposal does not impact on any Commonwealth Land.</p>	<p>Nil</p>

7. Mitigation Measures

The following Mitigation Measures will be imposed to ensure that any development activity is carried out in accordance with the plans/documentation.

Table 7-1. Mitigation Measures

Issue	Mitigation measure	Responsibility	Timing
Aboriginal Heritage	PPT will apply to Heritage NSW for approval of an Aboriginal Heritage Impact Permit (AHIP) that is issued under the <i>National Parks and Wildlife Act 1974</i> (NPW Act) for the 'WDA Area A' location as identified in the accompanying AHIP application map.	PPT	Pre-Construction
Aboriginal Heritage	Works can proceed with caution following the issuance of the AHIP approval and compliance with the terms and conditions of the permit.	Contractor	Pre-Construction
Aboriginal Heritage	The WDA test excavation report and a site card for the Aboriginal objects recovered at WDA Area A should be lodged with the Aboriginal Heritage Information Management System.	PPT	Pre-Construction
Aboriginal Heritage	The Aboriginal objects recovered by archaeological test excavation on West Domain Avenue should be retained by PPT for short-term storage while the transfer to the Deerubbin Local Aboriginal Land Council Keeping Place is arranged.	PPT	Pre-Construction
Aboriginal Heritage	A copy of ACHAR should be forwarded to the project First Nations cultural advisory group, to the Registrar of the Aboriginal Heritage Information Management System, and to the Heritage NSW Library.	PPT	Pre-Construction
Aboriginal Heritage	An Aboriginal archaeological excavation report will be completed at the completion of the investigations that will detail the methods and outcomes of the archaeological work and provide management for any Aboriginal cultural material that may be retained.	Contractor	Construction
Aboriginal Heritage	A heritage induction should be undertaken with contractors and managers before works commence to explain the significance of the park, their obligations under the NPW Act, and the procedures to follow if unexpected Aboriginal objects are discovered during future works.	PPT and Contractor	Pre-construction/ Construction
Cultural Heritage	<ul style="list-style-type: none"> Enhancing heritage items and park features through illumination should be considered a positive feature. This would permit appreciation of the items by an expanded audience over a wider time frame. 	PPT and Contractor	Pre-Construction and Construction

Cultural Heritage	<ul style="list-style-type: none"> In the event any heritage finds are identified, works must cease temporarily, and the 'Unexpected Finds Procedure' described in Appendix E of the HIS. 	Contractor	Pre-Construction and Construction
Cultural Heritage	<ul style="list-style-type: none"> A heritage induction should be instigated for all contractors and sub-contractors explaining the significance of the place and statutory obligations for cultural heritage under the <i>Heritage Act 1977</i>. 	Contractor	Pre-Construction and Construction
Cultural Heritage	<ul style="list-style-type: none"> All locations where built heritage items or archaeological potential is identified in, or adjacent to works, that area should be temporarily demarcated using t-top bollards and flagging tape until construction work is completed. All mitigation measures proposed for individual items in Table 6-4 and Table 6-5 are to be followed. 	Contractor	Pre-Construction and Construction
Cultural Heritage	<ul style="list-style-type: none"> A suitably designed archaeological research design and excavation methodology developed by an accredited excavation director should be implemented. 	Contractor	Pre-Construction and Construction
Soil and contamination	<p>In accordance with NSW EPA Consultants Reporting on Contaminated Land – Contaminated Land Guidelines 2020, additional investigations would be required to:</p> <ul style="list-style-type: none"> Determine the extent of asbestos containing materials (AEC1) within the Proposal site Establish whether historical off-site (AEC2) and on-site (AEC3) activities have resulted in contamination occurring within the Proposal site Determine the type, extent and likely risk of contamination within the two sites (the Coleman Oval Embankment (AEC4) and Parramatta Park Toilet Demolition (AEC5) sites) that are on the list of NSW contaminated sites notified to the EPA. <p>A Detailed Site Investigation (DSI) will be completed, inclusive of an intrusive test pitting program, to determine whether contamination is present within the Proposal site. The findings of the DSI assessment would inform the best approach for the proposed lighting installation.</p>	PPT	Pre-Construction
Soil and contamination	<p>Stockpiles will be appropriately controlled by sediment fencing or other materials identified in the Managing Urban Stormwater - Soils and Construction Vols 1 and 2, 4th Edition (Landcom, 2004) -Blue Book to ensure sediments do not enter a waterway.</p>	Contractor	Construction and rehabilitation
	<p>Following the construction phase, the site will be cleaned up including remediating soils if required, removing</p>		

