CITY OF PARRAMATTA

Review of Environmental Factors

Part 5 of the Environmental Planning & Assessment Act, 1979

New Foreshore Lighting along Old Kings Parade Ground Marsden Street to O'Connell Street, Parramatta

22 July 2020

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1.0	17/06/2020	Preliminary Draft Issued for Review
2.0	22/07/2020	Final REF Issued
3.0		

Executive summary

The proposal

The City of Parramatta is proposing to install new lighting along the existing shared pathway on the northern side of the Parramatta River foreshore, between O'Connell Street and Marsden Street in Parramatta. The existing shared path, adjacent to the Old Kings Parade Ground, is one of the major pedestrian routes between the Parramatta CBD and the new Bankwest Stadium and the purpose of the new lighting is to provide a continuously lit corridor along the foreshore, between the existing lighting at O'Connell Street and the Marsden Street underpass. The new lighting is consistent with the design and performance standards for the City River Corridor and incorporates multi-function light poles that cater for lighting and event power provision, as well as cabling and housing for potential future CCTV provision.

The scope of the proposed new lighting works includes the following:

- Installation of twenty (20) new (LED) multi-function light poles (City Elements 200 by HESS) to meet Category P1 – *AS/NZS 1158.3.1:2005* (during peak event mode) / Category P2 (during non-event mode) along the existing shared pathway adjacent to the Old Kings Parade Ground, between Marsden Street and O'Connell Street;

- Minor excavation, formwork and pouring of twenty (20) 1200mm (l) x 1200mm (w) x 500mm (h) concrete pad footings to support the light poles;

- Trenching along the full length of the new lighting to accommodate conduits and three (3) 600mm x 600mm Class C pits to house the communication and electrical wiring, as well as a connection pillar and switch board for part of the works.

Need for the proposal

The shared pathway along the foreshore of the Parramatta River between Marsden Street and O'Connell Street is not currently (permanently) lit and a risk analysis undertaken by the City of Parramatta has identified that this poses a significant public safety risk. To improve public safety, a series of three (3) temporary lighting fixtures are being relied upon to provide a degree of lighting along the shared pathway. However, permanent lighting that meets the current AS/NZS standards for roads and public spaces is required.

Statutory and planning framework

The Environmental Planning & Assessment Act, 1979 provides the statutory framework for planning and environmental assessment in NSW. Development consent is required to carry out development and/or works unless they fall within Section 4.1 of the *Environmental Planning & Assessment Act, 1979*.

Section 4.1 of the *Environmental Planning & Assessment Act, 1979* states that if an environmental planning instrument provides that specified development may be carried out without the need for development consent, then a person may carry the development out, in accordance with the instrument, on land to which the provisions apply. Environmental assessment of the development may nevertheless be required under Part 5 of the Act.

Subclause 65(3)(a)(iv) of *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) applies to the proposed new lighting installations along the foreshore of the Old Kings Parade Ground and allows the City of Parramatta Council, as a public authority, to undertake the works without the need to obtain development consent.

Notwithstanding, the proposed works that do not require development consent are considered to be an "activity" within the meaning of Section 5.1 of the *Environmental Planning and Assessment Act,1979* on the basis that subclause 5.1(1)(d) of the EP&A Act defines the *carrying out of a work* as an "activity". Section 5.5 of the *Environmental Planning & Assessment Act, 1979* states a determining authority in its consideration of an activity shall, notwithstanding any other provisions of this Act or the provisions of any other Act or of any instrument made under this or any other Act, examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.

As such, the proposed works are being assessed under Part 5 of the *Environmental Planning and Assessment Act, 1979* and a Review of Environmental Factors (REF) has been prepared.

Community and stakeholder consultation

There has been an ongoing engagement with stakeholders and adjoining land owners since inception of the project to ensure that the proposed lighting will meet with their expectations, or address any concerns they may have. These stakeholders include Venues NSW, Bayanami Public School and Property NSW, who were all consulted in relation to the project and the proposed lighting design and raised no objections.

This REF is to be placed on public exhibition and nearby stakeholders notified. Any submissions will be considered and the feedback received will be appended to the REF.

The engagement activities are outlined in the City of Parramatta Council's Engagement Plan and include the following channels:

- Customer Contact Centre
- Engagement Portal
- Residents letter
- Postcard
- Park signage
- Website
- Social media

Environmental impacts

The main potential environmental impacts associated with the proposed installation of twenty (20) new light poles along the Parramatta River foreshore adjacent to the Old Kings Parade Ground include:

- Archaeological impacts;
- Acid Sulfate Soils impacts;
- Contamination impacts;
- Flora and Fauna impacts;
- Heritage impacts;
- Geotechnical impacts;
- Traffic and access impacts;
- Noise and vibration impacts;
- Air quality impacts;
- Visual amenity impacts;
- Waste management and minimisation impacts.

Justification and conclusion

The proposed new lighting installations adjacent to the Old Kings Parade Ground have the potential to result in some minor environmental impacts with respect to archaeology, acid sulfate soils, contamination, flora and fauna, heritage, geotechnical, traffic and access, noise and air quality, visual amenity impacts and waste management, including storage and disposal. Notwithstanding, the safeguards and mitigation measures that are detailed in this Review of Environmental Factors will ameliorate or minimise these expected impacts. The proposal will also realise a positive impact through an improvement to the quality of lighting along the shared pathway, which in turn will improve public safety and amenity for users of the shared pathway, for the benefit of the wider community. On balance the proposal is considered justified.

The environmental impacts of the proposal are not likely to be significant and therefore it is not necessary for approval to be sought for the proposal under Part 4 of the *Environmental Planning & Assessment Act 1979*. The proposal will not have a substantial impact on any matters of National environmental significance.

Contents

Appendices

1 Introduction

1.1 Site and proposal identification

The City of Parramatta is proposing to install new lighting to meet Category P1 (AS/NZS1158.3.1:2005) (during peak event mode) / Category P2 (during non-event mode) along the existing shared pathway on the northern side of the Parramatta River foreshore, between O'Connell Street and Marsden Street in Parramatta. The existing shared path, adjacent to the Old Kings Parade Ground, is one of the major pedestrian routes between the Parramatta CBD and the new Bankwest Stadium and the purpose of the new lighting is to provide a continuously lit corridor along the foreshore, between the existing lighting at O'Connell Street and the Marsden Street underpass. The new lighting is consistent with the design and performance standards for the City River Corridor and incorporates multi-function light poles that cater for lighting and event power provision, as well as cabling and housing for potential future CCTV provision. The new lighting will set the design standard for lighting upgrades along the remainder of the Parramatta River corridor, including Parramatta Quay.

The land on which the new lighting is proposed to be installed contains an existing concrete shared pathway that runs between Marsden Street and O'Connell Street in Parramatta. The land, legally described as Lot 4, DP 1132683, is Crown Land that is managed by Property NSW and has been reserved for public purposes of access and public recreation. It is understood that Property NSW has commenced proceedings to formally transfer ownership of the land to the City of Parramatta. Further, Property NSW have advised that they will provide the City of Parramatta with either landowner's consent or a short term lease to allow the proposed new lighting to be installed.

The land forms part of the State heritage listed Marsden Rehabilitation Centre (and potential archaeological site) and the foreshore lands are significant at National, State and local levels, being:

- part of the territory of the Burramuttagal people;
- part of the former Government Farms at Parramatta;
- associated with the development of the horticultural industry and botanical exploration;
- associated with important people and events in the development and settlement of Parramatta such as George Caley, Robert Brown and Francois Peron;
- associated with the development of the setting for the Old King's School; and
- associated with the open space created by the natural flood zone along the Parramatta River.

The site is mapped as being affected by both Class 3 and Class 5 Acid Sulfate Soils (ASS).

The land has been subject to significant filling over the years since European settlement, primarily to 'build up' the land to facilitate recreational activities associated with the Old Kings School site. However, beneath the upper fill deposits (to depths of 450mm to 800mm below the current surface), lies the Parramatta Terrace Sand Sheet (approx. 1m in depth), a highly significant cultural deposit that has the potential to contain archaeological material from two phases of archaeological human occupation – initially during the terminal Pleistocene and then the late Holocene. Originally identified in 2005 during excavations on the corner of George and Charles Street in the Parramatta CBD and again in 2005 on an adjoining site, the sand sheet was found to contain artefacts including hatchets and grindstones.

Notwithstanding, as described in the Aboriginal Heritage Due Diligence Assessment prepared by EMM Consulting Pty Ltd (***Appendix D***), the sand sheet has been subject to many compliance-based archaeological excavations at various locations since 2005 and with few exceptions, the investigations have found a sterile or near sterile sand deposit.

Being located on the Parramatta River foreshore, the site has been subjected to periodic flooding events, such that it is likely that the upper soil deposits are highly active deposits within which little cultural material is expected.

Although there is an identified camp of Grey-headed flying foxes (a listed vulnerable species) on the banks of the Parramatta River to the north-west of the site (north of Bankwest Stadium), the site is not known to contain or provide critical habitat for any threatened flora or fauna.

The shared pathway traverses well maintained open grassland. However, the land falls away quite steeply to the Parramatta River and the northern riverbank is heavily vegetated with predominantly exotic species. There is a mature *Ficus* species towards the eastern end of the pathway, close to Marsden Street.

An aerial view of the shared pathway between Marsden Street and O'Connell Street and the surrounding area is provided in ***Figure 1.1*** below:

Figure 1.1 – *Aerial View delineating the approx. area of works adjacent to the Old Kings Parade Ground.*

Source: nearmap.com.au

1.2 Purpose of the report

This Review of Environmental Factors has been prepared by Andrew Robinson Planning Services Pty Ltd on behalf of the City of Parramatta Council. For the purposes of the proposed works, the City of Parramatta Council is the proponent and the determining authority under Part 5 of the *Environmental Planning and Assessment Act, 1979*.

The purpose of the Review of Environmental Factors is to describe the proposed works, to document the likely impacts of the proposed works on the environment, and to detail any necessary safeguards and mitigation measures to be implemented in order to reduce or avoid potential environmental impacts as a result of the proposed works.

The description of the proposed new lighting along the shared pathway adjacent to the Old Kings Parade Ground and the associated environmental impacts has been undertaken in context of Clause 228 of the *Environmental Planning and Assessment Regulation 2000*, the *Environmental Planning & Assessment Act, 1979* and other relevant environmental legislation including the Commonwealth's *Environment Protection and Biodiversity Conservation Act, 1999*. In doing so, the Review of Environmental Factors helps to fulfil the requirements of Section 5.5 of the *Environmental Planning & Assessment Act, 1979* that the City of Parramatta Council examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

1.3 Structure of the REF

The REF is divided into the following sections:

- Introduction (Section 1) – introduces the proposal and purpose of the report;
- Need for the proposal (Section 2) – provides a description of the need for the project;
- Description of the proposal (Section 3) – provides a detailed description of the proposed works;
- Statutory and planning framework (Section 4) – provides information on the statutory and policy requirements for the proposed works;
- Community and stakeholder consultation (Section 5) – provides information on the stakeholder / community consultation that has been undertaken;
- Environmental assessment (Section 6) – describes the existing environment and potential environmental impacts, and identifies the corresponding impact safeguards and environmental management/mitigation measures;
- Environmental management (Section 7) – summarises the proposed safeguards and environmental management/mitigation measures associated with the works;
- Conclusion (Section 8) – provides justification for the proposed works and concluding remarks as to whether the adverse environmental impacts are balanced or outweighed by the beneficial effects of the proposal;
- Certification (Section 9) – certifies that the Review of Environmental Factors provides a true and fair review of the proposal in relation to its potential effects on

the environment;

- References (Section 10) – contains a list of the documents used in the preparation of the Review of Environmental Factors; and

- Appendices – contains an assessment of the potential environmental impacts of the proposal in the context of Clause 228 of the *Environmental Planning and Assessment Regulation 2000* and the matters of National environmental significance under the *Environment Protection and Biodiversity Conservation Act, 1999,* as well as copies of the technical/specialist reports that have informed this Review of Environmental Factors.

2 Need for the proposal

2.1 Strategic need for the proposal

The shared pathway along the foreshore of the Parramatta River between Marsden Street and O'Connell Street is not currently (permanently) lit and a risk analysis undertaken by the City of Parramatta has identified that this poses a significant public safety risk.

To improve public safety, a series of three (3) temporary lighting fixtures are currently being relied upon to provide a degree of lighting along the shared pathway. However, permanent lighting that meets the current AS/NZS standards for roads and public spaces is required.

2.2 Strategic Alignment

2.2.1 Parramatta City River Strategy Design and Activation Plan

The project has a strategic alignment with the Parramatta City River Strategy Design and Activation Plan (the Strategy) adopted in 2015, which aims to position the Parramatta River at the front and centre of the Parramatta City Centre as redevelopment occurs and to create a re-profiled river corridor that naturalises the river edge, improves accessibility to the river and responds to the river corridors flood characteristics. The aim is to encourage people to visit the water's edge and engage with Parramatta River.

The Strategy breaks the river corridor into a series of distinctive river quarters and the site for the proposed new lighting is located in River Quarter 1: Kings Quarter. One of the key proposals for the Kings School precinct under the Strategy is to provide an accessible network of footpaths that can link the precinct to the local stadium (now Bankwest Stadium), Parramatta Park and the river edge.

The proposed new lighting along the shared pathway between Marsden Street and O'Connell Street is aligned with this strategic objective and will improve public safety for users of the shared pathway, particularly between dusk and dawn.

The lighting plan outlined in the Strategy provides a guide to the development of the City's public domain lighting along the river corridor, so as to support the urban development, creating a unique night time identity and experience at a pedestrian level, and express the character of the revitalised City riverfront through lighting. The section of shared pathway where the new lighting is proposed is identified as a key destination (major pedestrian thoroughfare between the Parramatta CBD and Bankwest Stadium) and nominates the need for a lighting strategy that establishes a lighting hierarchy to differentiate major night time destinations and night time movement corridors.

2.3 Proposal objective

The primary objective for the new lighting is to address the existing public safety risk associated with a lack of permanent lighting along this section of shared pathway.

As described earlier, the purpose of the new lighting is to provide a continuously lit corridor along the foreshore, between the existing lighting at O'Connell Street and the Marsden Street underpass. The new lighting is consistent with the design and performance standards for the City River Corridor and will incorporate multi-function light poles to cater for lighting and event power provision, as well as cabling and housing for potential future CCTV provision.

The following images illustrate the context and existing condition of the site for the proposed new lighting:

Image 2.1: *View of the eastern end of the shared pathway, looking from Marsden Street and showing one of the temporary lighting fixtures* (image courtesy of nearmap.com.au).

Image 2.2: *View of the western end of the shared pathway, looking from O'Connell Street and showing one of the temporary lighting fixtures (image courtesy of nearmap.com.au).*

3 Description of the proposal

3.1 The proposal

The City of Parramatta is proposing to install new lighting along the existing shared pathway on the northern side of the Parramatta River foreshore, between O'Connell Street and Marsden Street in Parramatta. The existing shared path, adjacent to the Old Kings Parade Ground, is one of the major pedestrian routes between the Parramatta CBD and the new Bankwest Stadium and the purpose of the new lighting is to provide a continuously lit corridor along the foreshore, between the existing lighting at O'Connell Street and the Marsden Street underpass. The new lighting is consistent with the design and performance standards for the City River Corridor and incorporates multi-function light poles that cater for lighting and event power provision, as well as cabling and housing for potential future CCTV provision.

The scope of the proposed new lighting works includes the following:

- Installation of twenty (20) new (LED) multi-function light poles (City Elements 200 by HESS) to meet Category P1 – AS/NZS 1158.3.1:2005 (during peak event mode) / Category P2 (during non-event mode) along the existing shared pathway adjacent to the Old Kings Parade Ground, between Marsden Street and O'Connell Street;

- Minor excavation, formwork and pouring of twenty (20) 1200mm (l) x 1200mm (w) x 500mm (h) concrete pad footings to support the light poles;

- Trenching along the full length of the new lighting to accommodate conduits and three (3) 600mm x 600mm Class C pits to house the communication and electrical wiring, as well as a connection pillar and switch board for part of the works.

The selected light poles are the City Elements 200 series manufactured by HESS. The lighting design prepared by Lighting Art and Science (***Appendix B***) nominate slightly different light assemblies across the area to be lit, dependent on location. Of the twenty (20) lights, eighteen (18) will be 6m high poles, fourteen (14) of which will be fitted with a top element (LED) luminaire with a 120 degree shield, together with four (4) where a shield is not required. The remaining two (2) poles will be located on the southern branch of the western end of the shared pathway adjacent to O'Connell Street where the shared pathway becomes a boardwalk and goes beneath the O'Connell Street bridge. These two (2) lights will have a 6.5m pole, as the footings are to be set below the level of the boardwalk and therefore require a higher pole to achieve the required level of illumination.

The light poles are multi-function and will have the capability to support CCTV and power outlets. Two (2) of the poles (Poles 10 & 17) will be provided with 3 phase power outlets that will be able to support events in the reserve or the adjacent Old Kings Parade Ground.

Lighting Art and Science have documented the lighting design and confirm that it is in accordance with *2005 AS/NZS1158 – Lighting for roads and public spaces – Part 3.1: Pedestrian area – Category P1 requirements* (***Appendix B***). The selected LED

luminaires utilise lenses which allow for better lighting control and enable lighting to be placed precisely where it is required, while minimising light spill into adjoining areas.

The proposed footing detail (***Appendix H***) has been designed by Civil & Structural Engineering Design Services Pty Ltd, having regard to the recommendations set out in the Geotechnical Investigation Report prepared by Alliance Geotechnical Pty Ltd (***Appendix F***). Field investigations determined that the light pole footings will be founded on either soft to firm silty clay, medium dense sandy gravel, or firm to stiff sandy clay. Although the design loads of the light poles were not available at the time of preparing the report, a 1200mm x 1200mm x 500mm steel reinforced concrete pad footing is expected to be suitable to support the allowable bearing pressure (min. 75kpa soil bearing pressure) and accommodate the estimated settlement (expected to be less than 25mm). The light poles will then be fixed to the pad footings by 2 x M22 'U' bolts set into the footing and fixed with a base plate and nuts.

Excavation of an area slightly larger than 1200mm x 1200mm will be required for each footing. The depth of excavation is proposed to be limited in depth to a maximum of 600mm in order to minimise the potential to breach the significant sand sheet below the upper fill levels. A shallow trench (approx. 550mm x 300mm) will also need to be excavated along the full length of the line of the new light poles in order to accommodate conduits for electrical and communications wiring. Three (3) x 600mm x 600mm Class C Pits are required to be excavated.

3.2 Construction activities

3.2.1 Work methodology

Prior to the commencement of any work, 'construction zones' will need to be established around the perimeters of the work sites where each light pole is to be located. The final details of the construction methodology are still under consideration and therefore were not available at the time of preparation of this Review of Environmental Factors. However, prior to any works commencing, the pedestrian and traffic management controls and other environmental controls recommended in this Review of Environmental Factors will need to be implemented. Notwithstanding, given the 'contained' nature of the site, the construction zones are unlikely to have a significant impact on traffic and pedestrian movements outside the confines of the existing pedestrian thoroughfare.

Construction activities will vary throughout the works period, however are anticipated to include (but not be limited to):

- Minor earthworks associated with excavation for footings and conduit trenches etc;
- Formwork and concreting work associated with the footings;
- Installation of the light poles and connection to the electrical supply;
- Landscaping, including returfing and making good disturbed surfaces etc.

3.2.2 Plant and equipment

The plant and equipment that will be required for the works will vary throughout the ongoing stages of the work activities. Typical equipment and plant will generally include (but not be limited to) the following:

- Construction and/or earthmoving equipment including bobcats, excavator, crane etc;

- Various trucks and trade vehicles;
- Various powered and unpowered hand tools.

During the course of the works various forms of environmental control equipment such as silt fences / socks, rubbish skips etc may be required.

3.2.3 Waste management

All waste material will need to be either removed from the site immediately following demolition or stored on site in skip bins (or similar) and either recycled or disposed of at a licensed waste management facility.

3.2.4 Source of materials

Wherever possible, materials of construction should be sourced locally.

3.2.5 Traffic management and access

When and where necessary, pedestrian management measures will need to be put into place prior to the commencement of works in order to provide a safe environment for cyclists and pedestrians, and to manage access to the work site/s.

As the works are being undertaken within the confines of the shared pathway, public access is essentially limited to pedestrians, cyclists and other forms of non-motorised transport such as skateboards/scooters etc, such that the need for traffic and pedestrian management measures is likely to be minimal. However, temporary traffic management arrangements in Marsden Street and/or O'Connell Street may be necessary to assist with the arrival and departure of large vehicles to/from the site.

All changes to the existing cyclist and pedestrian conditions in the vicinity of the works area/s will need to be accompanied by appropriate signage to notify users of the temporary arrangements.

3.3 Public utility adjustment

It is unlikely that there will be any requirement for adjustment to the existing utility infrastructure as a consequence of the proposed lighting works. The electricity supply for the new lighting is anticipated to be obtained from the existing supply available in O'Connell Street, via a connection pillar and main switch board to be located at the north-western end of the pathway, where it meets O'Connell Street. However, this is not expected to have any significant impact on the capacity of the existing infrastructure.

4 Statutory and planning framework

4.1 State legislation

4.1.1 Environmental Planning & Assessment Act 1979 & *Environmental Planning and Assessment Regulation 2000*

The *Environmental Planning & Assessment Act, 1979* provides the statutory framework for planning and environmental assessment in NSW. It contains two parts that impose requirements for planning approval:

- Part 4 generally provides for the control of local 'development' that requires development consent from local council.

- Part 5 provides for the control of 'activities' that do not require development consent and are undertaken or approved by a determining authority.

The applicable approval process under the *Environmental Planning & Assessment Act, 1979* is generally determined by reference to the relevant environmental planning instruments and other statutory planning instruments and controls. These include *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP), the *Environment Protection and Biodiversity Conservation Act 1999*, other relevant State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs).

Development consent is required to carry out development and/or works unless they fall within Section 4.1 of the *Environmental Planning & Assessment Act, 1979*.

Section 4.1 of the *Environmental Planning & Assessment Act, 1979* states that if an environmental planning instrument provides that specified development may be carried out without the need for development consent, then a person may carry the development out, in accordance with the instrument, on land to which the provisions apply. Environmental assessment of the development may nevertheless be required under Part 5 of the Act.