	<p>rubbish, restoring profiles and decompacting soils in the construction areas.</p>		
	<p>Monitor Bureau of Meteorology forecast heavy rainfall events in order to allow sufficient time to vacate and prepare the site prior to the commencement of heavy rainfall and flood events</p>		
Erosion and sediment control	<p>The CEMP will include the measures below as part of the Erosion and Sediment Control Plan (ESCP), in accordance with the requirements of Landcom’s “Managing Urban Stormwater: Soils and Construction, 2004”:</p> <ul style="list-style-type: none"> • Install and maintain erosion and sediment controls on a regular basis during construction to prevent sediment moving offsite and sediment laden water entering drainage lines. <ul style="list-style-type: none"> ○ Details of controls specific to the open drainage channel east of SP1c must be considered. • Stabilised access is to be established to prevent mud tracking prior to exiting onto public roads. • Stabilise disturbed areas progressively. • Minimise soil disturbance from vehicle use onsite. • Inspect and maintain sediment and erosion controls until the site has been stabilised post construction. • The ESCP will be prepared in conjunction with the CEMP. 		Pre-construction/Construction
	<p>All servicing, refuelling, stockpiles, waste disposal and storage areas will be located as far as possible from stormwater drains to reduce potential of pollution via spillage.</p> <p>No hazardous material will be stockpiled.</p> <p>Induction training will be undertaken for employees to increase their awareness of chemical management protocols including proper handling and storage of chemicals, and emergency response and contingency plans.</p>		
Vegetation removal	<ul style="list-style-type: none"> • Prior to the commencement of any works, a physical clearing boundary is to be clearly marked and maintained. • Prior to any vegetation disturbance or removal, two nights of stag watching (spotlighting HBT) are to be conducted to provide information on species presence and ensure that no threatened hollow dependent fauna will be disturbed or impacted by construction noise or activity. • Utilise areas already impacted by previous clearing or disturbance for access purposes, stockpiles or the establishment of compound sites. 	Contractor	Pre-construction/Construction

Weed and pathogen management	<ul style="list-style-type: none"> • No clearing of vegetation can occur outside the Development Footprint without ecological assessment and approval. • All Trees are to be retained. Trees adjacent but outside of the Proposal site, require the establishment of a tree protection zone (TPZ) (including fencing and signage) for the duration of works. Details for calculating TPZs are provided within Australian Standard 4970-2009 – Protection of trees on development sites. • Any encroachment into the TPZ that is >10% may lead to the decline of health of the tree. Any encroachment within 10% of the TPZ requires an arborist assessment and an arborist on site during any proposed works. • No works may occur in the Structural Root Zone (SRZ). Details for calculating the SRZs are provided within Australian Standard 4970-2009 – Protection of trees on development sites. • Where underground components of native trees (or exotic heritage trees) are encountered by trenching machinery a qualified arborist is to inspect the roots to properly trim and seal the wound. • Where trees need to be pruned or trimmed qualified arborists should be employed. • Construction areas will be stabilised as soon as practicable (progressively where possible). • All areas containing mapped Plant Community Types to be demarcated as ‘No Go Zones’ and avoided, except where works would not impact any vegetation e.g. for the routing of cable over the Domain Creek Bridge. • Area of Juniper-leaved Grevillea (<i>Grevillea juniperina</i> ssp. <i>Juniperina</i>) to be demarcated as ‘No Go Zones’ and avoided. • A Weed Management Plan will be developed for the site to minimise risk of spread of weeds. • PPT will notify the Contractor of all declared Priority Weeds identified on site. • All declared Priority Weeds within the work area are to be cleared and managed according to the Weed Management Plan and the requirements stipulated by the <i>Biosecurity Act 2015</i>. To fulfil this requirement, all priority weeds requiring removal will need to be disposed of at a registered waste management facility. • All machinery (e.g., bulldozers, excavators, trucks, loaders etc.) will be cleaned using a high-pressure washer (or other suitable device) prior to entering and exiting work sites. 	Contractor	Pre-construction/ Construction
------------------------------	---	------------	-----------------------------------

<p>Impacts to threatened fauna</p>	<ul style="list-style-type: none"> • A pre-works tool-box meeting is to be completed detailing all threatened species that have been assessed to be likely to utilise the area (Appendix C) so that workers are aware of what to look for during construction. • A stop-works procedure is to be implemented should an unexpected threatened species be found during construction. An appropriately trained ecologist is to be consulted and complete relocation to appropriate habitat. • The Green and Golden Bell Frog undertakes large dispersal movements after rain and a pre-clearance survey should be undertaken prior to works commencing, where works coincide with these weather conditions. • To manage potential impacts on breeding Powerful Owl <i>Ninox strenua</i>: <ul style="list-style-type: none"> ○ Carry out a pre-construction/ clearance survey targeting these trees and period to verify no Powerful Owls are breeding. If breeding activity is detected, the construction works restrictions must apply. • Sodium or LED streetlights will be used to limit nighttime fatalities of nocturnal foragers. • Avoid the use of high-intensity, elevated and upward-facing lights that have the strongest negative impact on fauna. • Avoid the use of 'white' coloured lights. • Angle lights away from bushland or HBTs. <p>All trenches that are left open are to be inspected every morning prior to works commencing and in the evening prior to leaving site so as to release any trapped fauna. When not in use open trenches should be covered where practical.</p>	<p>Contractor, PPT</p>	<p>Pre-construction/ Construction</p>
<p>Aquatic habitat and water quality</p>	<ul style="list-style-type: none"> • All stockpile sites to be appropriately fenced with silt traps to prevent sedimentation of waterways. • Erosion controls to be put in place for areas subject to ground cover disturbance. <p>Chemical spills kit to be available onsite for any accidental spills involving potentially harmful chemicals.</p>	<p>Contractor</p>	<p>Pre-construction/ Construction</p>

Waste Management	<p>Resource management hierarchy principles are to be followed:</p> <ul style="list-style-type: none"> • Avoid unnecessary resource consumption as a priority. • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery). <p>Disposal is undertaken as a last resort. (in accordance with the <i>Waste Avoidance & Resource Recovery Act 2001</i>).</p>	Contractor	Pre-construction/ Construction
	Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working shift.		Pre-construction/ Construction
	Waste material is not to be left on site once the works have been completed.		Pre-construction/ Construction
Storage of waste	Waste will be stored in an appropriate location. For example, spoil is to be stored in a stockpile with adequate erosion and sedimentation control measures. General litter to be stored in bins.	Contractor	Pre-construction/ Construction
Minimise visual and landscape impact during construction	<p>Proposal work sites, including construction areas will be managed to minimise visual impact. A site arrangement plan showing at minimum the following:</p> <ul style="list-style-type: none"> • Storage areas for equipment and materials • All construction areas will be fenced off with construction fence • Colour for construction fence will be chosen to minimise contrast with the surrounding as far as practicable • Sufficient parking areas are available at the work sites <p>Waste storage areas, and ensure waste is collected and sorted at the end of each day.</p>	Contractor	Pre-Construction Construction
Minimise visual and landscape impact upon completion	All work sites including the compound area are to be demobilised and rehabilitated to its previous condition as best as practicable.	Contractor	Post-construction
Water quality	Chemicals/fuel stored at the Proposal site will be stored in an impervious bunded area at the compound site.	Contractor	Pre-construction/ Construction
Water quality	Spill kits will be located on site at all times during construction. All staff would be inducted into the incident emergency spill procedures and made aware of the location of emergency spill kits.	Contractor	Pre-construction/ Construction