Further, where an environmental planning instrument specifies that certain development may be carried out as *exempt development*, it may be carried out without the need for development consent under Part 4 of the *Environmental Planning & Assessment Act, 1979* or for assessment under Part 5 of the Act.

State Environmental Planning Policy (Infrastructure) 2007 is the environmental planning instrument under which the proposed lighting upgrade works may be carried out as *development without consent*. Further discussion on the provisions of the Infrastructure SEPP is provided at 4.2 below.

Notwithstanding, those works that do not require development consent are considered to be an "activity" within the meaning of Section 5.1 of the *Environmental Planning and Assessment Act 1979* on the basis that subclause 5.1(1)(d) of the *Environmental Planning & Assessment Act, 1979* defines the *carrying out of a work* as an "activity".

Section 5.1(1) of the *Environmental Planning & Assessment Act, 1979* defines an "activity" as being:

(a) the use of land, and
(b) the subdivision of land, and
(c) the erection of a building, and
(d) the carrying out of a works, and
(e) the demolition of a building or work, and
(f) any other act, matter or thing referred to in Section 3.14 that is prescribed by the regulations for the purposes of this definition,
but does not include:

(g) any act, matter or thing for which development consent under Part 4 is required or has been obtained, or
(h) any act matter or thing that is prohibited under an environmental planning instrument, or
(i) exempt development, or
(j) development carried out in compliance with an order under Division 2A of Part 6, or
(k) any development of a class or description that is prescribed by the regulations for the purposes of this definition.

The proposal involves the use of land and the carrying out of works and is therefore an "activity" for the purposes of Part 5.

A determining authority is defined in Section 5.1 of the Act as "a Minister or public authority and, in relation to any activity, means the Minister or public authority by or on whose behalf the activity is or is to be carried out or any Minister or public authority whose approval is required in order to enable the activity to be carried out".

The term 'public authority' is defined in Section 1.4 of the *Environmental Planning & Assessment Act, 1979* as follows:

(a) *a public or local authority constituted by or under an Act;*

(b) *a government Department;*

(c) *a statutory body representing the Crown;*

(d) *a chief executive officer within the meaning of the Public Sector Management Act 1988 (including a Director General);*

(e) *a statutory State owned corporation (and its subsidiaries) within the meaning of the State Owned Corporations Act 1989;*

(f) *a chief executive officer of a corporation or subsidiary referred to in paragraph (e); or*

(g) *a person prescribed by the regulations for the purposes of this definition.*

The City of Parramatta Council is a public authority constituted under the *Local Government Act 1993*. Accordingly, as the works will be undertaken either by or on behalf of the public authority, the Council is deemed to be the determining authority for the proposed lighting works at the Old Kings Parade Ground Foreshore in accordance with Part 5 of the *Environmental Planning & Assessment Act, 1979*.

Section 5.5 of the *Environmental Planning & Assessment Act, 1979* states a determining authority in its consideration of an activity shall, notwithstanding any other provisions of this Act or the provisions of any other Act or of any instrument made under this or any other Act, examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.

In addition, the determining authority must also take into account the matters outlined in Clause 228 of the *Environmental Planning and Assessment Regulation 2000*, which provides as follows:

(1) For the purposes of Part 5 of the Act, the factors to be taken into account when consideration is being given to the likely impact of an activity on the environment include:

(a) for activities of a kind for which specific guidelines are in force under this clause, the factors referred to in those guidelines, or
(b) for any other kind of activity:
(i) the factors referred to in the general guidelines in force under this clause, or
(ii) if no such guidelines are in force, the factors referred to subclause (2).

(2) The factors referred to in subclause (1)(b)(ii) are as follows:

(a) any environmental impact on a community,
(b) any transformation of a locality,
(c) any environmental impact on the ecosystems of the locality,
(d) any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality,
(e) any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations,
(f) any impact on the habitat of protected animals (within the meaning of the Biodiversity Conservation Act, 2016),
(g) any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air,
(h) any long-term effects on the environment,
(i) any degradation of the quality of the environment,
(j) any risk to the safety of the environment,
(k) any reduction in the range of beneficial uses of the environment,
(l) any pollution of the environment,
(m) any environmental problems associated with the disposal of waste,
(n) any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply,
(o) any cumulative environmental effect with other existing or likely future activities,
(p) any impact on coastal processes and coastal hazards, including those under projected climate change conditions.

(3) For the purposes of this clause, the Planning Secretary may establish guidelines for the factors to be taken into account when consideration is being given to the likely impact of an activity on the environment, in relation to activities generally or in relation to any particular kind of activity.

(4) The Planning Secretary may vary or revoke any guidelines in force under this clause.

These matters are discussed in ***Appendix A*** of this Review of Environmental Factors.

A general guideline "*Is an EIS Required? – Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act, 1979*" has been issued by the Secretary of the (then) Department of Planning and Environment. This Review of Environmental Factors has been prepared in accordance with these guidelines to enable the City of Parramatta Council to assess the environmental impacts of the proposed works associated with the new lighting along the share pathway and to determine whether these activities are likely to have a significant impact on the environment.

As described previously, Section 5.1 of Part 5 of the *Environmental Planning & Assessment Act, 1979* relates to the duty to consider environmental impact and subclause (1) states:

> *(1) For the purpose of attaining the objects of this Act relating to the protection and enhancement of the environment, a determining authority in its consideration of an activity shall, notwithstanding any other provisions of this Act or the provisions of any other Act or of any instrument made under this or any other Act, examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.*

4.2 State Environmental Planning Policies

4.2.1 State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State and in particular, by identifying the environmental assessment category into which different types of infrastructure and services development fall. The provisions of the ISEPP prevail over any provisions within a local environmental plan that relate to the development of infrastructure facilities identified in the ISEPP.

Division 12 of the ISEPP relates to Parks and other public reserves and allows the City of Parramatta Council, as a public authority, to undertake the lighting upgrade works at the Old Kings Parade Ground Foreshore without the need to obtain development consent under Part 4 of the *Environmental Planning & Assessment Act, 1979*.

A discussion in the provisions of Division 12 of the ISEPP is provided below:

Division 12 Parks and other public reserves

Under Clause 65(3) of Division 12 - Parks and other public reserves, in Part 3 of the ISEPP, any of the following development may be carried out by or on behalf of a council without consent on a public reserve under the control of or vested in the council (**emphasis added**):

(a) development for any of the following purposes—

(i) roads, pedestrian pathways, cycleways, single storey car parks, ticketing facilities, viewing platforms and pedestrian bridges,

(ii) recreation areas and recreation facilities (outdoor), but not including grandstands,

(iii) visitor information centres, information boards and other information facilities,

(iv) lighting, if light spill and artificial sky glow is minimised in accordance with the Lighting for Roads and Public Spaces Standard,

(v) landscaping, including landscape structures or features (such as art work) and irrigation systems,

(vi) amenities for people using the reserve, including toilets and change rooms,

(vii) food preparation and related facilities for people using the reserve,

(viii) maintenance depots,

(ix) portable lifeguard towers,

The land on which the new lighting is to be located (Lot 4, DP 113683) is Crown Land, currently under the care and control of Property NSW and has been reserved for the public purposes of access and public recreation (R103 1 74 8) pursuant to Section 87 of the *Crown Lands Act, 1989*. As noted previously, Property NSW has commenced proceedings to transfer ownership of the land to the City of Parramatta. However, have indicated that the Crown would either provide land owner's consent or a short term lease to the City of Parramatta to allow the lighting to be installed. As such, it is considered that the proposed works may be carried out without consent, relying on Clause 65(3)(a)(iv) of the ISEPP.

Notwithstanding, the works associated with the installation of the proposed new lighting are considered to be an "activity" within the meaning of Section 5.1 of the *Environmental Planning &Assessment Act 1979* on the basis that Section 5.1(1)(d) of the *Environmental Planning & Assessment Act 1979* defines the *carrying out of a work* as an "activity". Section 5.5 of the *Environmental Planning & Assessment Act 1979* states a determining authority in its consideration of an activity shall, notwithstanding any other provisions of this Act or the provisions of any other Act or of any instrument made under this or any other Act, examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.

As such, the proposed new lighting works are being assessed under Part 5 of the *Environmental Planning & Assessment Act 1979* and this Review of Environmental Factors (REF) has been prepared.

Clause 64 of the ISEPP provides the following definition of a public reserve:

> ***public reserve*** *has the same meaning as it has in the Local Government Act, 1993, but does not include a Crown reserve that is dedicated or reserved for a public cemetery.*

The *Local Government Act, 1993* defines a public reserve as follows:

> ***public reserve*** *means:*
>
> *(a) a public park, or*
>
> *(b) any land conveyed or transferred to the council under section 340A of the Local Government Act, 1919, or*
>
> *(c) any land dedicated or taken to be dedicated as a public reserve under section 340C or 340D of the Local Government Act, 1919, or*
>
> *(d) any land dedicated or taken to be dedicated under section 49 or 50, or*
>
> *(e) any land vested in the council, and declared to be a public reserve, under section 37AAA of the Crown Lands Consolidation Act, 1913, or*
>
> *(f) any land vested in the council, and declared to be a public reserve, under section 76 of the Crown Lands Act, 1989, or*
>
> *(g) a Crown reserve that is dedicated or reserved:*

(i) for public recreation or for a public cemetery, or

(ii) for a purpose that is declared to be a purpose that falls within the scope of this definition by means of an order published in the Gazette by the Minister administering the Crown Lands Act, 1989, being a Crown reserve in respect of which a council has been appointed as manager of a reserve trust for the reserve or for which no reserve trust has been established, or

(h) land declared to be a public reserve and placed under the control of a council under section 52 of the State Roads Act, 1986, or

(i) land dedicated as a public reserve and placed under the control of a council under section 159 of the Roads Act, 1993, and includes a public reserve of which a council has the control under section 344 of the Local Government Act, 1919 (repealed) or section 48, but does not include a common.

The Crown Land described as Lot 4, DP 113683 has been reserved for the public purposes of access and public recreation (R103 1 74 8) pursuant to Section 87 of the *Crown Lands Act, 1989*. Although the City of Parramatta has not been appointed as reserve trust manager and the land is currently managed on behalf of the Crown by Property NSW, no reserve trust has been established. Therefore, having regard to item (g) in the above definition, the land on which the new lighting is proposed is classified as a public reserve.

Clauses 13 to 17 in Part 2 of the ISEPP contain provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Table 4-1 below outlines the issues to be considered when determining whether consultation is required, and their applicability to this proposal.

Table 4-1: *Requirements for consultation under the Infrastructure SEPP*

Issue		**Consultation Required?**
Clause 13 - Consultation with Councils – impacts on Council related infrastructure or services		
1(a)	Will the development have a substantial impact on Council stormwater services?	No.
1(b)	Is the development likely to generate traffic to an extent that will constrain the capacity of the road system?	No.
1(c)	Does the development involve connection to, and a substantial impact on a sewerage system?	No.
1(d)	Does the development involve connection to, and use of a substantial volume of water from a council-owned water supply system?	No.
1(e)	Does the development involve the installation of a temporary structure on, or the enclosing of, a council-managed / controlled public place that is likely to cause disruption to pedestrian or vehicular traffic that is not minor or inconsequential?	No.

1(f)	Does the development involve excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which council is the roads authority?	No.
Clause 14 - Consultation with Councils – impacts on local heritage		
1(a)	Is the development likely to have an impact that is not minor or inconsequential on a local heritage item or a heritage conservation area?	No. The land forms part of the State heritage listed Marsden Rehabilitation site. However, an Aboriginal Heritage Due Diligence report has been prepared to assess the potential impacts of the works on the heritage significance, concluding that the works will not have an adverse impact. Further, as Council is the proponent for the works, there is no need for consultation.
Clause 15 - Consultation with Councils – impacts on flood liable land		
2	Is the development on flood liable land and will it change flood patterns other than to a minor extent?	Yes, however, the lighting installations will not change the flood patterns to any extent and as the Council is the proponent, no consultation is necessary.
Clause 16 - Consultation with public authorities other than Councils		
2(a)	Is the development adjacent to land reserved under the National Parks and Wildlife Act 1974?	No.
2(b)	The development is adjacent to a marine park declared under the Marine Parks Act 1997?	No.
2(c)	Is the development adjacent to an aquatic reserve declared under the Fisheries Management Act 1994?	No.
2(d)	Is the development within the foreshore area within the meaning of the Sydney Harbour Foreshore Authority Act 1998?	No.
2(e)	Does the development comprise a fixed or floating structure in or over navigable waters?	No.
2(f)	Is the development for the purposes of an educational establishment, health services facility, correctional centre or group home, or for residential purposes, in an area that is bush fire prone land?	No.

Having regard to the table above, there is no requirement for consultation under the ISEPP.

4.2.2 State Environmental Planning Policy No. 55 – Remediation of Land

State Environmental Planning Policy No. 55 – Remediation of Land provides for a consistent State-wide planning approach to the remediation of contaminated land.

The objectives of *State Environmental Planning Policy No. 55* are to:

- *Provide for a state wide planning approach to the remediation of contaminated land; and*

- *Promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment.*

Clause 7(1) of *State Environmental Planning Policy No. 55* states that:

A consent authority must not consent to the carrying out of any development on land unless:

(a) it has considered whether the land is contaminated, and

(b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and

(c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

Although the works associated with the installation of the new lighting do not require consent under Part 4 of the *Environmental Planning & Assessment Act, 1979*, the issue of contamination is a relevant consideration in order to ensure that works requiring disturbance to the ground surface are undertaken in a manner that protects the health of workers and members of the public.

Due to a history of uncontrolled filling activities to 'build up' the land, it was considered that the potential for the soil profile to contain contaminants was medium to high.

Geotechnical investigations were carried out by Alliance Geotechnical Pty Ltd on 31 March 2020 and comprised drilling of four (4) boreholes using hand held tools and four (4) dynamic cone penetrometer (DCP) tests. Due to the known presence of the historically significant underlying Parramatta Terrace Sand Sheet, the bore holes were limited to a maximum depth of 650mm to minimise the potential to penetrate the archaeologically sensitive layer. The DCP testing was undertaken to a depth of 2.0m, as there was minimal risk of damaging any potential archaeological artefacts with DCP rods. The fieldwork also included sampling for waste classification and two separate soil samples were taken from each hand auger borehole at 0-0.2m depth and 0.4-0.6m depth. The results of the waste classification are detailed in a separate Interim Waste Classification report (***Appendix E***).

The Geotechnical Investigations Report (***Appendix F***) provides details of the subsurface conditions (soil profiles) obtained from the four (4) boreholes. The soil profiles identified fill material comprising silty sandy clay, silty sand, and gravelly sand. The fill material also contained trace ironstone.

The analytical testing of the soil samples to determine waste classification found that the material from three (3) of the boreholes (HA01, HA03 & HA04) contained no contaminants and therefore was classified as General Solid Waste (non-putrescible), although the material from borehole HA03 was found to contain some acid sulfate soils. However, the material from borehole HA02 was found to contain some asbestos and was classified as Restricted Solid Waste (non-putrescible) containing special waste (asbestos).

As such, there is the potential for excavated material in the vicinity of borehole HA02 (near light pole 03) to contain friable asbestos fragments that will need to be treated in accordance with an Asbestos Management Plan.

Further, the potential for exposure to acid sulfate soils in the vicinity of borehole HA03 will require the preparation and implementation of an Acid Sulfate Soils Management Plan.

Notwithstanding, subject to the implementation of appropriate protective measures during the works period, once the lighting is installed and operational, there should be no risk and the land will be suitable for its ongoing use for access and public recreation.

4.3 Local Environmental Plans

4.3.1 Parramatta Local Environmental Plan 2011

The land on which the new lighting is proposed to be installed is zoned RE1 Public Recreation under *Parramatta Local Environmental Plan 2011*.

The stated objectives for the RE1 Public Recreation zone are as follows:

- *To enable land to be used for public open space or recreational purposes;*
- *To provide a range of recreational settings and activities and compatible land uses;*
- *To protect and enhance the natural environment for recreational purposes;*
- *To conserve, enhance and promote the natural assets and cultural significance of Parramatta Park; and*
- *To create a riverfront recreational opportunity that enables a high quality relationship between the built and natural environment.*

The use of the land for access and recreational purposes is commensurate with these objectives.

Under the Land Use Table for the RE1 Public Recreation zone, the only purposes that are permissible without consent are *environmental protection works* and *flood mitigation works*. Due to its primary function as a shared pathway and recreational land, the land use categorisation would be as a *recreation area*, defined under Parramatta LEP 2011 as follows:

> ***Recreation area*** *means a place used for outdoor recreation that is normally open to the public, and includes—*
>
> *(a) a children's playground, or*
> *(b) an area used for community sporting activities, or*
> *(c) a public park, reserve or garden or the like,*

and any ancillary buildings, but does not include a recreation facility (indoor), recreation facility (major) or recreation facility (outdoor). Recreation areas are listed as a permissible use with consent in the RE1 Public Recreation zone.

Recreation areas are permissible with consent in the RE1 Public Recreation zone. Therefore, ordinarily development consent under Part 4 of the *Environmental Planning & Assessment Act 1979* would be required prior to undertaking the proposed works.

Notwithstanding, as identified at Clause 1.9 of the LEP, the provisions of the ISEPP override the provisions of Parramatta LEP 2011 and pursuant to Division 12 of the ISEPP, the new lighting installation works may be carried out as *development without consent*.

4.4 Commonwealth legislation

4.4.1 Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (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.

The *Environment Protection and Biodiversity Conservation Act 1999* nominates any impact on listed threatened species or communities as a matter of National environmental significance (NES).

An assessment of the proposal's impact on matters of National environmental significance and the environment of Commonwealth land has been undertaken and is summarised in ***Appendix A*** of the REF.

This assessment concluded that there is unlikely to be a significant impact on relevant matters of National environmental significance. Accordingly, the proposal does not require referral to the Commonwealth.

4.4.2 Native Title Act, 1993

The Commonwealth Government enacted the *Native Title Act, 1993* in order to formally recognise and protect native title rights in Australia, following the decision of the High Court of Australia in *Mabo & Ors v Queensland (No. 2) (1992) 175 CLR 1 ("Mabo")*. This Act is the legal recognition of Indigenous Australians' rights and interests in land and waters, according to their own traditional laws and customs.

Although there is a presumption of Native Title in any area where an Aboriginal community or group can establish a traditional or customary connection with that area, there are a number of ways that Native Title is taken to have been extinguished. For example, land that was designated as having freehold title prior to 1 January 1994 extinguishes Native Title, as does any commercial, agricultural, pastoral or residential lease. Further, land that has been utilised for the construction or establishment of public works also extinguishes any Native Title rights and interests for as long as they are used for that purpose.

A search of the Register of Native Title Claims on the National Native Title Tribunal website indicates that there have been no claims made in relation to the land on which the new lights are proposed to be located.

It is considered that the proposed installation of new lighting along the shared pathway is unlikely to conflict with any of the provisions of the *Native Title Act, 1993*.

4.5 Confirmation of statutory position

All relevant statutory planning instruments have been examined with respect to the proposal.

The proposed new lighting installation works adjacent to the Old Kings Parade Ground have been assessed as being ***development without consent*** under the relevant environmental planning instrument (ISEPP). This position relies on the operation of the ISEPP to remove the otherwise applicable consent requirements.

Accordingly, the proposed works do not require approval under Part 4 of the *Environmental Planning & Assessment Act, 1979.*

Notwithstanding, the proposed works fall within the definition of an 'activity' as defined under Section 5.1 of the *Environmental Planning & Assessment Act, 1979* on the basis that subclause 5.1(1)(d) of the *Environmental Planning & Assessment Act, 1979* defines the *carrying out of a work* as an "activity".

Section 5.5 of the *Environmental Planning & Assessment Act, 1979* states a determining authority in its consideration of an activity shall, notwithstanding any other provisions of this Act or the provisions of any other Act or of any instrument made under this or any other Act, examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.

Therefore, as the works are being proposed by a public authority (City of Parramatta Council) and they do not require development consent, they are subject to an environmental impact assessment under Part 5 of the *Environmental Planning & Assessment Act, 1979.*

5 Stakeholder and community consultation

5.1 Consultation

There has been an ongoing engagement with stakeholders and adjoining land owners since inception of the project to ensure that the proposed lighting will meet with their expectations, or address any concerns they may have. These stakeholders include Venues NSW, Bayanami Public School and Property NSW, who were all consulted in relation to the project and the proposed lighting design and raised no objections.

This REF is to be placed on public exhibition and nearby stakeholders notified. Any submissions will be considered and the feedback received will be appended to the REF.

The engagement activities are outlined in the City of Parramatta Council's Engagement Plan and include the following channels:

- Customer Contact Centre
- Engagement Portal
- Residents letter
- Postcard
- Park signage
- Website
- Social media

5.2 ISEPP consultation

As identified in Table 4-1 in the previous Chapter, consultation in accordance with the ISEPP is not required.

5.3 Government agency involvement

There is no legislative requirement for involvement from other government agencies.

5.4 Ongoing or future consultation

As described above, an ongoing dialogue between Council and the adjoining land owners and stakeholders will continue in relation to all aspects of the lighting improvement works.

There is no requirement for any ongoing or future community consultation. Notwithstanding, Council may choose to notify affected businesses, residents, or sporting/community user groups prior to the commencement of any works.

Further, once works commence, the community should be provided with a contact name and number that they can contact should any complaints wish to be registered.

6 Environmental assessment

This section of the REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposal. All aspects of the environment potentially impacted upon by the proposal are considered. This includes consideration of the factors specified in the guideline *Is an EIS required?* (DUAP 1999) as required under Clause 228(1)(b) of the *Environmental Planning and Assessment Regulation 2000*. The factors specified in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000* are also considered at ***Appendix A***. Site-specific safeguards and management measures are provided to ameliorate or minimise the identified potential environmental impacts.

6.1 Archaeology

6.1.1 Existing environment

The land has been subject to significant filling over the years since European settlement, primarily to 'build up' the land to facilitate recreational activities associated with the Old Kings School site. However, beneath the upper fill deposits (to depths of 450mm to 800mm below the current surface), lies the Parramatta Terrace Sand Sheet (approx. 1m in depth), a highly significant cultural deposit that has the potential to contain archaeological material from two phases of archaeological human occupation – initially during the terminal Pleistocene and then the late Holocene. Originally identified in 2005 during excavations on the corner of George and Charles Street in the Parramatta CBD and again in 2005 on an adjoining site, the sand sheet was found to contain artefacts including hatchets and grindstones. Notwithstanding, as described in the Aboriginal Heritage Due Diligence Assessment prepared by EMM Consulting Pty Ltd (***Appendix D***), the sand sheet has been subject to many compliance-based archaeological excavations at various locations since 2005 and with few exceptions, the investigations have found a sterile or near sterile sand deposit.

6.1.2 Potential impacts

As set out in the Aboriginal Due Diligence Assessment at ***Appendix D***, the proposed works are generally constrained to the upper part of the soil profile and above the culturally significant Parramatta Terrace Sand Sheet, such that there is a low risk of harming any Aboriginal objects. Notwithstanding, there is the potential for excavation works to disturb Aboriginal artefacts, such that works should proceed with caution under the supervision of an archaeologist or Aboriginal stakeholder.

6.1.3 Safeguards and management measures

- Given the relatively shallow expression of the Parramatta Terrace Sand Sheet – a highly significant cultural deposit – all excavation activities are to be carried out under the direct supervision of an archaeologist and/or Aboriginal stakeholder to monitor the excavation works to reduce the risk of inadvertent impact and manage the process in the event that cultural material is observed.

- If any heritage or potential Aboriginal cultural materials, sites or places are discovered, all work is to cease immediately and the NSW Heritage Council, Metropolitan Local Aboriginal Land Council and NSW National Parks and Wildlife Service are to be notified.

- If human skeletal material less than 100 years old is discovered, the Coroners Act, 2009 requires that all works should cease and the NSW Police and the NSW Coroner's Office

should be contacted. Traditional Aboriginal burials (older than 100 years) are protected under the National Parks and Wildlife Act, 1974 and should not be disturbed. Interpreting the age and nature of skeletal remains is a specialist field and an appropriately skilled archaeologist or physical anthropologist should therefore be contacted to inspect the find and recommend an appropriate course of action. Should the skeletal material prove to be archaeological Aboriginal remains, notification of DPIE and the Local Aboriginal Land Council will be required. Notification should also be made to the Commonwealth Minister for the Environment, under the provisions of the Aboriginal and Torres Strait Islander Heritage Protection Act, *1984*.

6.2 Acid Sulfate Soils

The Acid Sulfate Soils Map (Sheet ASS_009) that accompanies *Parramatta Local Environmental Plan 2011* identifies the site for the proposed new lighting installations as being primarily located on Class 5 Acid Sulfate Soils. However, there are also Class 3 Acid Sulfate Soils mapped along the Parramatta River foreshore, towards the south-western corner of the area of proposed works.

Clause 6.1 of the LEP relates to Acid Sulfate Soils and *aims to ensure that development does not disturb, expose or drain acid sulfate soils and cause environmental damage*.

In accordance with Clause 6.1, *works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land,* would ordinarily require development consent under Part 4 of the *Environmental Planning & Assessment Act, 1979*.

Further, the consent authority must not grant consent for the carrying out of works unless an acid sulfate soils management plan has been prepared for the proposed works in accordance with the Acid Sulfate Soils Manual and a copy provided to the consent authority.

However, as identified at Clause 1.9 of the LEP, the provisions of *State Environmental Planning Policy (Infrastructure) 2007* override the provisions of *Parramatta Local Environmental Plan 2011* and pursuant to Division 12 of the Infrastructure SEPP, the works may be carried out as *development without consent*.

6.2.1 Potential Impacts

Although any earthworks associated with the proposed lighting installation works are not anticipated to exceed a depth of 650mm below existing ground level, the potential for disturbance of acid sulfate soils is unknown. This is particularly so given that the geotechnical investigations found acid sulfate soils present in the soil sample taken from borehole HA03.

As such, it is recommended that a precautionary approach be taken, under which all excavated and disturbed soil during earthworks should be treated as acid sulfate soils until verification of the nature of the materials has been undertaken.

Further, in accordance with the manual for Acid Sulfate Soil, it is recommended that management strategies to require onsite treatment and protective measures of all disturbed and excavated soil, storage of excavated materials in protective bunding, covering of stockpiles at all times and acid sulfate soil screening at the point of Waste Classification for the purpose of disposal offsite be implemented and observed throughout the course of works.

The potential for exposure to acid sulfate soils in the vicinity of borehole HA03 will require the preparation and implementation of an Acid Sulfate Soils Management Plan.

6.2.2 Safeguards and management measures

- All excavated material should be considered to be ASS and treated with lime to neutralise the acidity as it is removed from the ground. Keeping the excavated spoil lightly wetted at all times to limit potential oxidation and formation of acidic leachate. The recommended material for treatment is Medium-Fine agricultural lime (aglime) which is slightly alkaline and of low solubility. The aglime should be fine ground (at least <1 mm) calcium carbonate or calcite (limestone or marble).

- Aglime is to be readily available both at the site of excavation and at the location of stockpiles.

- Bunding and the provision for the collection and treatment of the leachate from the oxidation of the sulfidic material should such leachate occur.

- Prior to excavations, upcoming weather conditions should be checked and excavation works should not be undertaken unless a continuous forecast of 5 days does not indicate the chance of moderate to heavy rain. All excavations are to be covered once treated to protect against unforeseen weather events.

- The following recommendations outline the best practice methods for the stockpiling of Acid Sulfate Soils and are to be applied. Stockpiles of acid sulfate soils should be located in settings that ensure minimal environmental impact from any acidic leachate produced. The design of stockpile(s) should:

  - establish leachate collection and treatment systems including an impervious pad on which to place the stockpile.

  - minimise the surface area exposed to oxidation - consider using some form of artificial capping if storage is for longer than a few weeks.

  - minimise the amount of infiltration of water - consider using some form of artificial capping.

- All stockpiles should be bunded and leachate collection and treatment systems should be installed. If an impervious pad has not been established under the stockpile, as a precautionary measure, an apron of fine lime should be applied when stockpiling materials for any length of time.

- Once treatment has been applied and or testing has confirmed the materials do not, or no longer meet the definition of Actual Acid Sulfate Soils the materials are to be disposed of to an appropriately licensed landfill facility with an accompanying Waste Analysis Classification Report, for example Dial A Dump Industries, Eastern Creek. Details of the nature of the materials and the treatment applied is necessary within the body of the report. The waste classification assessment is to be conducted in accordance with NSW DECCW Waster Classification Guidelines 2008. The guidelines (Part 4) states ASS cannot be treated as virgin excavated natural materials (VENM) and that potential and actual ASS must be treated (neutralized) prior to acceptance by a landfill operator.

- Any Acid Sulfate Soil material requiring transport should be loaded directly into sealed trucks and transported. The base of the truck containment should be lined with a layer of lime. The condition of the lime layer should be visually checked regularly, and lime should be replenished if necessary. All vehicles must be covered to proven the loss of ASS material during transport. Wheels and external surfaces of trucks should be cleaned prior to leaving site.

6.3 Contamination

6.3.1 Existing environment

Due to the site history of uncontrolled filling, there is a medium to high potential for soil contaminating activities to have occurred. Geotechnical investigations carried out in connection with the project identified the presence of asbestos in one of the soil samples taken for analysis from one of the four (4) boreholes drilled on the site. Although limited to borehole HA02, the potential risk to human health during the carrying out of works is present.

6.3.2 Potential impacts

Due to the limited excavation required as part of the proposed works, the likelihood of encountering contaminated soils / asbestos containing materials is considered to be negligible. Notwithstanding, there is still the potential for workers to be exposed to contaminated soils during the carrying out of the lighting installation works.

6.3.3 Safeguards and management measures

- All excavated material to be removed from the site is to be stockpiled, sampled and given a waste classification prior to removal form the site.

- All transport of waste and disposal of materials must be conducted in accordance with the requirements of the POEO Act. All licenses and approvals required for disposal of the material will be obtained prior to removal of the materials from the site.

- Removal of waste materials from the site shall only be carried out by a licensed contractor holding appropriate license, consent and/ or approvals to dispose of the waste materials according to the assigned waste classification, and with the appropriate approvals obtained from the EPA, if required.

- All materials excavated and removed from the site shall be disposed in accordance with the POEO Act to a facility/site legally able to accept the material. Copies of all necessary approvals from the receiving site shall be given to the Site manager prior to any contaminated material being removed from the site. A record of the disposal of materials will be maintained.

- The following procedure is to be in the event of an unexpected discovery of stained, odorous material, unidentified infrastructure or suspected asbestos containing materials.

    1. Cease disturbance of the material and leave the immediate area.

    2. Contact the Site Manager or appropriate Manager.

    3. Site Manager to conduct an assessment of the nature and location of the unexpected material taking into consideration possible asbestos containing or contaminated materials and the quantity of material, i.e. if the quantity is small the Foreman initiates a clean-up using appropriate personal protective equipment and procedures.

    4. If Site Manager decides the material and quantities warrant further investigation the area is to be barricaded off to provide a ten (10) metre exclusion zone. Work can recommence in adjacent areas outside the exclusion zone.

    5. The Site Manager arranges with his Manager to organize further qualified assessment of the suspected materials.

6. Visual assessments and samples collected by a suitably qualified environmental scientist. Samples sent to a NATA registered laboratory for analysis.

6.4 Flora and Fauna

6.4.1 Existing Environment

The site is predominantly a well maintained open space area featuring an existing shared pathway and public benches along the Old Kings Parade foreshore. Vegetation along the Parramatta River foreshore adjacent to the works area is highly disturbed and dominated by exotic species with the exception of a large *Ficus spp*. Adjacent to Marsden Street. A desktop study for threatened fauna species within a 5km radius was conducted by Bushland Management Solutions Pty Ltd (***Appendix G***) using databases from the Living Atlas of Australia. This found no threatened fauna species listed in Appendix 1 had been recorded within the Old Kings Parade foreshore, however, could potentially be present within Parramatta Park located on the western side of O'Connell Street.

Although there is an identified camp of Grey-headed flying foxes (listed as a vulnerable species under the *Biodiversity and Conservation Act (2016*) and the *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999*) on the banks of the Parramatta River to the north-west of the site (north of Bankwest Stadium), the site is not known to contain or provide critical habitat for any threatened flora or fauna.

6.4.2 Potential impacts

There is the potential for direct and indirect impacts of obtrusive light spill on flora and fauna in the vicinity of the proposed new lighting that may disrupt foraging times or roosting patterns, or the potential to disrupt the flight path of the Grey-headed flying foxes.

Notwithstanding, the proximity to the highly lit (night time) environment of Bankwest Stadium means that any additional impacts from the proposed lighting would have negligible impact on local flora and fauna.

6.4.3 Safeguards and Management Measures

In order to minimise the potential impacts from light spill, the lighting must be designed, installed and operate in accordance with the requirements of *AS/NZS 1158.3.1: 2005 – Lighting for Roads and Public Spaces*.

6.5 Heritage

6.5.1 Existing environment

The site of the proposed new lighting installation works forms part of the curtilage of the State heritage listed Marsden Rehabilitation Centre (SHR 00826) (and potential archaeological site) and the Kings School Group (former) (SHR 00771). The foreshore lands are significant at National, State and local levels, being:

- part of the territory of the Burramuttagal people;
- part of the former Government Farms at Parramatta;
- associated with the development of the horticultural industry and botanical exploration;
- associated with important people and events in the development and settlement of Parramatta such as George Caley, Robert Brown and Francois Peron;
- associated with the development of the setting for the Old King's School; and
- associated with the open space created by the natural flood zone along the Parramatta River.

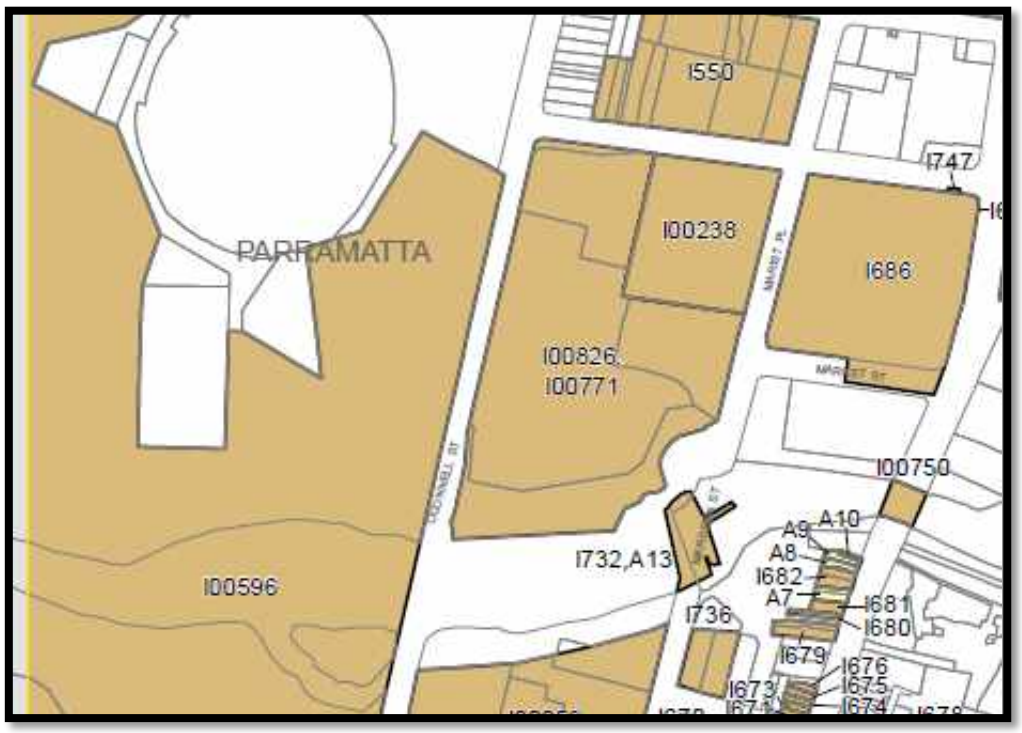
The site for the new lighting is more closely associated with the buildings and associated grounds of the Kings School (SHR 00771) and all proposed works are to be carried out in the pedestrian zone to the south of the Old Kings Parade Grounds.

There are also a number of State and local listed heritage items in the vicinity of the site listed under Schedule 5 of *Parramatta Local Environmental Plan 2011*.

The Schedule 5 listing details for the heritage listed elements are reproduced below:

Locality	Item Name	Address	Property Description	Significance	Item No.
Parramatta	Parramatta Park and Old Government House	O' Connell Street	Lot 369, DP 752058 Lots 7054 and 7055, DP 1074335	State	SHR00596
Parramatta	St Patrick's Cathedral, Presbytery and precinct (and potential archaeological site)	1 Marist Place	Lot 1, DP 1034092	State	SHR00238
Parramatta	Brislington property, Morton Bay fig tree (and potential archaeological site)	164 Marsden Street	Part Lot 21 and Lot 23, DP 1173876	State	SHR00059 & 00828
Parramatta	Convent of Our Lady of Mercy and associated buildings	2, 4 & 6 Victoria Road	Lot 1, DP 301995; Lot 14, DP 498; Lot 2, DP 301995; Lot 4, DP 68819; Lots 3 and 5–9, DP 758788	Local	I550
Parramatta	Alfred Square (and potential archaeological site)	353D Church Street	Lot 1, DP 724837	Local	I686
Parramatta	Parramatta Dam archaeological site weir	Marsden Street		Local	I732
Parramatta	Parramatta Hospital archaeological Site	22A O' Connell Street	Part Lot 21, DP 1173876	Local	A12
Parramatta	Archaeological Site	302 Church Street	Part Lot 1, DP 211499	Local	A13

Figure 6.1: *Extract from Parramatta LEP 2011 Heritage Map (Sheet HER_009)*



Source: Parramatta LEP 2011

The remnants of a brick incinerator are located to the west of the works area near the segment of the pathway that slopes below O'Connell Street. The feature consists of a brown brick chimney and base with a number of metal reinforcement bars fixed to its exterior and a metal plate fixed to the opening at the base with text that states "Goodrid Incinerator Sydney – Company Com Pat (commercial patent) 18480".

As noted in the Historical Archaeological Baseline Assessment (***Appendix D***), *the overall structure is in good condition with evidence of repointing and possible brickwork replacement. The metal reinforcement bars, and metal plate are heavily corroded, but the overall integrity of the metal features is intact. The base of the incinerator to the northern elevation is slightly below ground level as it sits at a point in the project area where the turfing is in a decline towards the zone below O'Connell Street. This is consistent with the 1943 aerial as the incinerator appears to have been located at a lower elevation than the Old Kings Parade Grounds close to the foreshore.*

6.5.2 Potential Impacts

A Historical Archaeological Baseline Assessment has been prepared by EMM Consulting Pty Ltd to assess the impact of the proposed new lighting on the heritage significance of the Marsden Rehabilitation Centre and Kings School Group (former) sites and other nearby heritage listed properties.

The report concludes that the proposed lighting will not alter or modify the current sitting of the Kings School or the foreshore with all setbacks and topographies being to a great degree maintained. During the proposed excavation and trenching works the nature of the topography will be altered however this is considered negligible as works are minor and appropriate in their intervention to the landscape.

6.5.3 Safeguards and management measures

- An application for an exemption notification under Section 57(2) of the *Heritage Act, 1977* is to be made to the NSW Heritage Council to undertake the works, with provision of this report as supporting documentation for the exemption notification;

- All proposed works are to avoid direct contact with identified features within the project area and as identified in the Historical Archaeological Baseline Assessment report;

- Temporary bunting is to be erected surrounding the incinerator during the works process to mitigate and potential damage or impact to its structural integrity;

- Upon the completion of works, the project area is to be filled, returfed and made good where interventions have been made to the landscape; and

- if unexpected finds are discovered during any phase of the project, works must cease, and an archaeologist contacted for advice.

6.6 Traffic and access

6.6.1 Existing environment

Construction access to the work sites will be via Marsden Street and/or O'Connell Street. Both streets are main roads that carry relatively high volumes of daily vehicles, cyclists and pedestrians.

6.6.2 Potential impacts

Impacts during the works would primarily occur when traffic flows and/or pedestrian movements directly outside the site may need to be temporarily disrupted to allow for construction vehicles and/or equipment to access or leave the work site/s. However, the impacts of these disruptions would be minimised through the implementation of traffic control measures in the vicinity of the works. Overall impacts on traffic flows are considered negligible as disruptive works would be unlikely to last for more than a few minutes at a time and traffic flows along Marsden Street and/or O'Connell Street can be managed and maintained through the implementation of traffic control measures.

6.6.3 Safeguards and management measures

- Where required, appropriate traffic management measures in Marsden Street and/or O'Connell Street, including temporary speed restrictions, precautionary signs, illuminated warning devices and manual and/or electronic traffic control to control access of construction vehicles etc to the park will need to be implemented (as necessary) and maintained throughout the works period.

6.7 Noise & vibration

6.7.1 Existing environment

The existing noise environment is typical of a public recreation area / reserve in an urban environment and flanked by two major roads. The locality is characterised by an area of essentially undeveloped land/open space traversed by a shared pathway and adjacent to a school playing field and the Parramatta River. Background noise levels are relatively low and noise sources include users of the reserve / shared pathway, together with intermittent noise from traffic on the surrounding local road network.

6.7.2 Potential impacts

There will be some noise impacts associated with the works. Of greatest significance will be the noise generated by motorised earthmoving/construction equipment associated with the proposed excavation works. However, general construction noise associated with the remainder of works is not likely to cause a significant disturbance. All works will occur during the day and although relatively low in this location, the background noise levels may assist in ameliorating any significant noise. The nearest potentially affected receivers are unlikely to be adversely impacted by noise generated by the works due to the substantial separation distance.

6.7.3 Safeguards and management measures

- Work is to be restricted to standard working hours and where possible, noisy work should be undertaken during less sensitive periods where possible.

- All plant, machinery and noise generating equipment should be maintained in good working order. Where practical / possible machinery should be fitted with exhaust silencers and / or noise reduction devices.

- Plant and machinery will need to be turned off when not in use.

- The construction noise levels shall not reach or exceed the exposure levels, including peak exposure (140dB[C]) and daily average (85dB[A]), as detailed in Clause 56 of the Work Health & Safety Regulation 2017. Work planning and preparation shall be considered to ensure noisy activities are minimised. The control measures developed shall meet the requirements of AS2436 – 1981 – 'Guide to Noise Control on Construction, Maintenance and Demolition Sites' i.e. localised noise boxes or barriers. Appropriate tools and equipment shall be used to ensure noise levels are reduced and controlled.

6.8 Air quality

6.8.1 Existing environment

The air quality is typical of an open space area in an urban environment and is relatively good. The main source of any air pollution is from air borne pollutants generated in the surrounding area during windy conditions.

6.8.2 Potential impacts

Air quality impacts expected during the works period will be created through air borne dust, as well as fumes and odours from machinery and tools etc. However, the likely cumulative impact is considered to be negligible.

6.8.3 Safeguards and management measures

- The Contractor is required to monitor and manage dust / air quality during the works.

- All plant, machinery and noise generating equipment is to be maintained in good working order and is to be turned off when not in use for prolonged periods.

- Where possible, all construction plant and machinery should be fitted with emission control devices complying with Australian Design Standards.

- Plant and machinery will need to be turned off when not in use.

- Any dust generating works should be stopped during periods of high wind.

- Plastic sheeting shall be available to cover excavation faces and stockpiles.

6.9 Visual amenity

6.9.1 Existing environment

The existing visual amenity is typical of a concrete pedestrian shared pathway set within a mown lawn public reserve in an urban environment.

6.9.2 Potential impacts

The likely short terms visual impacts associated with the works include the presence of plant and equipment, stockpiles etc at the site. However, this visual impact is likely to be minimal and will only exist for the duration of the works. Further, the visual impacts are effectively contained within the confines of this section of the shared pathway and are not readily visible from the surrounding public and private areas.

The long term change to this visual environment will be the improved appearance of the pathway along this section of the foreshore as a consequence of the lighting upgrade works. Other than a requirement that all parts of the work areas are kept in a clean and tidy manner, no additional safeguards are proposed with respect to visual amenity.

6.9.3 Safeguards and management measures

- All parts of the work areas are to be kept clean and tidy at all times.

6.10 Waste management & minimisation

6.10.1 Potential impacts

The new lighting installation works along the shared pathway adjacent to the Old Kings Parade Ground are not expected to produce a substantial amount of waste.

Notwithstanding, all waste that is generated during the course of works will need to be collected and stored on site in appropriate skips / containers etc and then disposed of at a licenced waste / recycling facility.