Water quality	An incident emergency spill plan will be prepared prior to start of works. Should a spill occur during construction, the incident emergency spill plan would be implemented.	Contractor	Pre-construction/ Construction
Water quality	The refuelling of plant and maintenance of machinery will be undertaken in impervious bunded areas off site or at the temporary compound/stockpile site at least 40m from Domain Creek.	Contractor	Pre-construction/ Construction
Air quality	<ul style="list-style-type: none"> • All loads will be covered during transport • Limit exposed surfaces areas to the minimum area required • Maintain plant to manufacturers standards • Machinery will not be left running when idle • Water carts are to be used on stockpile sites or temporary access roads to reduce dust • Ensure that all plant and equipment comply with Part 4 of the Protection of the Environment Operations (Clean Air) Regulation 2002 • Where levels of dust become unacceptable, appropriate action must be taken. This may include suspending works during periods of high wind • Smokey emissions from construction plant and vehicles will be maintained to Australian Standards. The POEO Act requires that no vehicle shall have continuous smoky emissions for more than 10 seconds • Vegetation or other materials will not be burnt on site. 	Contractor	Pre-construction/ Construction
Construction noise	<ul style="list-style-type: none"> • To assist the community in appreciating potential noise levels, the residents along Park Avenue in the NCA1 and NCA 2 noise catchment must be advised of the proposed works and anticipated noise impacts at least a weeks prior to the commencement of construction works. • Mitigation measures for receivers within 'highly intrusive' catchment area (NCA1): <ul style="list-style-type: none"> ○ Notification (letterbox drop or equivalent) a minimum of 7 days prior to the commencement of works. ○ Phone calls detailing relevant information made to identified/affected stakeholders within 7 days of proposed work. <p>Respite offer to receivers within NCA1 would be provided should there be any noise complaints received.</p>	Contractor	Pre-construction/ Construction
Construction noise	Where feasible the planning and scheduling of	Contractor	Pre-

	construction works should limit the simultaneous operation of noisy plant within a discernible range of a sensitive receptor.		construction/ Construction
Construction noise	Non-tonal broadband reversing alarms or beepers should be fitted on all construction vehicles and mobile plant.	Contractor	Pre- construction/ Construction
Construction noise	Carrying out loading and unloading away from noise sensitive areas.	Contractor	Pre- construction/ Construction
Construction noise	To minimise vibration impact risks, scheduling construction works to manage potential impacts and apply safe working distances for vibration generating plant.	Contractor	Pre- construction/ Construction
Traffic and access	A Traffic Management Plan in accordance with Transport's Traffic Control at Worksites Technical Manual (version 6.1, 2022) would be developed and implemented in consultation with City of Parramatta.	Contractor	Pre- construction/ Construction
Traffic and access	Variable message signs would be in place well in advance, detailing traffic arrangements before the start of works.	Contractor	Pre- construction/ Construction
Traffic and access	Pedestrian and vehicular access to the park will be maintained throughout construction.	Contractor	Pre- construction/ Construction
Traffic and access	All construction vehicles will follow the traffic arrangements at the park	Contractor	Pre- construction/ Construction
Traffic and access	Construction vehicles will not be permitted to use public carpark. All construction vehicles to be parked within designated construction compounds.	Contractor	Pre- construction/ Construction
Traffic and access	Heavy vehicles to avoid peak hours between 7:30 AM – 9:30 AM and 3 PM to 6 PM for bulk deliveries (for example delivery of light poles that require large truck movement).	Contractor	Pre- construction/ Construction
Construction Environmental Management Plan (CEMP)	A CEMP is to be prepared prior to commencement of works and implemented during the undertaking of works. The CEMP is to consider how compliance with all of the the environmental controls and mitigation measures detailed in this REF, and any associated s60 or AHIP, are to be achieved.	Contractor	Pre- construction/ Construction

8. Conclusion

This REF has assessed the potential impacts of the Proposal. The REF has identified potential impacts relating to biodiversity, contamination, traffic, noise, Aboriginal heritage and cultural heritage. In the cases of historic heritage and contamination, there is a requirement for further investigation to inform the works method.

A range of safeguards have been developed for the potential impacts identified. These would ensure that the potential negative impact of the Proposal is prevented, mitigated or limited in as much as is practical. Where further specialist studies are required, the mitigation measures will depend on the recommendation of those studies.

It is the general recommendation of this REF that the safeguards herein included should be implemented through appropriate design and management strategies, including the development of a CEMP for the Proposal.

The identified potential negative impacts of the Proposal are considered to be justified in terms of its potential benefits. These include improved safety for park user. These would have clear social benefits, in keeping with the principles of ecologically sustainable development.

The assessment has concluded that as the proposed works as described in this REF, with the implementation of all mitigation measures and safeguards, would not result in a significant effect on the environment.