6.10.2 Safeguards and management measures

- A Waste Management Plan will need to be prepared to detail the procedures for waste minimisation and management, including the likely waste generation, method of on-site collection and storage and details of the intended method of recycling or disposal.

- All areas of the site will need to be kept free of rubbish and cleaned at the end of each work day.

- The resource management hierarchy principles of the Waste Avoidance and Resource Recovery Act 2001(WARR Act) should be adopted as follows:

  – 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.

6.11 Community enquiries and complaints

6.11.1 Potential impacts

During the course of the construction/installation works there is the potential that members of the community may wish to make enquiries or complaints in relation to the works.

6.11.2 Safeguards and management measures

- A dedicated 'Community Liaison Officer' (Council representative) should be contactable and available to respond to enquiries and address complaints or other issues during the construction/works period.

6.12 Social and economic

6.12.1 Potential impacts

There is likely to be a positive social impact associated with the installation of the new lighting along this well used section of shared pathway, such as the improved appearance, function, safety and useability of the thoroughfare for the wider community.

6.12.1 Safeguards and management measures

No environmental safeguards or management measures are proposed.

6.13 Summary of beneficial effects

The main benefits of the new lighting installation works at the Old Kings Parade Ground Foreshore include:

- The new shared pathway lighting between Marsden Street and O'Connell Street will improve the safety and amenity for pedestrians, cyclists and other users along this section of shared pathway between the Old Kings Parade Ground and the Parramatta River Foreshore.

- The provision of an improved lighting environment in keeping with the community's desires and expectations;

- Improvement to the aesthetic, functional, recreational and long term value of the shared pathway, as a major pedestrian / cyclist thoroughfare to/from Bankwest Stadium.

6.14 Summary of environmental impacts

The main potential environmental impacts likely to arise during the proposed works include:

- Archaeological impacts;

- Acid Sulfate Soils impacts;

- Contamination impacts;

- Flora and Fauna impacts;

- Heritage impacts;

- Traffic and access impacts;
- Noise and vibration impacts;
- Air quality impacts;
- Visual amenity impacts;
- Waste management and minimisation impacts.

7 Environmental management

7.1 Environmental management plans

Environmental safeguards and management measures outlined in Table 7-1 below will minimise the identified potential adverse environmental impacts of the proposal on the surrounding environment.

A Construction Environmental Management Plan (CEMP) has not been prepared for the proposed works at this stage. However, a CEMP will need to be prepared prior to the commencement of works and will need to incorporate all of the safeguards and management measures described in the REF. The CEMP will form the framework for establishing how the safeguards and management measures will be implemented and who will be responsible for their implementation. The environmental management of this proposal will need to be in accordance with this plan.

7.2 Summary of safeguards and management measures

The environmental safeguards outlined in this document will need to be incorporated into the detailed design and implemented prior to and/or maintained throughout the duration of the lighting installation works at the Old Kings Parade Ground Foreshore. These safeguards are aimed at minimising any potential adverse impacts on the surrounding environment arising from the proposed works. All safeguards described in the REF will also need to be incorporated into the CEMP. These are summarised in Table 7-1.

Table 7-1: Summary of impact specific environmental safeguards

No.	Impact	Environmental safeguards & management measures
1	Archaeology	• Given the relatively shallow expression of the Parramatta Terrace Sand Sheet – a highly significant cultural deposit – all excavation activities are to be carried out under the direct supervision of an archaeologist and/or Aboriginal stakeholder to monitor the excavation works to reduce the risk of inadvertent impact and manage the process in the event that cultural material is observed. • If any heritage or potential Aboriginal cultural materials, sites or places are discovered, all work is to cease immediately and the NSW Heritage Council, Metropolitan Local Aboriginal Land Council and NSW National Parks and Wildlife Service are to be notified. • If human skeletal material less than 100 years old is discovered, the *Coroners Act, 2009* requires that all works should cease and the NSW Police and the NSW Coroner's Office should be contacted. Traditional Aboriginal burials (older than 100 years) are protected under the *National Parks and Wildlife Act, 1974* and should not be disturbed. Interpreting the age and nature of skeletal remains is a specialist field and an appropriately skilled archaeologist or physical anthropologist should therefore be contacted to inspect the find and recommend an appropriate

No.	Impact	Environmental safeguards & management measures
		course of action. Should the skeletal material prove to be archaeological Aboriginal remains, notification of DPIE and the Local Aboriginal Land Council will be required. Notification should also be made to the Commonwealth Minister for the Environment, under the provisions of the *Aboriginal and Torres Strait Islander Heritage Protection Act, 1984*.
2	Acid Sulfate Soils	• All the excavated material in the vicinity of borehole HA03 (as identified in the Geotechnical Investigations report prepared by Alliance Geotechnical Pty Ltd) should be considered to be ASS and treated with lime to neutralise the acidity as it is removed from the ground. Keeping the excavated spoil lightly wetted at all times to limit potential oxidation and formation of acidic leachate. The recommended material for treatment is Medium-Fine agricultural lime (aglime) which is slightly alkaline and of low solubility. The aglime should be fine ground (at least <1 mm) calcium carbonate or calcite (limestone or marble). • Aglime is to be readily available both at the site of excavation and at the location of any stockpiles. • Bunding and the provision for the collection and treatment of the leachate from the oxidation of the sulfidic material should such leachate occur. • Prior to excavations, weather should be checked and excavation works should not be undertaken unless a continuous forecast of 5 days does not indicate the chance of moderate to heavy rain. All excavations are to be covered once treated to protect against unforeseen weather events. • The following recommendations outline the best practice methods for the stockpiling of Acid Sulfate Soils and are to be applied. Stockpiles of acid sulfate soils should be located in settings that ensure minimal environmental impact from any acidic leachate produced. The design of stockpile(s) should: ➢ establish leachate collection and treatment systems including an impervious pad on which to place the stockpile. ➢ minimise the surface area exposed to oxidation - consider using some form of artificial capping if storage is for longer than a few weeks. ➢ minimise the amount of infiltration of water - consider using some form of artificial capping.

No.	Impact	Environmental safeguards & management measures
		• All stockpiles should be bunded and leachate collection and treatment systems should be installed. If an impervious pad has not been established under the stockpile, as a precautionary measure, an apron of fine lime should be applied when stockpiling materials for any length of time. • Once treatment has been applied and or testing has confirmed the materials do not, or no longer meet the definition of Actual Acid Sulfate Soils the materials are to be disposed of to an appropriately licensed landfill facility with an accompanying Waste Analysis Classification Report, for example Dial A Dump Industries, Eastern Creek. Details of the nature of the materials and the treatment applied is necessary within the body of the report. The waste classification assessment is to be conducted in accordance with NSW DECCW Waste Classification Guidelines 2008. The guidelines (Part 4) states ASS cannot be treated as virgin excavated natural materials (VENM) and that potential and actual ASS must be treated (neutralized) prior to acceptance by a landfill operator. • Any Acid Sulfate Soil material requiring transport should be loaded directly into sealed trucks and transported. The base of the truck containment should be lined with a layer of lime. The condition of the lime layer should be visually checked regularly, and lime should be replenished if necessary. All vehicles must be covered to proven the loss of ASS material during transport. Wheels and external surfaces of trucks should be cleaned prior to leaving site.
3	Contamination	• All excavated material to be removed from the site is to be stockpiled, sampled and given a waste classification prior to removal form the site. • All transport of waste and disposal of materials must be conducted in accordance with the requirements of the POEO Act. All licenses and approvals required for disposal of the material will be obtained prior to removal of the materials from the site. • Removal of waste materials from the site shall only be carried out by a licensed contractor holding appropriate license, consent and/ or approvals to dispose of the waste materials according to the assigned waste classification, and with the appropriate approvals obtained from the EPA, if required. • All materials excavated and removed from the site shall be disposed in accordance with the POEO Act to a facility/site legally able to accept the material. Copies of all necessary approvals from the receiving

No.	Impact	Environmental safeguards & management measures
		site shall be given to the Site manager prior to any contaminated material being removed from the site. A record of the disposal of materials will be maintained. • The following procedure is to be in the event of an unexpected discovery of stained, odorous material, unidentified infrastructure such as suspected asbestos containing materials. 1. Cease disturbance of the material and leave the immediate area. 2. Contact the Site Manager or appropriate Manager. 3. Site Manager to conduct an assessment of the nature and location of the unexpected material taking into consideration possible asbestos containing or contaminated materials and the quantity of material, i.e. if the quantity is small the Foreman initiates a clean-up using appropriate personal protective equipment and procedures. 4. If Site Manager decides the material and quantities warrant further investigation the area is to be barricaded off to provide a ten (10) metre exclusion zone. Work can recommence in adjacent areas outside the exclusion zone. 5. The Site Manager arranges with his Manager to organize further qualified assessment of the suspected materials. 6. Visual assessments and samples collected by a suitably qualified environmental scientist. Samples sent to a NATA registered laboratory for analysis.
4	Flora and Fauna	• In order to minimise the potential impacts from light spill, the lighting must be designed, installed and operate in accordance with the requirements of *AS/NZS 1158.3.1: 2005 – Lighting for Roads and Public Spaces*.
5	Heritage	• An application for an exemption notification under Section 57(2) of the *Heritage Act, 1977* is to be made to the NSW Heritage Council to undertake the works, with provision of this report as supporting documentation for the exemption notification; • All proposed works are to avoid direct contact with identified features within the project area and as identified in the Historical Archaeological Baseline

No.	Impact	Environmental safeguards & management measures
		Assessment report; • Temporary bunting is to be erected surrounding the incinerator during the works process to mitigate and potential damage or impact to its structural integrity; • Upon the completion of works, the project area is to be filled, returfed and made good where interventions have been made to the landscape; and • if unexpected finds are discovered during any phase of the project, works must cease, and an archaeologist contacted for advice.
6	Traffic and access	• Where required, appropriate traffic management measures in Marsden Street and/or O'Connell Street, including temporary speed restrictions, precautionary signs, illuminated warning devices and manual and/or electronic traffic control to control access of construction vehicles etc to the reserve will need to be implemented (as necessary) and maintained throughout the works period.
7	Noise & Vibration	• Work is to be restricted to standard working hours and where possible, noisy work should be undertaken during less sensitive periods where possible. • All plant, machinery and noise generating equipment should be maintained in good working order. Where practical / possible, machinery should be fitted with exhaust silencers and / or noise reduction devices. • Plant and machinery is to be turned off when not in use for prolonged periods of time. • The construction noise levels shall not reach or exceed the exposure levels, including peak exposure (140dB[C]) and daily average (85dB[A]), as detailed in Clause 56 of the Work Health & Safety Regulation 2017. Work planning and preparation shall be considered to ensure noisy activities are minimised. The control measures developed shall meet the requirements of AS2436 – 1981 – 'Guide to Noise Control on Construction, Maintenance and Demolition Sites' i.e. localised noise boxes or barriers. Appropriate tools and equipment shall be used to ensure noise levels are reduced and controlled.
8	Air Quality	• The Contractor is required to monitor and manage dust / air quality during the works. • All plant, machinery and noise generating equipment is to be maintained in good working order and is to be

No.	Impact	Environmental safeguards & management measures
		turned off when not in use for prolonged periods. • Where possible, all construction plant and machinery should be fitted with emission control devices complying with Australian Design Standards. • Plant and machinery will need to be turned off when not in use. • Any dust generating works should be stopped during periods of high wind. • Plastic sheeting shall be available to cover excavation faces and stockpiles.
9	Visual Amenity	• All parts of the work areas are to be kept clean and tidy at all times.
10	Waste Minimisation and Management	• A Waste Management Plan will need to be prepared to detail the procedures for waste minimisation and management, including the likely waste generation, method of on-site collection and storage and details of the intended method of recycling or disposal. • All areas of the site will need to be kept free of rubbish and cleaned at the end of each work day. • The resource management hierarchy principles of the Waste Avoidance and Resource Recovery Act 2001(WARR Act) should be adopted as follows: – 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.
11	Community enquiries and complaints	• A dedicated 'Community Liaison Officer' should be contactable and available to respond to enquiries and address complaints or other issues during the works period.

8 Conclusion

8.1 Justification

The proposed lighting upgrade works at the Old Kings Parade Ground foreshore have the potential to result in some minor environmental impacts with respect to archaeology, acid sulfate soils, contamination, flora and fauna, heritage, traffic and access, noise and air quality, visual impacts and waste storage and disposal. Notwithstanding, the safeguards and mitigation measures that are detailed in this Review of Environmental Factors will ameliorate or minimise these expected impacts.

The proposal will also realise a positive impact, in particular, the provision of an improved lighting environment, which in turn improves public safety and amenity for pedestrians, cyclists and other users along this section of shared pathway on the Parramatta River foreshore adjacent to the Old Kings Parade Ground, for the benefit of the wider community. On balance the proposal is considered justified.

The environmental impacts of the proposal are not likely to be significant and therefore it is not necessary for approval to be sought for the proposal under Part 4 of the *Environmental Planning & Assessment Act 1979*. The proposal will not have a substantial impact on any matters of National environmental significance.

8.2 Objects of the EP&A Act 1979

Decisions made under the EP&A Act must have regard to the objects of the Act, as set out in Section 1.3 of the Act. The objects are:

(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,

(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,

(c) to promote the orderly and economic use and development of land,

(d) to promote the delivery and maintenance of affordable housing,

(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,

(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),

(g) to promote good design and amenity of the built environment,

(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,

(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,

(j) to provide increased opportunity for community participation in environmental planning and assessment.

The proposed new lighting installation works at the Old Kings Parade Ground Foreshore are consistent with the objects of the Act, in particular, the outcome following completion of the works represents the proper management of the public domain and promotes the social and welfare of the community by providing an improved lighting environment, amenity and public safety along this highly used pedestrian / cyclist route, which in turn improves the value of the place for both active and passive recreation.

8.3 Ecologically sustainable development

The National Strategy for Ecologically Sustainable Development (NSESD) has been formulated to ensure ESD is accounted for in all proposals. There are three core objectives:

- *Enhance the well-being and welfare of individuals and the community by following a path of economic development that safeguards the welfare of future generations;*
- *Provide for equity within and between generations;*
- *Protect biological diversity and maintain essential ecological processes and life-support systems.*

The EP&A Act acknowledges that ecologically sustainable development (ESD) should be considered in the assessment and approval of proposed development.

The proposed new lighting installation works at the Old Kings Parade Ground Foreshore that are the subject of this REF have been assessed against the following four principles of ecologically sustainable development (ESD) listed in the *Protection of the Environment Administration Act 1991*:

- *The precautionary principle;*
- *The principle of intergenerational equity;*
- *The principle of biological diversity and ecological integrity; and*
- *The principle of improved valuation of environmental resources.*

A discussion on the degree to which the proposed works comply with these principles is provided below.

8.3.1 Precautionary principle

The precautionary principle states 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.

In the application of the precautionary principle, public and private decisions should be guided by:

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

(ii) an assessment of the risk weighted consequences of various options

A range of investigations have been undertaken in order to inform the preparation of this REF and to ensure that the potential environmental impacts are able to be understood with a high degree of certainty. The proposal is not likely to result in any substantial environmental impacts. Where the potential for environmental impacts has been identified, a range of safeguards and mitigation measures have been recommended in order to minimise these adverse impacts. No mitigation measures have been deferred due to a lack of scientific certainty. The proposal is therefore considered to be consistent with the precautionary principle.

8.3.2 Intergenerational equity

The principle of intergenerational equity states that:

> *the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.*

The proposed new lighting installation works at the Old Kings Parade Ground Foreshore will not result in any impacts that are likely to adversely impact on the health, diversity or productivity of the environment for the future generations.

8.3.3 Conservation of biological diversity and ecological integrity

The principle of biological diversity and ecological integrity states that:

> *conservation of biological diversity and ecological integrity should be a fundamental consideration.*

The proposed new lighting installation works at the Old Kings Parade Ground Foreshore are unlikely to have a significant impact on biological diversity and ecological integrity. The proposed works are contained within a highly modified environment and will not impact on any endangered flora or fauna, or threaten biological or ecological diversity.

8.3.4 Improved valuation, pricing and incentive mechanisms

The principle of improved valuation of environmental resources states that:

> *environmental factors should be included in the valuation of assets and services, such as:*
>
> *(i) polluter pays – that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
>
> *(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
>
> *(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

The cost of environmental resources includes those costs that are incurred in order to protect the environment. In this way, any environmental safeguards that are imposed in order to minimise adverse impacts, result in economic costs to the construction and operation of the project. This indicates that the valuation of environmental resources has been assigned.

The implementation of appropriate mitigation measures (as recommended in this REF) where environmental impacts are expected will ensure that the proposed new lighting

installation works at the Old Kings Parade Ground Foreshore are undertaken with minimal impact on the environment.

8.4 Conclusion

The proposed lighting upgrade works at the Old Kings Parade Ground Foreshore have been the subject of an assessment under Part 5 of the *Environmental Planning & Assessment Act 1979*. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity. The proposed works, as described in the REF, will meet the project objectives but will still result in some minor impacts during construction with respect to archaeology, acid sulfate soils, contamination, flora and fauna, heritage, traffic and access, noise and air quality, visual amenity and waste storage and disposal. Notwithstanding, the implementation and effective management of the safeguards and mitigation measures that are detailed in this REF will ameliorate or minimise these expected impacts, such that they will have no more than a minor impact.

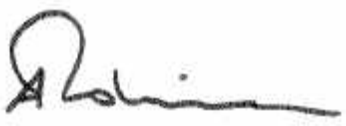
The proposal will realise a number of positive impacts, including the provision of an improved lighting environment, which in turn provides improved public safety and amenity for users of the shared walkway, which is to the benefit of the local and wider community. On balance the proposal is considered justified.

The environmental impacts of the proposed works are not likely to be significant and therefore it is not necessary for approval to be sought for the proposal under Part 4 of the *Environmental Planning & Assessment Act 1979*. The proposal will not impact on any matters of National environmental significance.

Having regard to the above, it is concluded that the proposal is not likely to significantly affect the environment within the meaning of Section 5.7 of the *Environmental Planning & Assessment Act 1979*.

9 Certification

This Review of Environmental Factors provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposal.



Andrew Robinson MPIA
Director
Andrew Robinson Planning Services Pty Ltd
Date: 22 July 2020

10 References

The following publications and documents have been used in the preparation of this REF:

Alliance Geotechnical, 2020, *Geotechnical Investigation Report*

Alliance Geotechnical, 2020, *Interim Waste Classification Report*

City of Parramatta Council website *(www.cityofparramatta.nsw.gov.au)*

City of Parramatta Council, *Parramatta Local Environmental Plan 2011*

EMM Consulting, 2020, *Old Kings Parade Ground – Foreshore Lighting – Historical Archaeological Baseline Assessment*

EMM Consulting, 2020*, Old Kings Parade Ground – Foreshore Lighting – Aboriginal Heritage Due Diligence Assessment*

Hills Bushcare, 2020, *Review of Environmental Factors – Old Kings Parade Ground Foreshore Lighting Upgrade*

Appendix A

Consideration of clause 228(2) factors and matters of National environmental significance

Clause 228(2) Checklist

The factors that need to be taken into consideration when reviewing the likely environmental impact of a proposed activity are listed in Clause 228(2) of the *Environmental Planning and Assessment Regulation 2000.* The table below provides a summary of the consideration of these factors.

Factor	*Impact*
a. Any environmental impact on a community? Minor environmental impacts may occur during the works period. Notwithstanding, any impacts would be minimised through the implementation of the safeguards described in Table 7-1. In the long term, once the new lighting has been installed and is operational, the community will benefit from the improved safety and amenity along the shared pathway that will be realised.	Short term: Negligible Long term: Positive
b. Any transformation of a locality? The proposed new lighting will provide improved safety and amenity for pedestrians and other users of the shared pathway. This will substantially improve the night time visual quality and useability of the locality to the benefit of the local and wider community.	Long term: Positive
c. Any environmental impact on the ecosystems of the locality? The proposed works will not have an unreasonable impact on any ecosystems in the locality.	Nil
d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? The new lighting along the shared pathway will improve the existing night time aesthetic quality of the pathway and will improve the amenity and useability of the pathway to benefit the local and wider community.	Nil
e. Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The proposed lighting installation works will not have an adverse effect on the value or significance of the locality for present of future generations in respect to cultural, historical, archaeological or aesthetic value.	Negligible

Factor	*Impact*
f. Any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974)? The shared pathway is in an urban environment that has been highly modified over the years and is not known to provide specific habitat for any protected fauna. However, it is noted that to the north-west (north of Bankwest Stadium) there is a camp of Grey-headed flying foxes on the banks of the Parramatta River, listed as a vulnerable species under the *Biodiversity Conservation Act 2016* and the *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999*. As concluded by the report prepared by Hills Bushcare (***Appendix H***), the proposed new lighting in this location is unlikely to have any impact on fauna species that utilise this area of the Parramatta River.	Negligible
g. Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The shared pathway is in an urban environment, has been highly modified and is not known to provide specific habitat for any endangered flora or fauna and will not endanger any life form, either on land, in the water or in the air.	Negligible
h. Any long-term effects on the environment? The proposal will not result in any substantial long-term adverse effects on the environment.	Negligible
i. Any degradation of the quality of the environment? The proposed works will not result in any degradation of the quality of the environment.	Nil
j. Any risk to the safety of the environment? The proposed works will not generate any risk to the safety of the environment.	Nil
k. Any reduction in the range of beneficial uses of the environment? There will be no reduction in the range of beneficial uses of the environment as a result of the proposed works.	Nil
l. Any pollution of the environment? There is the potential for some minor noise and air pollution during the works. However, due to the relatively short term nature of the works, these impacts are considered to be negligible and can be suitably ameliorated through appropriate site and environmental management measures.	Short term: Negative

Factor	*Impact*
m. Any environmental problems associated with the disposal of waste? The proposed works will not generate a substantial quantity of waste. Where possible, waste material is to be reused / recycled. All waste that is not able to be reused or recycled will need to be collected and disposed of at a licenced waste facility.	Negligible
n. Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The proposed works will not place an undue demand on resources that are, or are likely to become in short demand.	Nil
o. Any cumulative environmental effect with other existing or likely future activities? There will be no cumulative impacts or environmental effects and the proposed works will realise a generally positive impact on the locality and will deliver a significant public benefit through the provision of an upgraded lighting environment and improved safety and amenity along the shared pathway.	Nil

Matters of National Environmental Significance

Under the environmental assessment provisions of the *Environment Protection and Biodiversity Conservation Act 1999*, the following matters of National environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government Department of the Environment, Water, Heritage and the Arts.