The proposed works are not considered to result in a significant impact on any declared critical habitat, threatened species, populations or ecological communities or their habitats. Therefore, a SIS is not considered to be required.

9. References

- AS 4482.1-2005. (2005). *Guide to investigation and sampling of sites with potentially contaminated soil*.
- Australian Department of the Environment. (2012). *Conservation agreement with the NSW Government and Parramatta City Council for the protection and conservation of the World Heritage Values and National Heritage Values of the Australian Convict Sites, Old Government House and Domain, Parramatta New South*. Minister for the Environment on behalf of the Commonwealth of Australia, Minister for Planning on behalf of the State of New South Wales, and Parramatta City Council .
- Cropper, S. (1993). *Management of endangered plants*. Melbourne: CSIRO Publications.
- DCCEEW. (2015). *National Flying-fox monitoring viewer*. Retrieved from <https://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf>
- DECC. (2009). *Interim Construction Noise Guideline*.
- DPE. (2022). *Guidelines for Division 5.1 assessments*.
- Heritage Office. (2001). *Archaeological Assessments Guidelines*. Retrieved from Heritage NSW: Publications and resources: <https://www.heritage.nsw.gov.au/search-for-heritage/publications-and-resources/#archival>
- Heritage Office. (2001). *Assessing heritage significance*. Retrieved from Heritage NSW: Publications and resources: <https://www.heritage.nsw.gov.au/search-for-heritage/publications-and-resources/#archival>
- Heritage Office and DUAP. (2002). *Statements of Heritage Impact*. Retrieved from Heritage NSW: Publications and resources: <https://www.heritage.nsw.gov.au/search-for-heritage/publications-and-resources/#archival>
- ICOMOS Australia. (2013). *The Burra Charter: The Australia ICOMOS charter for places of cultural significance*. Burwood, Vic, 3125: ICOMOS Australia.
- Lotsearch Pty Ltd. (2023). *Parramatta Park - Lotsearch Enviro Professional*.
- National Trust NSW. (2023, 04 26). *Old Government House*. Retrieved from <https://www.nationaltrust.org.au/places/old-government-house/>
- NEPM. (2013). *Assessment of Site Contamination*. National Environment Protection Measure.
- NSW Department of Planning and Environment. (2022). *NSW State Vegetation Type Map*. Retrieved from <https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet/state-vegetation-type-map>
- NSW DPIE. (2023). *Planning and Environment*. Retrieved from Data Download Facility: <https://www.dpie.nsw.gov.au/air-quality/air-quality-data-services/data-download-facility>
- NSW EPA. (2014). *EPA Waste Classification Guidelines Part 1: Classifying Waste* .
- NSW EPA. (2015). *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*. NSW EPA.

-
- NSW EPA. (2017). *Contaminated Land Management - Guidelines for the NSW Site Auditor Scheme (3rd edition)*. NSW EPA.
- NSW EPA. (2020). *Consultants Reporting on Contaminated Land*. NSW EPA.
- NSW Government. (2022). *SEED*. Retrieved from NSW Government:
https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU
- NSW Government. (2023). *Air Quality*. Retrieved from
<https://www.airquality.nsw.gov.au/central-west-sydney/parramatta-north>
- NSW Government. (2023). *Blacktown 9030bt*. Retrieved from eSpade v2.2:
<https://www.environment.nsw.gov.au/Salis5app/resources/spade/reports/9030bt.pdf>
- Parramatta Catchment Group. (2023). *Parramatta Catchment Group*. Retrieved from Our Living River: <https://www.ourlivingriver.com.au/about-us/prcg-overview/>
- Planisphere. (2012). *Development in parramatta city and the impact on old government house and domain's World and National Heritage listed values technical report*.
- Spoelstra, K. v. (2015). Experimental illumination of natural habitat—an experimental set-up to assess the direct and indirect ecological consequences of artificial light of different spectral composition. *Philosophical Transactions* .
- Transport for NSW. (2020). *Construction Noise and Vibration Strategy*.
- Transport for NSW. (2020). *Guidile for landscape character and visual impact assessment*.
- Varman. (1997). *Archaeological Zoning Plan for Parramatta Park. Part 1*.
- Wilson, A. D. (2021). Artificial night light and anthropogenic noise interact to influence bird abundance over a continental scale. *Global Change Biology*, 3953-3955.