Factor	*Impact*
a. Any impact on a World Heritage property? The proposal will not have an impact on a World Heritage property.	Nil
b. Any impact on a National Heritage place? The proposal will not have an impact on a National Heritage place.	Nil
c. Any impact on a wetland of international importance? The proposal will not have an impact on a wetland of international importance.	Nil
d. Any impact on a listed threatened species or communities? The proposal will not have an impact on a threatened species or community.	Nil
e. Any impacts on listed migratory species? The proposal will not have an impact on a listed migratory species.	Nil
d. Any impact on a Commonwealth marine area? The proposal will not have an impact on a Commonwealth marine area.	Nil
g. Does the proposal involve a nuclear action (including uranium mining)? The proposal does not involve a nuclear action.	Nil
Additionally, any impact (direct or indirect) on Commonwealth land? The proposal will not have an impact (either direct or indirect) on Commonwealth Land.	Nil

Appendix B

Lighting Design Drawing Package and Lighting Design Report – Lighting, Art and Science

OLD KINGS PARADE GROUND
FORESHORE LIGHTING

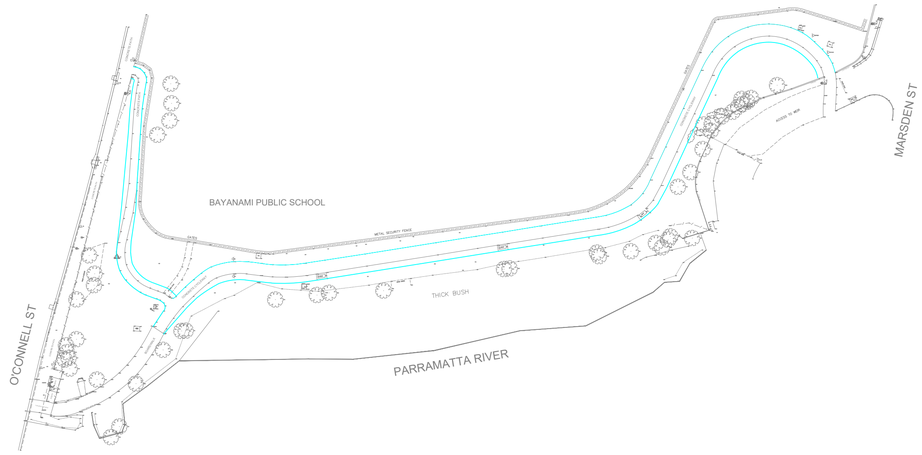
LIGHTING LEGEND

SYMBOL	DESCRIPTION	HOUSING/COLOUR	REFLECTOR	LAMP	CONTROL GEAR	SUPPLIER	PRODUCT No.
A	IP65, TOP ELEMENT LUMINAIRE WITH 120° SHIELD. MOUNTED AT 6.0m HEIGHT. ASYMMETRICAL LIGHT DISTRIBUTION	TBC	O8 AA	28W LED 500mA 3000K	INTEGRAL ELECTRONIC CONTROL GEAR	LIGHT + FORM / HESS	HESS CITY ELEMENTS CE 200-2 AA 2xLevo3 O8 28W 500mA 3000K
A*	IP65, TOP ELEMENT LUMINAIRE WITH 120° SHIELD. MOUNTED AT 6.0m HEIGHT FROM GROUND/BOARD WALK LEVEL. LIGHT POLE TO BE 6.5m TALL ALONG BOARDWALK	TBC	O8 AA	28W LED 500mA 3000K	INTEGRAL ELECTRONIC CONTROL GEAR	LIGHT + FORM / HESS	HESS CITY ELEMENTS CE 200-2 AA 2xLevo3 O8 28W 500mA 3000K
B	IP65, TOP ELEMENT LUMINAIRE WITH NO SHIELD. MOUNTED AT 6.0m HEIGHT. ASYMMETRICAL LIGHT DISTRIBUTION	TBC	O8 AR	28W LED 500mA 3000K	INTEGRAL ELECTRONIC CONTROL GEAR	LIGHT + FORM / HESS	HESS CITY ELEMENTS CE 200-2 AR 2xLevo3 O8 28W 500mA 3000K
EX-SL	EXISTING STREET LIGHTS TO REMAIN	-	-	-	-	-	-

POWER LEGEND

SYMBOL	DESCRIPTION	HOUSING/COLOUR	SUPPLIER	PRODUCT No.
	MAIN SWITCH BOARD	316 STAINLESS STEEL	-	-
	ELECTRICAL / COMMS PIT CLASS C PIT 600X600 mm	-	ACO OR EQUAL	-
–E/C––	COMMS AND ELECTRICAL CONDUITS IN COMMON TRENCH REFER PLANS FOR SIZES	WHITE ORANGE	-	-

DRAWING LIST



A — **SITE PLAN**
N.T.S.@A1

Issue	Amendment	Date
P1	PRELIMINARY ISSUE	06-03-20

N

N.T.S.

T:\Projects\L162\L162R - Old Kings Parade Ground Foreshore\L162R-OG\L162R-EL.dwg - EL-001 - 06/03/2020 - 12:41:44 PM

Lead Consultant

Client
CITY OF PARRAMATTA

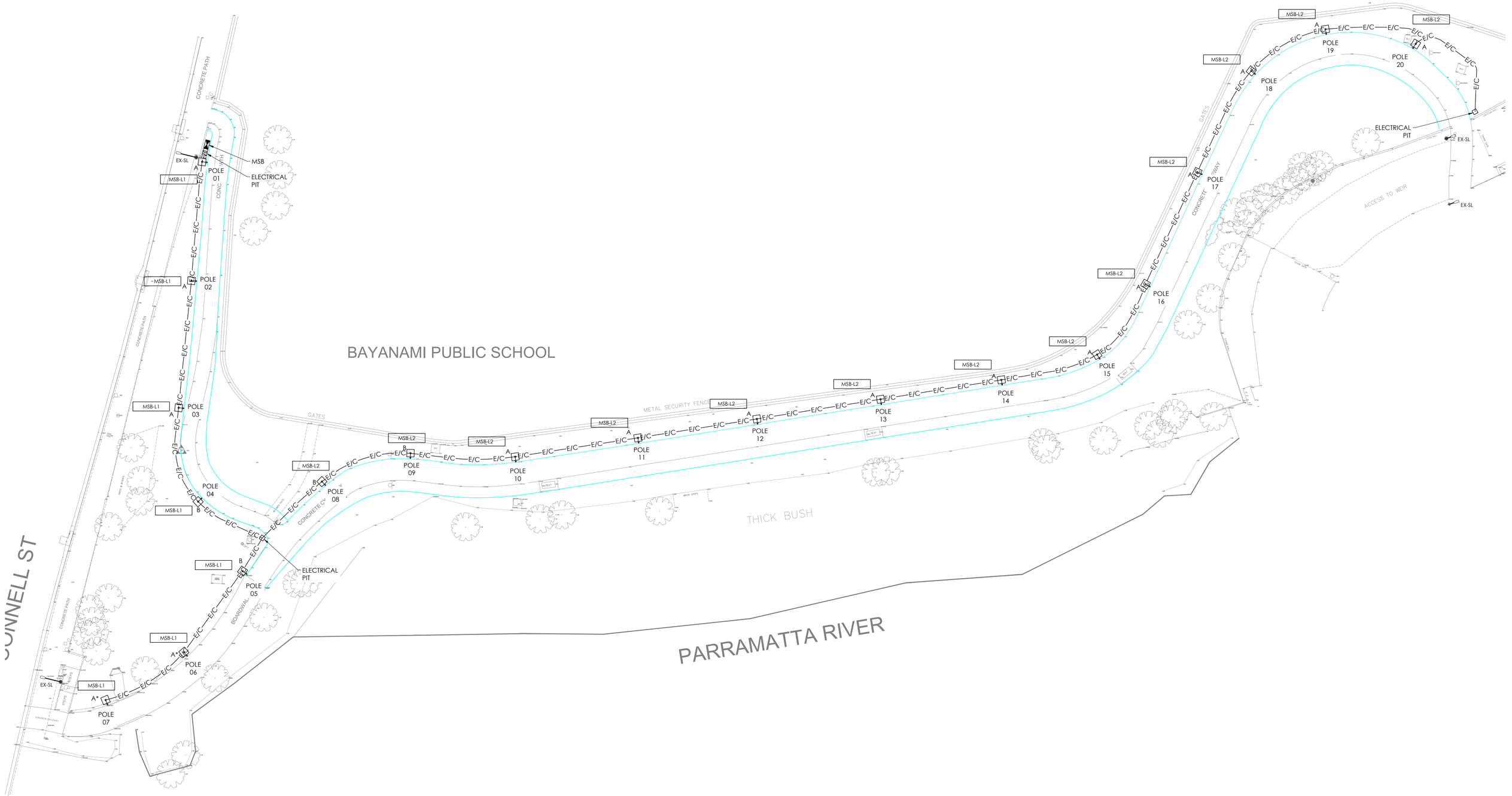
Lighting, Art & Science
Lighting Consultants, Electrical Engineers
Level 1, 41 Hume St, Crows Nest NSW 2065
p: +61 2 9436 0998 e: mail@laands.com.au

Project OLD KINGS PARADE GROUND
FORESHORE LIGHTING

Drawing LEGEND, DRAWING LIST & LOCATION PLAN

Drawn MA | Approv. RM | Date MAR 2020 | Scale N.T.S.

Project No L162R | Drawing No EL-001 | Rev P1



Issue	Amendment	Date
P1	PRELIMINARY ISSUE	06-03-20

0 2.5 5 7.5 10 12.5 25m

1:250@A1

Notes:
1. Pathways Lighting Design to Category P1 - AS/NZS 1158.3.1:2005:
   - Average Horizontal Illuminance > 7.0 lx
   - Point Horizontal Illuminance > 2.0 lx
   - Horizontal Uniformity Max/Avg < 10
   - Point Vertical Illuminance > 2.0 lx
2. Proposed larger path edge

Lead Consultant

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Project OLD KINGS PARADE GROUND FORESHORE LIGHTING

Drawing LIGHTING & ELECTRICAL LAYOUT

Drawn	Approv.	Date	Scale
MA	RM	MAR 2020	1:250@A1

Project No	Drawing No	Rev
L162R	EL-100	P1

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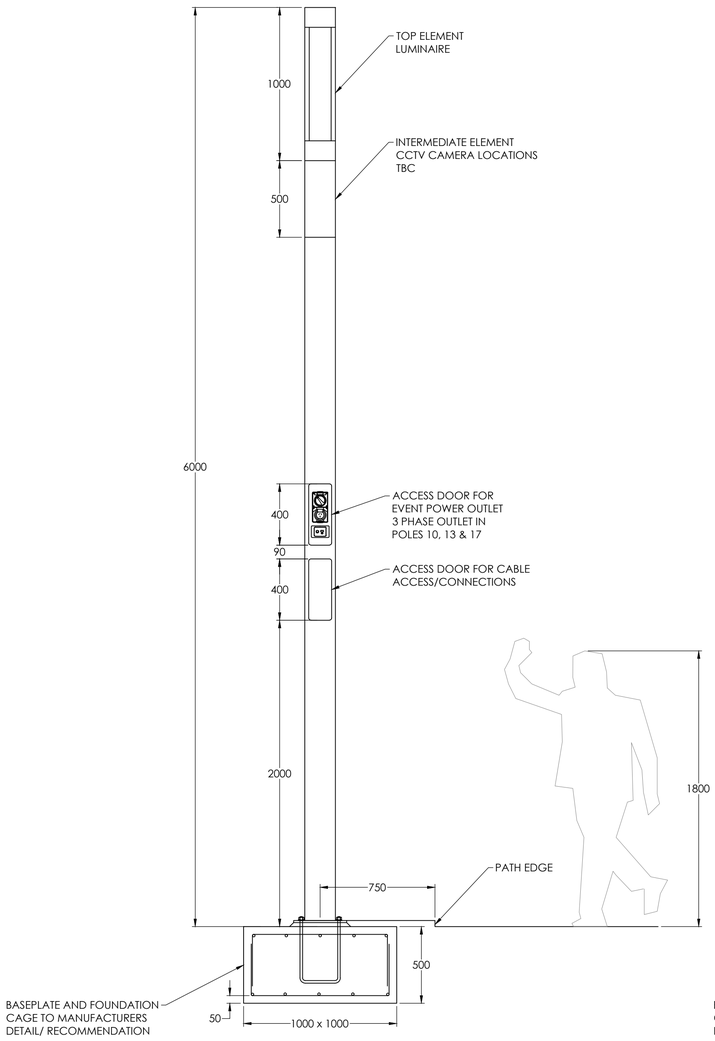
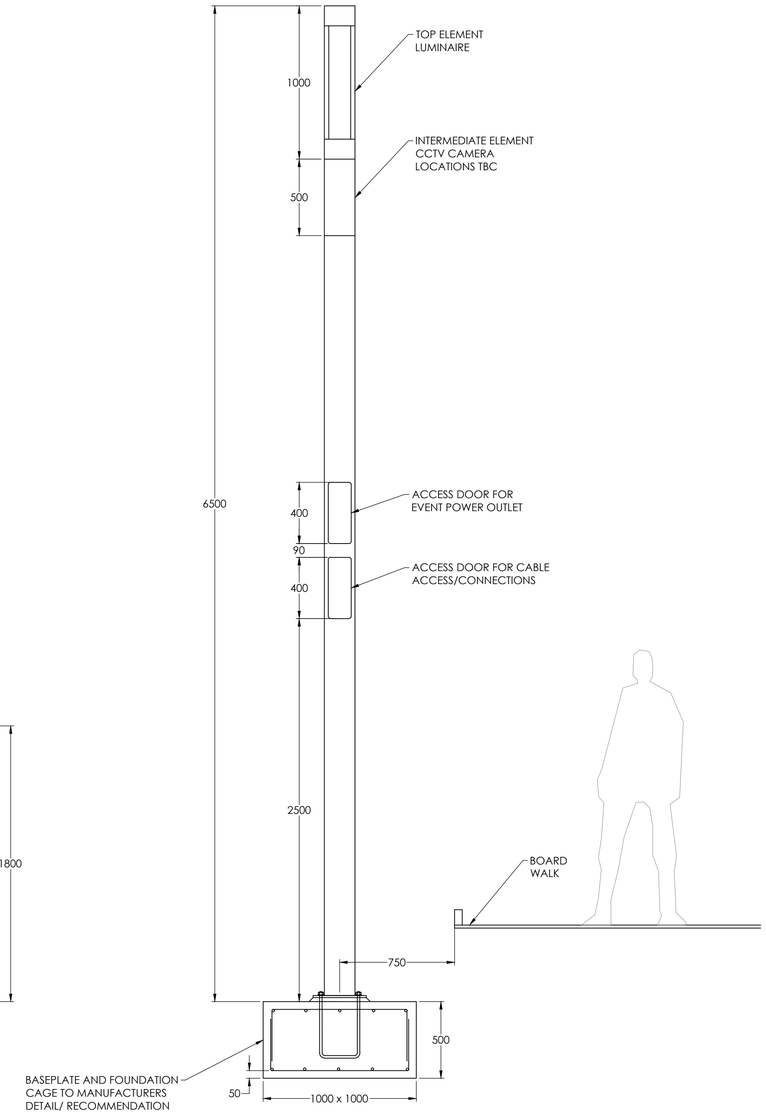
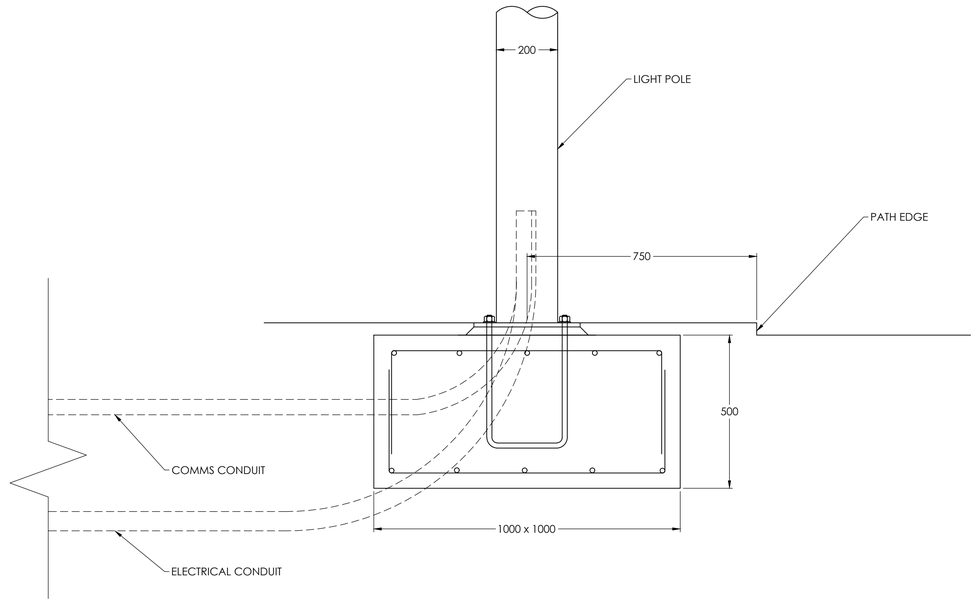


01 **TYPICAL POLE ELEVATION [A, B]**
1:20@A1



02 **TYPICAL POLE ELEVATION [A*]**
1:20@A1



03 **TYPICAL FOOTING DETAIL**
1:10@A1

04 **AA TOP ELEMENT IMAGE**
N.T.S.@A1

05 **AR TOP ELEMENT IMAGE**
N.T.S.@A1

Issue	Amendment	Date
P1	PRELIMINARY ISSUE	25-02-20

Notes:
1. Provide pole shop drawings
2. 3 Phase event power outlet inside lighting columns - Pole 10, Pole 13 & Pole 17

AS SHOWN

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Lead Consultant

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Project OLD KINGS PARADE GROUND FORESHORE LIGHTING

Drawing LIGHTING DETAILS

Drawn MA | Approv. RM | Date FEB 2020 | Scale AS SHOWN

Project No L162R | Drawing No EL-200 | Rev P1

Lighting, Art + Science
Lighting and Electrical Consultants

Lighting, Art & Science Pty Limited
ABN 86 152 715 921
Master Security License: 410812303
PO Box 373, CROWS NEST 2065
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mail@laands.com.au

Old Kings Parade Ground Lighting Design Report

Prepared by:

Lighting, Art and Science

for

City of Parramatta

Table of Contents

1. INTRODUCTION

Lighting Art & Science has been engaged to document the new lighting installation at the Old Kings Parade Ground, in Parramatta.

2. AS/NZS 1158.3.1:2005

The new foreshore lighting was designed in accordance with 2005 AS/NZS1158 Lighting for roads and public spaces – Part 3.1: Pedestrian area (category P) lighting – Category P1 requirements. Table 1 below illustrates the categories and recommended light technical parameter limits for the different lighting categories.

VALUES OF LIGHT TECHNICAL PARAMETERS AND PERMISSIBLE LUMINAIRE TYPES FOR ROADS IN LOCAL AREAS AND FOR PATHWAYS

1	2	3	4	5	6
Lighting subcategory	Light technical parameters				Permissible luminaire type (see Table 2.10)
	Average horizontal illuminance[a,b] ($\overline{E}_h$) lux	Point horizontal illuminance[a,b] (E_{Ph}) lux	Illuminance (horizontal) uniformity[c] Cat. P (U_{E2})	Point vertical illuminance[a,b] (E_{Pv}) lux	
P1	7	2	10	2	Type 4 where part of a road reserve or Types 2, 3, 4 or 6 elsewhere
P2	3.5	0.7	10	0.7	
P3[e]	1.75	0.3	10	0.3[d]	
P4[e]	0.85	0.14	10	N/A	
P5[e]	0.5	0.07	10	N/A	

Table 1 – Light Technical Parameters per lighting subcategory

3. AS/NZS 4282:2019

AS/NZS 4282 Control of obtrusive effects of outdoor lighting, gives control for the levels of spill light that can be reasonably expected in an urban environment.
The standard sets different limits on several lighting parameters based on the ambient lighting conditions or background, and the time of night. The higher the ambient conditions, the higher the allowable obtrusive lighting limit.

Public lighting is not within the scope of this standard as this lighting is provided to facilitate safety and security for the public. However, the upward waste light ratio (UWLR) is a limit that must be considered. It is a parameter that controls the amount of light emitted in direction above the luminaires.

The LED lighting columns selected for this job utilizes lenses which allows for better lighting control. This control enables the ability to place lighting precisely where it is required, along the pathway, whilst minimizing unnecessary spill light into adjoining areas.

Appendix C

Historical Archaeological Baseline Assessment – EMM Consulting Pty Ltd

Ground floor, 20 Chandos Street
St Leonards NSW 2065
PO Box 21
St Leonards NSW 1590

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

7 May 2020

Ron Pidock
Portfolio Manager
City of Parramatta
126 Church Street
Parramatta NSW 2150

Re: Old Kings Parade Ground - Foreshore Lighting - Historical archaeological base-line assessment

Dear Ron,

The City of Parramatta (CoP) has engaged EMM Consulting Pty Ltd (EMM Heritage) to complete a historical archaeological baseline assessment of proposed lighting installations along the existing pathway adjacent to the Old Kings Parade Ground. CoP is seeking advice on the potential heritage constraints, assessment and approval requirements for the project prior to construction.

This report has been prepared in accordance with the relevant government assessment requirements, guidelines and policies including the principles of *The Australian International Council on Monuments and Sites, Charter for Places of Cultural Significance* (also known as the *Burra Charter,* Australia ICOMOS 2013) and the New South Wales (NSW) *Heritage Manual* (Heritage Office 1996 with regular additions). The report includes:

- a brief exploration of the historical context of the project area and neighbouring region;
- identify existing relics and items of heritage significance and determine their current condition based on a physical site inspection of the project area;
- summarises historical archaeological potential within the project area and determine its significance;
- provides recommendations that will either allow works to proceed or define methods to mitigate harm and facilitate the approval of works.

Should you have any questions or concerns please do not hesitate to contact me on 02 9493 9500.

Yours sincerely,

Anthony Dakhoul
Heritage Consultant
adakhoul@emmconsulting.com.au

1 Background

1.1.1 Introduction

The City of Parramatta (CoP) has engaged EMM Consulting Pty Ltd (EMM Heritage) to complete a historical archaeological baseline assessment for lighting installations along the existing pathway adjacent to the Old Kings Parade Ground (Lot 4 DP1132683; Figure 1.1). Current design plans indicate that the lighting will be installed within the curtilage of a listed heritage item and in close proximity to extant historical features. CoP is seeking advice on the potential heritage constraints, assessment and approval requirements for each site so that development priorities can be determined.

1.1.2 Assessment framework

In NSW heritage items and "relics", that is archaeological sites assessed to be of local or State significance, are protected by two main pieces of legislation: the NSW *Heritage Act 1977* (Heritage Act) and the *NSW Environmental Planning and Assessment* Act 1979 (EP&A Act). The guidelines presented in the NSW Heritage Manual (Heritage Office, 1996) *Assessing heritage significance* (Heritage Office 2001) have also been used as a basis and as a guide for this historical archaeological baseline assessment. This document does not address Aboriginal heritage.

1.1.3 The Heritage Act 1977

The Heritage Act is the primary piece of State legislation affording protection to items of environmental heritage (predominantly cultural) in NSW. Under the Heritage Act, 'items of environmental heritage' include "places, buildings, works, relics, moveable objects and precincts identified as significant based on historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic values".

Items that have been formally nominated for the State heritage significance and approved by the Minister in charge of heritage are on the State Heritage Register (SHR; part 3A) are managed under the Act. Change to SRH items is managed through the approvals process defined in the Heritage Act either through an exemption notification or a s60 approval.

Under Section 170 of the Heritage Act, government agencies must establish and keep a register that includes all items of environmental heritage that have been identified by the agency, or that are listed on the SHR, an environmental planning instrument, or which may be subject to an interim heritage order that are owned, occupied or managed by that government body. These registers provide a list of known heritage items to be considered during this assessment.

Part 6 of the Heritage Act provides protection for 'relics', regardless of their listing status. It applies to all land in NSW that is not owned by the Commonwealth and not included in the SHR. Section 4(1) of the Heritage Act (as amended 2009) defines a 'relic' as follows:

A "relic" means 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.

Section 139(1) of the Heritage Act states that:

> A person must not disturb or excavate any land knowingly or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, damaged or destroyed unless the disturbance or excavation is carried out in accordance with an excavation permit.

Approval under the Heritage Act is not applicable for projects assessed under the *Critical Needs Act 2019;* however, where unanticipated relics are discovered, notification to the Heritage Council is regulated under Section 146 of the Heritage Act.

Section 146 Notification of discovery of relic:

> A person who is aware or believes that he or she has discovered or located a relic (in any circumstances, and whether or not the person has been issued with a permit) must:
>
> a) within a reasonable time after he or she first becomes aware or believes that he or she has discovered or located that relic, notify the Heritage Council of the location of the relic, unless he or she believes on reasonable grounds that the Heritage Council is aware of the location of the relic, and
>
> b) within the period required by the Heritage Council, furnish the Heritage Council with such information concerning the relic as the Heritage Council may reasonably require.

The Heritage Act identifies the category of 'works', which refers to infrastructure construction, and is viewed as separate to that of archaeological 'relics' under the Heritage Act. 'Works' may be buried, and are therefore archaeological in nature, but exposing a 'work' does not trigger reporting obligations under the Heritage Act unless it is of demonstrable significance.

1.1.4 The Burra Charter, ICOMOS 2013

The report and field survey were undertaken using the principles of *The Australian International Council on Monuments and Sites, Charter for Places of Cultural Significance* (also known as the *Burra Charter,* Australia ICOMOS 2013) and the New South Wales (NSW) *Heritage Manual* (Heritage Office 1996 with regular additions).The *Burra Charter* defines the concept of cultural significance as 'aesthetic, historic, scientific, social or spiritual value for past, present or future generations' (Australia ICOMOS 2013, Article 1.2). It identifies that conservation of an item of cultural significance should be guided by the item's level of significance.

1.2 Statutory Listings

Listing on statutory registers provides a basis under which the item or place is protected, and change is managed through approval processes to the authorities that administer the relevant Acts. Statutory listings provide legal protection for heritage items under the legislation outlined above.

Statutory registers reviewed as a part of this assessment include:

- SHR - this register is made under Part 3A of the Heritage Act. Items on the SHR undergo a rigorous assessment process and must reach a high significance threshold to be included. Inclusion on the SHR is directed by the Minister in charge of heritage.
- Schedule 5 of the *Parramatta Local Environmental Plan* 2011 (PLEP). The EP&A Act sets the provisions for the making of LEPs. Where an item is included in the heritage schedule, development applications must include an assessment of impacts to the item.
- State Heritage Inventory (SHI), which was cross-checked with Schedule 5 of the Bathurst Regional Council LEP 2014 and the s170 register. The SHI is not a single statutory register, but a central collection of listed statutory heritage items in NSW and is maintained by the Heritage Division.

1.3 Identified items of heritage significance

The project area is located within the curtilage of two listed items of state heritage significance identified in the State Heritage Register (SHR) as:

- item number 00826 (00826) with the title '*Marsden Rehabilitation Centre (and potential archaeological site)*' located at 24 and 24A O'Connell Street and 3 Marist Place, Parramatta, NSW 2150.
- item number 00771 (00771) with the title '*Kings School Group (former)*' located at 3 Marist Place, Parramatta, NSW 2150.

The project area is more closely associated with the buildings and associated grounds of the Kings School (00771) and all proposed works are to be conducted to the pedestrian zone to the south of the Old Kings Parade Grounds. The following statement of significance has been drawn from the State Heritage Register listing for the 00771, with information relevant to the project area bolded:

> The area was originally occupied by the Dharug people. The historical development of the site spans almost 200 years, from early agricultural activities in this area, followed by occupation of the site by the Agricultural and Horticultural Society (Australia's first)(Charles, 1986)) for the purposes of forming a nursery garden and introducing fruit tree species into the colony. The history of the site is dominated by the development of the King's School, one of the major educational institutions in NSW throughout much of the 19th and 20th centuries (operating from this site from 1836 to the 1960s).
>
> The King's School, run by the Anglican Church, was the first large public boarding school (secondary) to be established in the colony of NSW, and developed to become one of Australia's notable private schools. The school was one of the large institutions which shaped both the urban form and cultural framework of the regional town of Parramatta in the early 19th century, and counts a number of notable Australians among its former students.
>
> The potential archaeological resource at this site is very complex, with various phases of construction, expansion and demolition across the site, most of which occurred during the King's School phase. The King's School represented the dominant phase of development across the site and, subsequently, physical remains associated with this phase of development also dominate the potential archaeological resource at the site. The potential archaeological resource at the site may provide a tangible link to each phase of the historical development of the site. Investigation, analysis and interpretation of the potential archaeological remains across the site may provide information about the nature of the development and occupation of the site throughout the various phases of its history. Many of these remains would have potential to contribute substantial information to our understanding of the development and occupation of the site that could not be obtained from other sources, such as historical documentation. Owing to the continuous operation of the King's School on this site for 128 years, investigation of the remains of this occupation may provide a rare opportunity to investigate the development and changing operation of a major institution, allowing investigation of changes in material culture within the one context over time, including construction techniques, infrastructure technology, domestic and personal items of the inhabitants (students and staff), as well as developments or modifications in educational practices over time.
>
> Archaeological evidence associated with the earliest phases of European occupation of this site (early agricultural activities of the Agricultural and Horticultural Society's occupation of the site) would be of high State significance for its ability to provide information about a poorly documented and understood phase of Parramatta and NSW's history. However, such evidence would be fragmentary at best, if it survives at all.
>
> Archaeological evidence associated with the development and occupation of the King's School would also be of high State significance for its ability to provide information about a major institutional site over an extended period of time. Archaeological remains associated with the King's School would contribute to the historical significance of the site, providing a tangible link to this significant phase of the site's history,

as well as information about the occupation and operation of the institution that could not be obtained from other sources.

Archaeological evidence associated with the development and occupation of the Marsden Rehabilitation Centre would be limited and would have little potential to provide information about the operation of this institution that could not be obtained from other sources. Archaeological remains associated with this phase of the site's history would have little or no significance. (Godden Mackay Logan, 2004)

The site of the former King's School Parramatta is very important in the history of education in the state. The King's School occupied the site almost continuously from 1836 to 1964. It was the first large private boarding school run by the Anglican Church to provide secondary education, which was established in the colony of New South Wales. The school developed during its tenure on the site into one of Australia's notable schools and thus gave community status to Parramatta as a regional town/city in New South Wales. The growth of the school is evident in the relatively intact exterior fabric of the buildings.

Many buildings were the work of prominent Australian architects: Ambrose Hallen (Colonial Architect 1832-1835), Cyril Blacket and Power Adams & Munnings, the successors of the earlier firm of (John) Sulman and Power. The stonework of the original 1830s school building and its eastern wing is evidence of the relatively high level skills of the Scottish artisans who were brought to Australia following the depression in the British construction industry in the 1820s.

The foreshore lands of the Marsden Rehabilitation Centre site are of significance at national, state and local levels, as:

- part of the territory of the Burramuttagal people;
- part of the former Government Farms at Parramatta;
- associated with the development of the horticultural industry and botanical exploration;
- associated with important people and events in the development and settlement of Parramatta such as George Caley, Robert Brown and Francois Peron;
- associated with the development of the setting for the King's School;
- associated with the open space created by the natural flood zone along the Parramatta River (Zenscapes, 2005, p.26)

The major landscape significance of the site is the spatial relationship between the wall of the buildings and the river. **The gracious setback of the buildings demonstrates the principle of picturesque siting, giving the building group a 'prospect'. This layout of the site greatly contributes to the understanding of the early development of Parramatta as an important centre in the Colony and the attitudes to particular landscape settings** (Mathew & Associates, Landscape Report, in Peddle Thorp, 1994)

The site is one of two surviving examples along the Parramatta River of the picturesque siting principles of the 18th and 19th centuries by which large building groups were sited on the brow of a hill overlooking sloping land bordering a river. The site is evidence of the role of major social institutions in the evolution of the physical and cultural framework of the regional town of Parramatta during the nineteenth century. The site was under cultivation early in the colony's history and was used in the 1820s for the acclimatisation and development of exotic fruit trees when Australia's first Agricultural Society was formed in Parramatta (1822) and was given this land by its president, Governor Brisbane as an experimental garden to grow new varieties of plants and trees. (Peddle Thorp 1994:81) A number of trees over 100 years old remain from the School gardens, some rare in Sydney, such as the carob bean tree, Ceratonia siliqua. (A Brief History of Parramatta Park - Historic Parramatta Series, 1986: 9, Read, S. (pers.comm.))

SHR DB No.: 5045107

1.4 Nearby items of heritage significance

Nine items of heritage significance are located in close proximity to the project area, but their curtilage does not extend within it. They are identified in the table below and include:

Table 1.1.1 Nearby items of heritage significance

Item No.	Item name	Property description	Significance	Location
SHR 00596	*Parramatta Park and old government house*	O'Connell Street Lot 369, DP 752058 Lots 7054 and 7055, DP 1074335.	State	Directly west of the project area.
SHR 00238	*St Patrick's Cathedral, presbytery and precinct (and potential archaeological site)*	1 Marist Place Lot 1, DP 1034092	State	To the north of the project area.
SHR 00059 & 00828	*Brislington property, Moreton Bay fig tree (and potential archaeological site)*	164 Marsden Street Part Lot 21 and Lot 23, DP 1173876	State	Directly south of the project area.
LEP A12	*Parramatta Hospital archaeological site*	22A O'Connell Street Part Lot 21, DP 1173876	Local	Directly south of the project area.
LEP I732	*Parramatta Dam archaeological site weir*	Marsden Street	Local	South-east of the project area.
LEP A13	*Archaeological site*	302 Church Street Part Lot 1, DP 211499	Local	South-east of the project area.
LEP I550	*Convent of Our Lady of Mercy and associated buildings*	2, 4 and 6 Victoria Road Lot 1, DP 301995; Lot 14, DP 498; Lot 2, DP 301995; Lot 4, DP 68819; Lots 3 and 5–9, DP 758788	Local	North of the project area.
LEP I686	Alfred Square (and potential archaeological site)	353D Church Street Lot 1, DP 724837	Local	North-east of the project area.

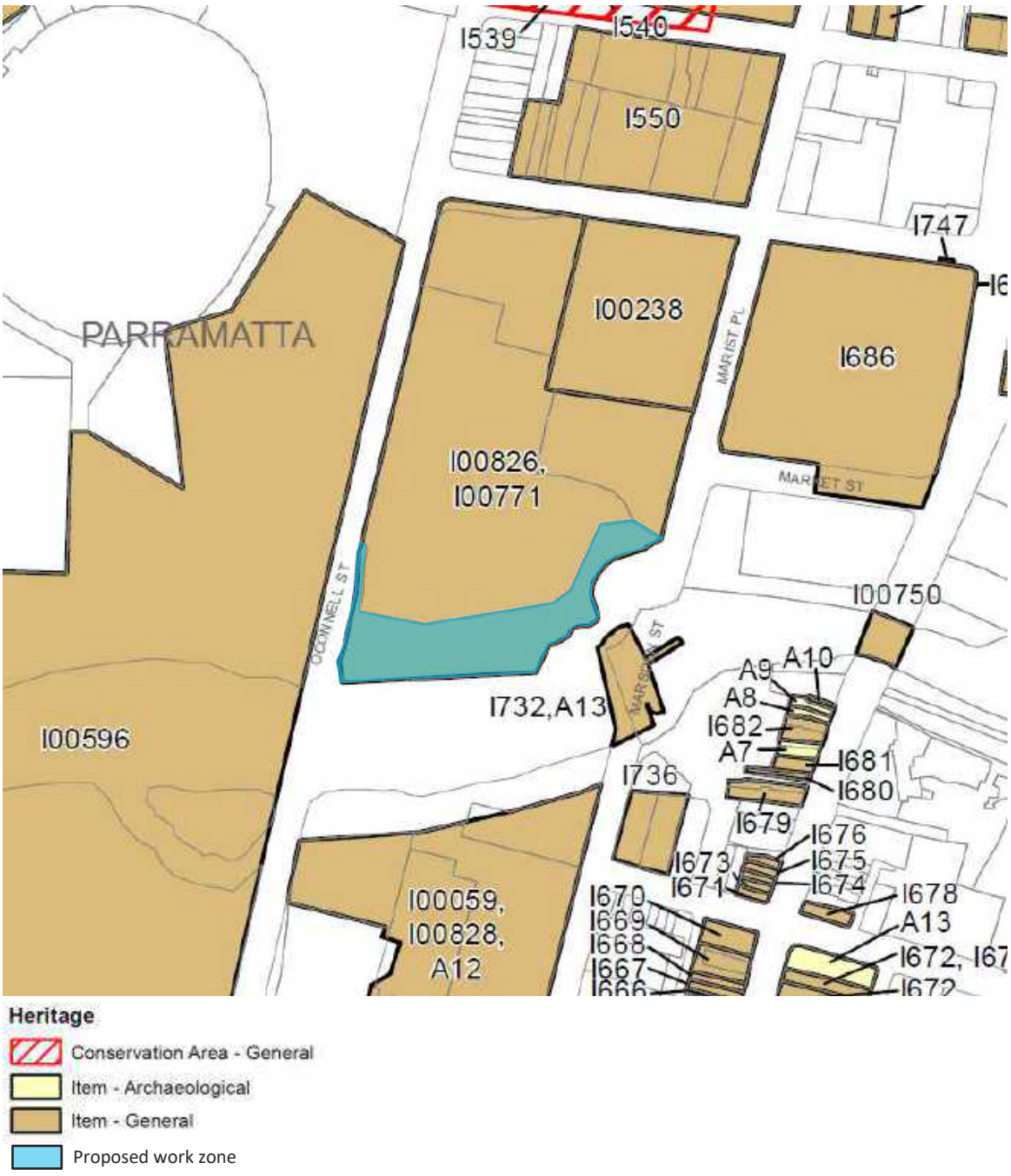


Plate 1.1 **Heritage Map - Sheet HER_009 (proposed work zone highlighted in blue). Source: Parramatta Local Environmental Plan 2011.**

1.5 Description of project area

The project area is located at the address of Marsden Street and 24A O'Connell Street, Parramatta 2050 within the Parramatta local government area in the greater Sydney region. The site has a real property description of Lot 4, DP1132683 (refer to Figure 1.1).

The project area is located on the north bank of the Parramatta River, and comprises a public walkway on the foreshore of the river bounded by Marsden Street in the east and O'Connell Street in the west. Access to the project area is achieved from the streetscape to Marsden Street adjacent to Parramatta Dam (I732), via a staircase from O'Connell Street and through a continuation of the public walkway below O'Connell Street that connects to a network of pathways within Parramatta Park, south of the Bankwest Stadium car park. The project area is also defined by the shape of the public walkway and is bounded by the security fence that defines the extents of the Old King's Parade Grounds to the north and the Parramatta river foreshore to the south. Dense vegetation is present to the south of the public walkway where the topography steeply declines towards the Parramatta River.

1.6 Authorship

This report was authored by Anthony Dakhoul (Heritage Consultant) and reviewed by Pamela Kottaras (National Technical Lead - Historical Heritage) of EMM Heritage.

KEY

- Study area
- Train station
- Rail line
- Major road
- Minor road
- Named watercourse
- Named waterbody
- Local government area
- NPWS reserve (refer to inset)
- State forest (refer to inset)

Source: EMM (2020); Nearmap (2020); DFSI (2017); GA (2011); ASGC (2006)

\\Emmsvr1\emm\Jobs\2019\J190879 - Kings Street Path Paramatta\GIS\02 Maps\G001 RegionalSetting 20200501 03.mxd 1/05/2020

Regional setting

Old Kings Parade Ground - Foreshore Lighting
Aboriginal heritage due diligence
Figure 1.1

EMM
creating opportunities

2 Brief historical analysis of project area

2.1 Early history

The history of European contact within Parramatta region begins as early as 1788 when settlers began to explore inland NSW to locate suitable, arable land for agricultural and pastoral activities. Prior to European settlement, the Parramatta region was occupied by the Burramattagal people, a clan of the Darug, who first settled along the upper reaches of the Parramatta River.

In November 1788, Governor Arthur Philip travelled to Parramatta to select the location for a new settlement. Land clearance began quickly to the north of the river establish a government farm, located directly north of Government House (Kass 1996) a small bridge facilitated access to the farm. In the earliest days of Parramatta, the only use of the land across the river to the north was associated with this Government Farm, which served as the locus of agricultural activity in the township. The project area is located outside the main group of farming structures and activities within the area defined by the Government Farm.

In terms of occupation, land ownership in early nineteenth century Parramatta followed a loose and informal process. Early Settlement maps indicate that although the land to the north of the river was in use for agricultural purposes, the project area was most likely unoccupied by European settlers (AHMS 2016).

2.2 Nineteenth century development

Expansion to the north of the Parramatta River was facilitated by the construction of the Church Street Bridge to the east of the project area, sometime at the end of the eighteenth century. A second crossing, constructed to connect the township with the farms on the northern bank and to facilitate work for a new gaol, was completed in 1804 and located to the east of the project area (Plate 2.1). Between 1800 and 1809 formal leases had been issued for much of the land occupying the centre of the town, and included land along George, Church and Macquarie streets. A survey completed in 1804 by James Meehan to identify available leaseholds determined that the project area was on plots occupied by three separate squatters; Thomas Arndell, Thomas Bradley and Andrew McDougal (AHMS 2016). With the exception of the gaol to the north of the river, by 1805 most of the built structures were exclusively situated to the south of the river and in 1806 the Governor William Bligh was formally granted 105 acres of land known as the 'Field of Mars' north of Parramatta that included land within the project area (Plate 2.1).

Plate 2.1 **1814 Plan, showing street alignments and the developing nature of Parramatta (project area in blue). Source: State Library of NSW, item no. M2 811.1301/1814/1.**

Activity during the beginning of the nineteenth century to the north of the river was minimal, with the land remaining unoccupied and undeveloped until the grant provided to Governor Bligh was revoked in 1819 in order to facilitate future development. In 1822 six acres of land was granted to the Agricultural and Horticultural Society of New South Wales, for the establishment of a short-lived experimental garden for the promulgation of various species of plants and trees for scientific research. The gardens were cleared of all vegetation, trees and planting associated with the Horticultural Society by 1833 (AHMS 2016).

The completion of the King's School to the north of the river in 1836 was one of the first large-scale developments that began the structural transformation of the north of the river (AHMS 2016). The school originally included a two-storey building with two single-storey wings and a large open area (now referred to as the Old Kings Parade Grounds) that extended from the school to the foreshore. By 1844 an additional building added to the King's School and also shows that the Old Kings Parade Grounds were enclosed with fencing, including a portion to the south of the site along the river and within the boundaries of project area (William Brownrigg; Plate 2.2).

No substantial structures were added to, or developed on, the grounds to the south of the school towards the end of the nineteenth century, however as indicated by Plate 2.3, the fencing present in Plate 2.2 had been fully or partially removed from the foreshore. By 1893, a bridge had been built over the Parramatta River at O'Connell Street, west the project area and above the overflow zone of the Parramatta River to connect the north and south sides of the township (AHMS 2016).

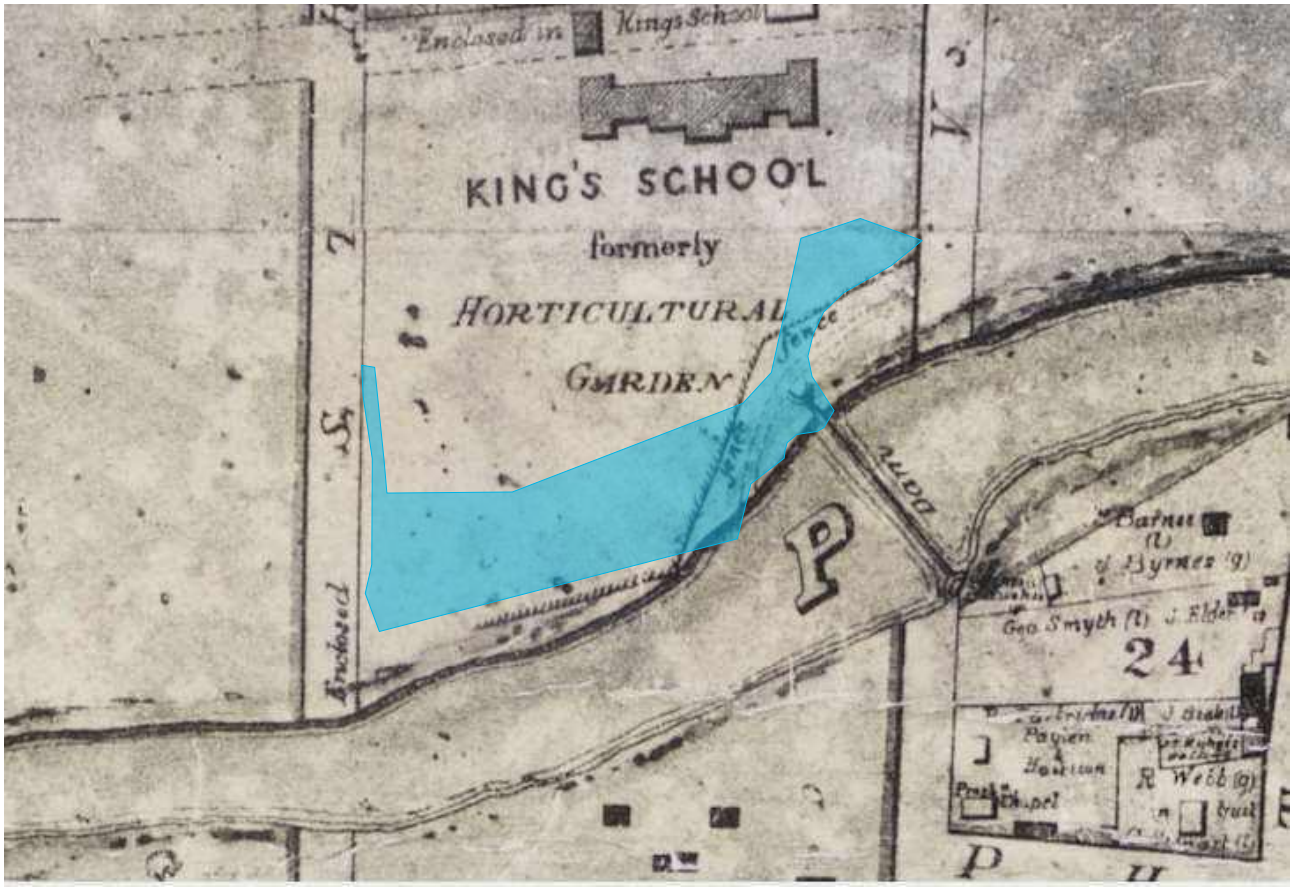


Plate 2.2 **1844 Brownrigg Plan with subject area outlined in blue. Source: Source: State Library of NSW, item no. MLSLNSW M4 811.1301/1844/1.**

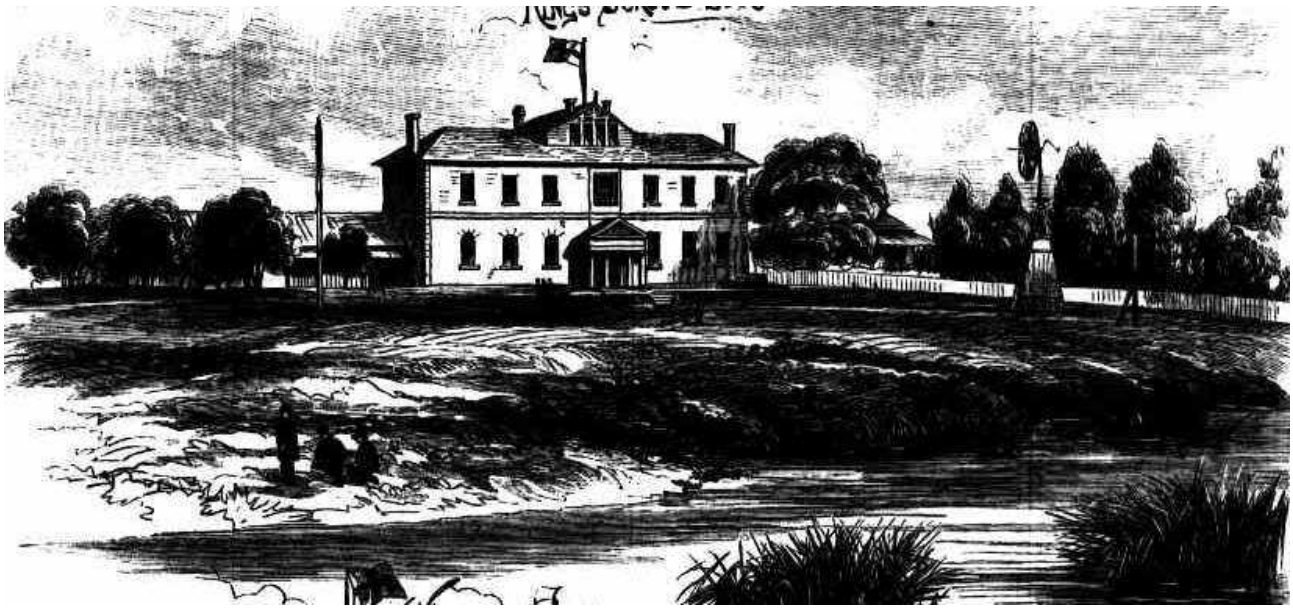


Plate 2.3 The King's School foreshore c.1882. Source: The Sydney Mail and New South Wales Advertiser, 11 March 1882, Article 162031652.

2.3 Twentieth century and later development

The foreshore remained largely undeveloped at the turn of the nineteenth century. A postcard from the early 1900s (Plate 2.4) indicates that a perimeter fence to the foreshore consisting of low posts was present on in the project area; a footpath is also visible. The earliest major development to the project area occurred between 1930 and 1943 with the introduction of terracing to the Old Kings Parade Grounds and the construction of a retaining wall to the south of the school near the foreshore. Aerial photographs from the same year also suggest that a rectilinear structure was located to the south-west of the school (Plate 2.5). The retaining wall also became the boundary that defined a shift in elevation from the elevated Old Kings Parade Grounds to the north and the lower zone near the foreshore to the south where the rectilinear structure was located. Anti-aircraft trenches are also present in the 1943 aerial photograph at the edge of the Old Kings Parade Grounds along the retaining wall and within the grounds to the west and east.

The upgrade and expansion of the old O'Connell Street and bridge occurred in 1961 and in 1964 the King's School site was sold to the New South Wales Department of Health. Aerial photography from 1965 suggests that retaining wall and rectilinear structure were extant on the site; however similar photographs from 1970 reveal that the vegetation at the edge of river had grown up to the retaining wall and the rectilinear structure to the west of the project area was no longer present or in a severely dilapidated state (Plate 2.6). Between 1975 and 1986 vegetation to the foreshore was cleared revealing that the inter war retaining wall and stairs were still present in the project area (Plate 2.7).

The site remained undeveloped until 2005 when the strip of land near the Parramatta River foreshore was subdivided from the Old Kings Parade Grounds to allow for the construction and maintenance of a public foreshore walkway way in 2006. In this period, vegetation was removed and the current concrete pedestrian pathway, referred to as the 'Kings Pathway', was introduced to the project area, extending from Parramatta Park, below O'Connell Street, through the project area and east towards Marsden Street (Plate 2.8).The Old Kings Parade Grounds were later delineated by a security fence in 2017, distinguishing it from the pedestrian zone near the foreshore. Refer to Appendix B for aerial photographs referenced within this report captured between 1930 and 2020.

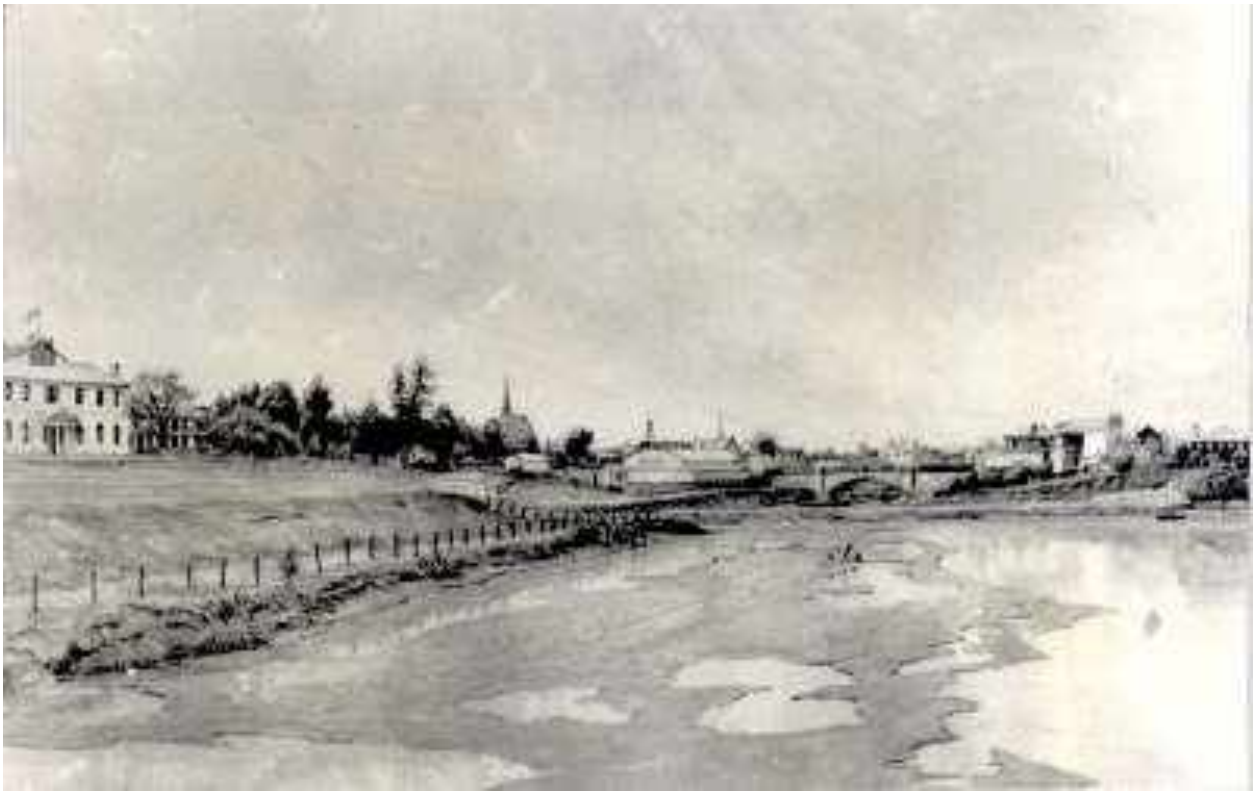


Plate 2.4 Postcard showing a view of the Kings School from across the Parramatta River in the early 1900s. Source: Local Studies and Family History Collection, Parramatta Heritage Centre.

Plate 2.5 A 1943 aerial photograph of the project area (red) with rectilinear structure (yellow), retaining wall and stairs (green). Source: SIX Maps 2020.

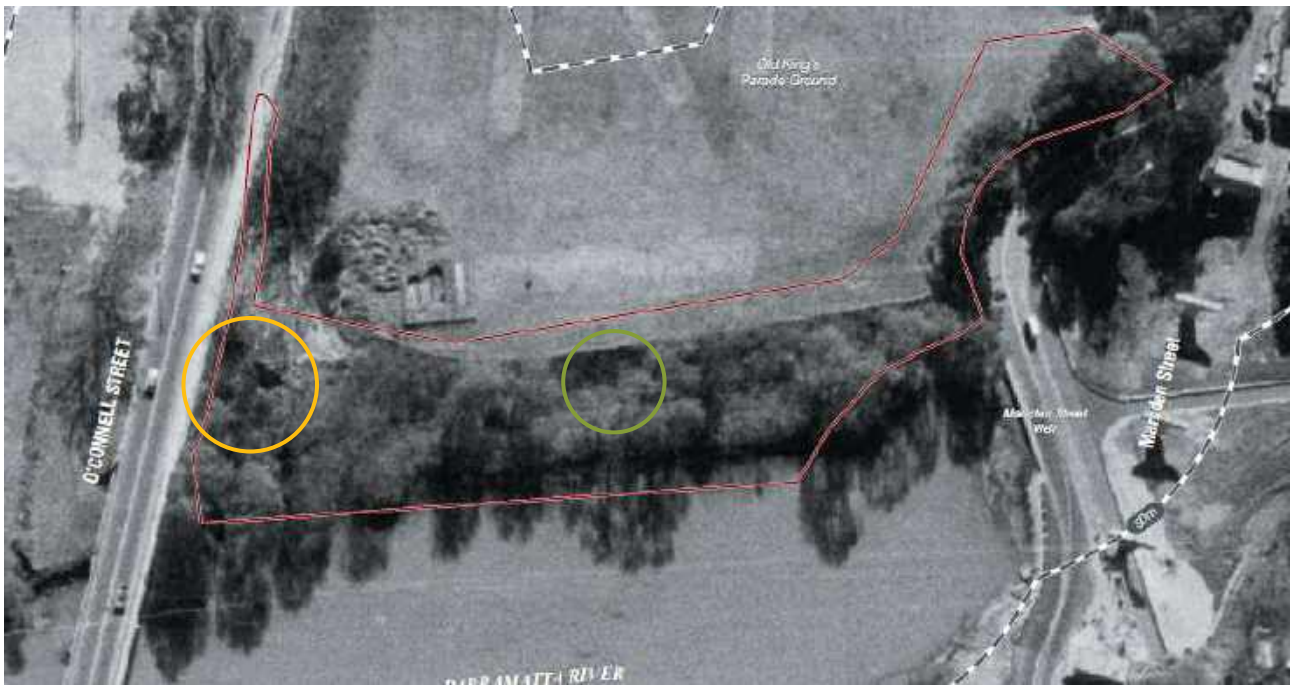


Plate 2.6 **1970 aerial photograph of the project area (red) with historic location of the rectilinear structure (yellow). Retaining wall is still present on site but staircase is hidden by vegetation (green). Source: Department of Finance, Services & Innovation.**

Plate 2.7 **1986 aerial photograph of the project area (red) with historic location of the rectilinear structure (yellow) and possible indication of incinerator. Retaining wall and stairs (green) are still present on site. Source: Department of Finance, Services & Innovation.**

Plate 2.8 **2004 aerial map of the project area (red). with historic location of the incinerator (yellow). The retaining wall and stairs (green) are no longer visible on site. Source: Department of Finance, Services & Innovation.**

3 Site analysis

3.1 Site inspection

A site inspection of the project area was undertaken on 25 March 2020 by Anthony Dakhoul and Georgia Burnett (EMM). The physical inspection was conducted to determine the topography of the project area, to identify and assess the condition of any existing historic features present and to assess whether there was potential for the discovery of relics during the proposed works.

Visual inspection of the project area indicates that there is currently no evidence of relics that would be associated with the earliest history of the site dating from the eighteenth and nineteenth centuries. This is consistent with the general history of the site as the project area was not substantially altered until the twentieth century.

The project area has been disturbed and modified between 1930 and 1943 through the filling of the foreshore to level the surface of the Old Kings Parade Ground. The introduction of services and a contemporary pedestrian pathway in 2006 added to the level of disturbance. It is evident that the sharp differentiation in elevation between the Old Kings Parade Grounds and the lower foreshore was originally defined by the 1943 modifications and further altered in 2006, to provide:

- a gradual decline in elevation towards the zone below O'Connell Street, towards Parramatta Park (Plate 3.3);
- a gradual incline for the pathway leading to O'Connell Street (Plate 3.4); and
- general filling to the terrain of the main segment of the pathway adjacent to the foreshore and to the west of the project area near the pathway leading to O'Connell Street.

Within the project area, the majority of the pedestrian pathway and turfed areas are very gently sloping (refer to Section 2.3) but generally level with the Old Kings Parade Grounds (Plate 3.1). The landscape experiences a steep decline around 3 m south of pathway at the edge of the landscape terracing where dense vegetation is present, impeding views towards the river. The pathway increases in elevation to the east of the project area towards Marsden Street.

Plate 3.1. The pathway, view east. Note the level topography, from the school (left) to the pathway (right).

Plate 3.2. The edge of the terracing, view east. Note to the right of frame, the steep slope (~60°) downwards to the river.

Plate 3.3. The project area facing O'Connell Street (background) with the remnants of the incinerator chimney, view south-west.

Plate 3.4. Example of turfing across project area and pathway towards O'Connell Street, view east.

3.2 Inspection results

3.2.1 Remnants of a brick incinerator

The remnants of a brick incinerator are located to the west of the project area near the segment of the pathway that is declining towards the zone below O'Connell Street. The feature consists of a brown brick chimney and base with a number of metal reinforcement bars fixed to its exterior and a metal plate fixed to the opening at the base with text that states "Goodrid Incinerator Sydney – Company Com Pat (commercial patent) 18480" (Plate 3.6).

The overall structure is in good condition with evidence of repointing and possible brickwork replacement. The metal reinforcement bars, and metal plate are heavily corroded, but the overall integrity of the metal features is intact. The base of the incinerator to the northern elevation is slightly below ground level as it sits at a point in the project area where the turfing is in a decline towards the zone below O'Connell Street. This is consistent with the 1943 aerial as the incinerator appears to have been located at a lower elevation than the Old Kings Parade Grounds close to the foreshore.

Although the construction date of the incinerator is unclear it would have been present within the site after the creation of the 'Goodrid Incinerator' company that was established in 1927 and before 1943. The type and style of coursing to the brickwork is inconsistent with the typical coursing used in the Colonial, Victorian and Edwardian periods but is consistent with the inter war (c. 1915-1940) and post war periods (c.1940-1960). Based on aerial photography the incinerator would have most likely been constructed in the inter war period between 1927 and 1943.

This incinerator may be associated with the rectilinear structure identified in the 1943 aerial (Plate 2.5) but not present in the 1970 aerial (Plate 2.6). Refer to Section 6.1 for further discussion regarding the relationship of these two features.

Plate 3.5. The brick incinerator, view south. Note the slightly raised pathway to the background.

Plate 3.6. Metal plate with lettering, view east.

Plate 3.7. The brick incinerator, view north.

Plate 3.8. Example of turfing across project area and pathway towards O'Connell Street, view east.

3.2.2 Remnants of a brick staircase

A brick staircase is present at the centre of the project area to the south of the pathway, at the edge of the terracing and is to a great extent covered in vegetation with only a portion visible. The full length of the staircase and the number of steps is unclear; however, the direction of the staircase is towards the water's edge of the Parramatta River. The visible brickwork appears to be in stable condition with slight surface erosion and discolouration.

This feature is most likely the staircase identified in the 1943 aerial photograph (Plate 2.5) that was associated with the retaining wall built in the same year. The retaining wall defined the boundary of the Old Kings Parade Grounds with the lower foreshore, most likely to provide a solid barrier between the grounds and the river flood zone. The staircase provided an access point to the foreshore of the Parramatta River and to the rectilinear structure and incinerator (feature described in Section 3.2.1). The staircase is currently the only visible element of the greater retaining wall and it is unclear whether the retaining wall is still present below ground level or if it was partially or fully removed during later works conducted to the project area. Around 3 m of grassed verge separates the brick staircase and terrace edge from the pedestrian pathway.

Plate 3.9. Brick staircase, view east.

Plate 3.10. Location of brick staircase (indicated with arrow to the right) and turfing separating pathway with brick staircase, view east.

3.3 Summary of findings

The site inspection confirmed the findings of the desktop assessment, in particular, that eighteenth or nineteenth century features are unlikely to exist in the project area, and a minimal number of twentieth century features dating from around the inter war period are present. These relics are consistent with structures identified in aerial photographs taken of the site from 1930 onwards and no other structures or features were found in the project area. The incinerator in particular is the most substantial structure within the project area and potentially represents a small fraction of other structures was present in its location, particularly the former rectilinear structure first identified in the 1943 aerial photograph. The staircase too, is a small fraction of the greater retaining wall it was associated with. Modifications to the landscape, turfing and vegetation have to some degree affected the and condition and visibility of both features, particularly the staircase.

4 Proposed works

The proposed alterations and additions have been designed by Lighting, Art and Science and the following description of the works is based on the provided design documentation dated February and March 2020 and technical drawings created by Edward Bennett on 6 May 2020 (Refer to Appendix A).

The proposed works involve the erection of twenty (20) new lighting installations, four (4) along the western edge of the pathway towards O'Connell Street, three (3) along the western edge of the pathway leading towards Parramatta park, below O'Connell Street and thirteen (13) along the northern edge of the pathway adjacent to the fore shore and Old Kings Parade Grounds, towards Marsden Street. Works will involve:

- excavation of pits at the specified, regular intervals to the edge of the pathways within turfed zones of the project area. The dimensions of the pits are to be relative to the dimensions of the foundation blocks (described below). It is assumed that the minimum depth of the pits are to be 500 mm;
- placement of 1200 x 1200 x 500mm re-fabricated foundation blocks (to manufacturers details) and associated baseplate within pits as footings to lighting poles (Plate 4.2);
- the erection of 6 m or 6.5 m lighting poles to footings (Plate 4.1); and
- trenching works to the edge of the pathways within turfed zones to facilitate new below ground electrical/communications conduits and wiring between lights and to existing electrical pits. The depth and width of trenching works are currently unspecified.

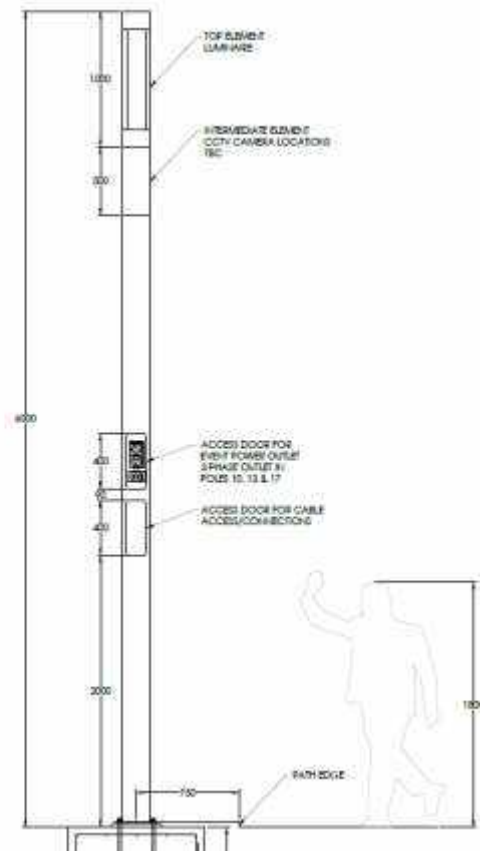


Plate 4.1 Typical pole elevation [A, B]. Source: drawings provided by Lighting, Art and Science dated February 2020 (Appendix A).

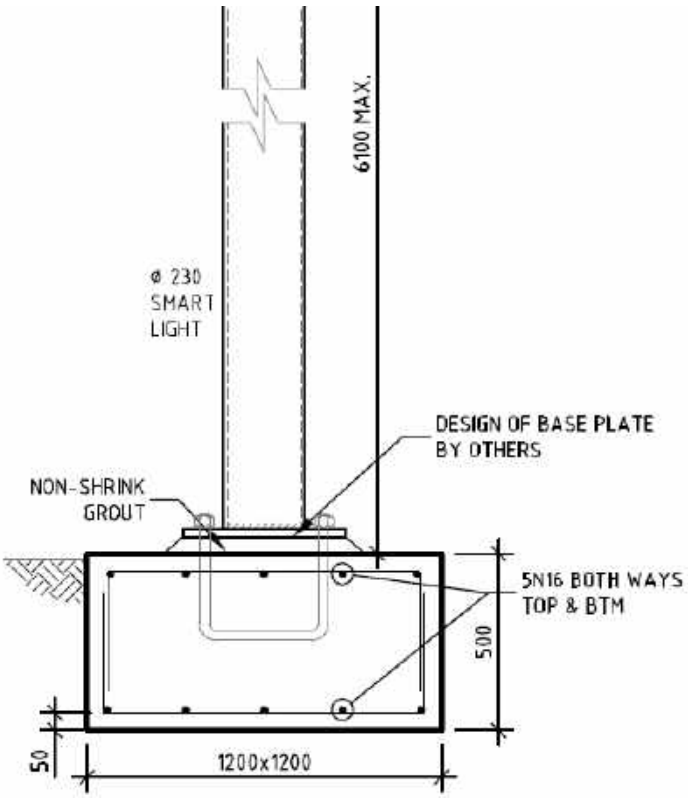


Plate 4.2 **Typical footing detail. Source: drawings provided by Edward Bennett dated 6 May 2020 (Appendix A).**

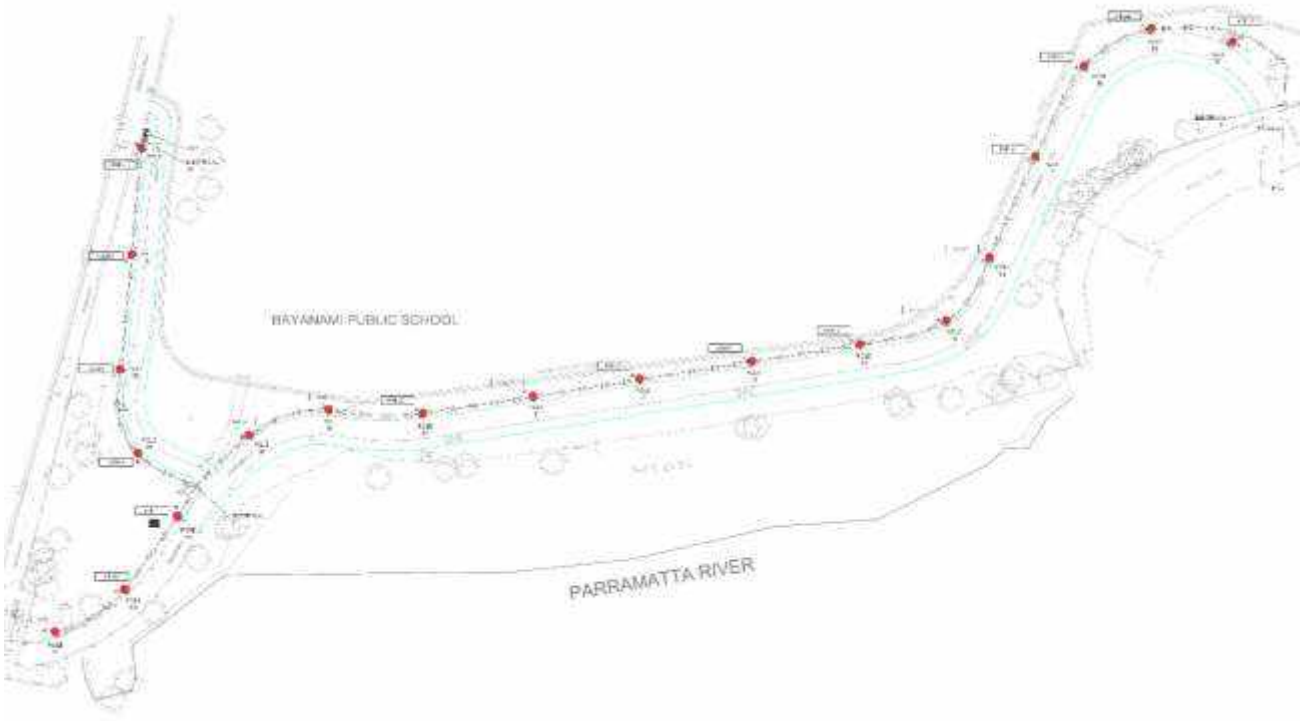


Plate 4.3 **Lighting and electrical layout with location of lighting poles indicated in red. Source: drawings provided by Lighting, Art and Science dated March 2020 (Appendix A).**

5 Heritage impact

5.1 Assessment of significance

Although the project area is located within the curtilage of two state listed items (Section 1.3) there is no specific mention of the identified features within any statutory listing or heritage inventory as items of individual or collective significance. The features are not mentioned as key elements associated with the Kings School, its grounds or the foreshore to the south of the school; however they are surviving structural features within a section of the curtilage that has historically experienced very little development. The staircase is a feature associated with a greater retaining wall introduced during significant modifications to the project area during the inter-war period.

5.1.1 The incinerator

The significance of the incinerator present in the project area lies mostly with its historic and functional connection to other, much larger incinerators located throughout the state and country, constructed in the same time period. A large number of significant incinerators were constructed during the inter-war period, particularly those designed by Walter Burley Griffin (Plate 5.1). Although the incinerator in the project area is not of the same scale, design or identified significance, its probable date of construction during the inter-war period correlates with the popularity of these structures at all scales during that time period. It also has a connection to a historic and still operating Australian company 'Goodrid Incinerators', now 'Scholer Industries', founded in 1927 as identified on the existing metal plate to the opening of the incinerator base. The incinerator is also significant as an extant external structure with a historic association to the old Kings School and with a purpose relating to the function of the school during the interwar period. It is also one of the few identified historic features or structures located at the foreshore, throughout the history of the school and the grounds.

Date	Location	Building designer	Status
1926	Sandringham (Melbourne), Victoria	Boadle (pre-RIECo)	demolished
1927	Box Hill (Melbourne), Victoria	Boadle (pre-RIECo)	extant
1928	Geelong, Victoria	Boadle (pre-RIECo)	extant
1929	Bexley (Sydney), NSW	Boadle (pre-RIECo)	demolished
1930	Kuring-Gai, NSW	Griffin and Nicholls	demolished
1930	Essendon (Melbourne), Victoria	Griffin and Nicholls	extant
1931	Waratah (Newcastle), NSW	Griffin and Nicholls	demolished
1932	Randwick (Sydney), NSW	Griffin and Nicholls	demolished
1933	Glebe (Sydney), NSW	Griffin and Nicholls	extant
1934	Willoughby (Sydney), NSW	Griffin and Nicholls	extant
1935	Pyrmont (Sydney), NSW	Griffin and Nicholls	demolished
1936	Leichhardt (Sydney), NSW	Griffin and Nicholls	demolished
1936	Hindmarsh (Adelaide), SA	Griffin and Nicholls	extant
1936	Brunswick (Melbourne),Victoria	Griffin and Nicholls	demolished
1936	Ipswich, Queensland	Griffin and Nicholls	extant
1937	Thebarton (Adelaide), SA	Griffin and Nicholls	extant
1938	Newcastle, NSW	Newcastle City Eng	demolished
1938	Canberra, ACT	Griffin and Nicholls	extant

Plate 5.1 **Incinerators designed by Walter Burley Griffin in the inter war period. Source: Walter Burley Griffin Society website.**

5.2 Assessment of heritage impact

5.2.1 Impact to identified historic features and structures

The vast majority of the proposed excavation and trenching works are to be conducted within an acceptable distance from the identified features (Section 3) and no nearby structures of heritage significance within the curtilage of the Kings School shall be impacted by the proposed works. No works shall be conducted around or in close proximity to the stair feature identified in Section 3.2.2 with no impact to its structural integrity.

Construction works are to be conducted in very close proximity to the incinerator with trenching directly to the south of the feature and the erection of a lighting pole immediately to the north east. The provided documentation indicates that the pathway for trenching and the location of excavation for footings avoids direct contact with the feature however there may be unintended impacts to the structure during construction works due to this proximity. Similarly, the presence of the lighting pole directly to the north-east may have a minor impact on the viewing of the incinerator from the pedestrian pathway.

5.2.2 Impact to significant settings

The picturesque setting of the Kings School and its relationship to the Parramatta River foreshore are of high significance. The Kings School has been siting principle along the Parramatta River since the eighteenth and early nineteenth centuries. The proposed works will not alter or modify the current sitting of the Kings School or the foreshore with all setbacks and topographies being to a great degree maintained. During the proposed excavation and trenching works the nature of the topography will be altered however this is considered negligible as works are minor and appropriate in their intervention to the landscape.

6 Archaeological potential

The project area is located to the north of the Parramatta within a segment of the foreshore that has experienced very little development since the eighteenth century and after the conception of the Kings School in 1834. A majority of the pedestrian pathway and grassed verge in the project area sits within the historical boundaries of the Old Kings Parade Grounds, as defined by the inter-war period landscape modifications and retaining wall. The presence of any significant structural or built features in this zone has not been identified prior to or after 1943 until subdivision in 2005 and the construction of the pedestrian pathway in 2006 and the grounds have remained largely an open, grassed space defining the setback of the former Kings School buildings. The 1943 aerial photograph (Plate 2.5) indicates that anti-aircraft trenches had been dug within the Old Kings Parade Grounds below much of the existing pedestrian pathway that were later re-filled. Any small-scale relics or objects that may have been present would have most likely been disturbed or destroyed during this process. The potential for the discovery of new artefacts or features in this zone is considered low.

The foreshore at the edge of the river has been dominated by vegetation with periodic clearing occurring to varying degrees at the foreshore. Based on historic plans and aerial photography, the water's edge has shifted over time as the foreshore sits within the flood plain of the Parramatta River. This zone has been largely devoid of historic built form with the exception of the identified incinerator to the west of the project area and the inter-war retaining wall and stairs that defined the steep change in elevation from the grounds to the foreshore and rivers edge. The potential for the discovery of new artefacts or features in this zone is considered low.

The potential for the discovery of new artefacts or features to the north-west along the pathway towards O'Connell Street and to north-east adjacent to Marsden Street is considered low.

Plate 6.1 **Overlay of 1943 and 2017 aerial maps with indication of location of former incinerator (yellow), retaining wall (red) and staircase (green). The historical extent of the Old Kings Parade Grounds is highlighted in red. The early 2000s pedestrian pathway is highlighted in white. Source: EMM.**

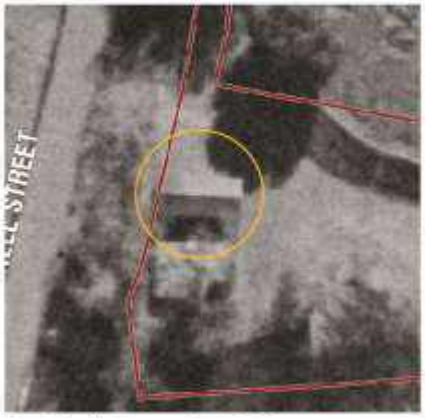
6.1 Zone surrounding the incinerator

As shown in Plate 6.2, a rectilinear structure was present to the west of the project area from at least 1943 to around 1970. Through the overlaying of historic and contemporary aerial photography, the approximate location and footprint of the structure can be determined. The structure appears to cover a segment of the existing pedestrian pathway leading towards O'Connell Street, directly north of the incinerator and east of O'Connell Street (Plate 6.2). Due to the quality of historic aerial photography and a lack of evidence surrounding both the rectilinear structure and the incinerator, it is difficult to determine if they are related in function and form.

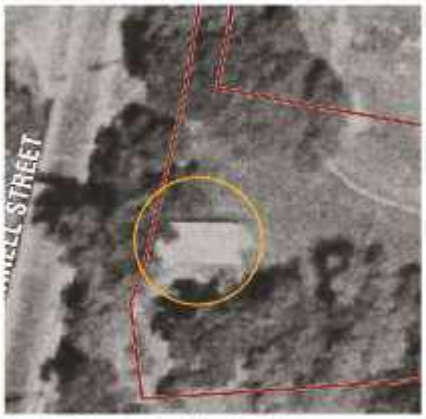
The presence of the incinerator cannot be properly determined within the project area by observing the available aerial photography, nor does it appear to puncture the roof line of the rectilinear structure. The possible presence of fencing or minor structures to the south of the rectilinear structure may be inferred from 1943 aerial photograph, which could have included an incinerator. It is probable that the two structures were most likely separate, and the incinerator was external and independent, as illustrated by the overlay of historic imagery. This is however inconclusive. The rectilinear structure would have most likely been a groundskeepers or gardeners shed or a storage shed associated with the function of the old Kings School and it may have also facilitated the storage of waste for incineration.

What is clear is that the rectilinear structure was present during the expansion of O'Connell Street in 1961 and then experienced gradual degradation over the next decade. From 1965, the structure was either demolished or in a very progressive state of degradation as it does not appear in the project area after 1970. The ambiguity surrounding both the incinerator and the rectilinear structure highlights the potential for the discovery of features associated with both. Plate 6.3 highlights the approximate zone surrounding the existing incinerator and the historic location of the rectilinear structure that may yield archaeological finds, based on historic aerial photography.

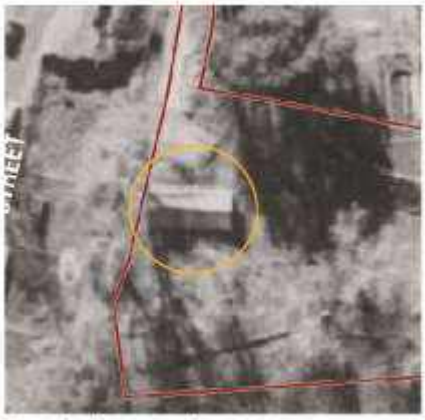
Although the overall potential for archaeological finds is low throughout the rest of the project area, within this zone the chances are elevated due to the historic presence of the rectilinear structure and the existing incinerator. The excavation required for the footings for two lighting poles and a segment of trenching may have the potential to yield archaeological finds along the pedestrian pathway identified in Plate 6.3.



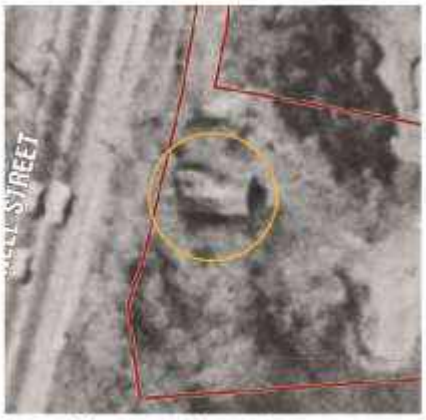
Aerial photograph - 1943



Aerial photograph - 1956



Aerial photograph - 1961



Aerial photograph - 1965

Aerial photograph - 1970

Aerial photograph - 1986

Plate 6.2 **Aerial photographs from 1930-1986. Source: Department of Finance, Services & Innovation.**

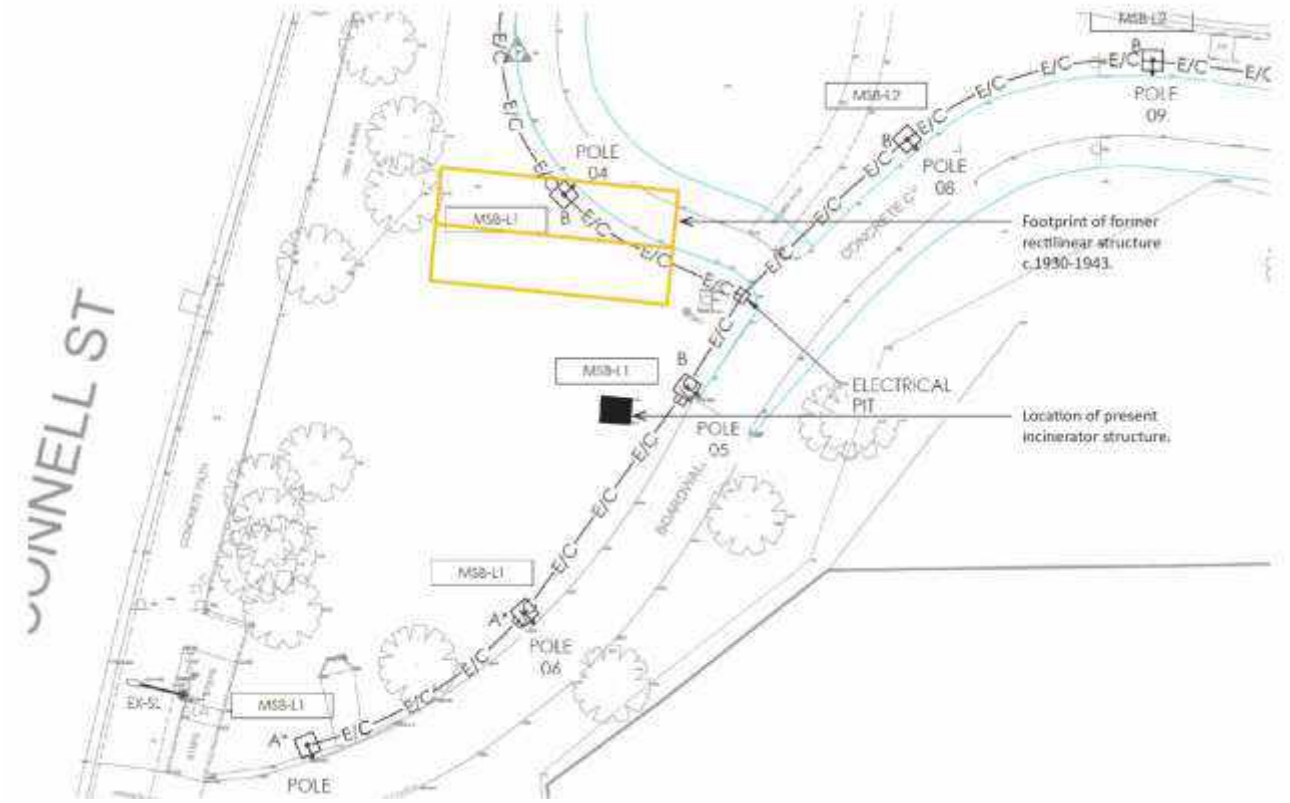


Plate 6.3 **Current location of incinerator (black) and historic location of neighboring rectilinear structure (yellow). Source: Diagram by EMM.**

7 Conclusion

7.1 Recommendations

Based on the information presented within this report, it is considered that the works may proceed with caution and in accordance with the following measures in place:

- an application for an exemption notification under Section 57(2) to be made to the NSW Heritage Council to undertake the works;
- provision of this letter report as supporting documentation for the exemption notification;
- all proposed works are to avoid direct contact with identified features within the project area and as identified in this report;
- temporary bunting is to be erected surrounding the incinerator during the works process to mitigate and potential damage or impact to its structural integrity;
- upon the completion of works, the project area is to be filled, returfed and made good where interventions have been made to the landscape; and
- if unexpected finds are discovered during any phase of the project, works must cease, and an archaeologist contacted for advice.

References

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Appendix A

Lighting design documentation

A.1 Lighting design drawings

Drawings produced by Lighting, Art & Science

Issue P1, Dated March 2020

OLD KINGS PARADE GROUND
FORESHORE LIGHTING

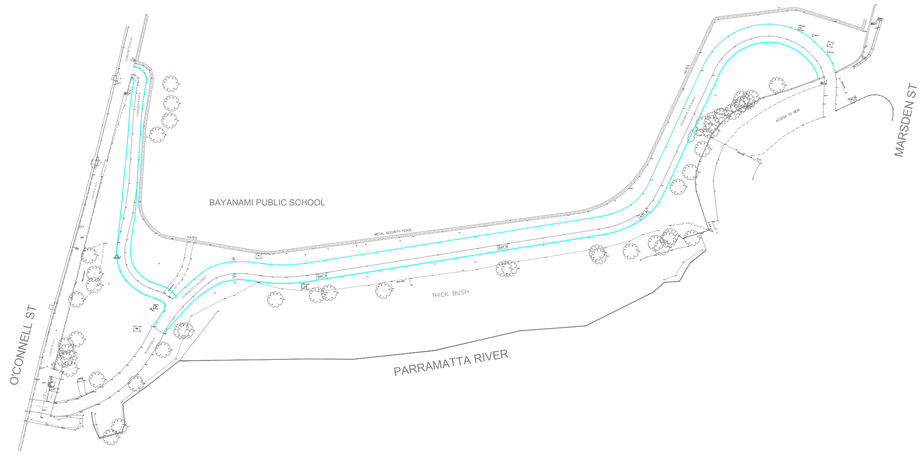
LIGHTING LEGEND

SYMBOL	DESCRIPTION	HOUSING/COLOUR	REFLECTOR	LAMP	CONTROL GEAR	SUPPLIER	PRODUCT No.
A	IP65, TOP ELEMENT LUMINAIRE WITH 120° SHIELD, MOUNTED AT 6.0m HEIGHT, ASYMMETRICAL LIGHT DISTRIBUTION	TBC	O8 AA	28W LED 500mA 3000K	INTEGRAL ELECTRONIC CONTROL GEAR	LIGHT + FORM / HESS	HESS CITY ELEMENTS CE 200-2 AA 2xLevo3 O8 28W 500mA 3000K
A*	IP65, TOP ELEMENT LUMINAIRE WITH 120° SHIELD, MOUNTED AT 6.0m HEIGHT FROM GROUND/BOARD WALK LEVEL, LIGHT POLE TO BE 6.5m TALL ALONG BOARDWALK	TBC	O8 AA	28W LED 500mA 3000K	INTEGRAL ELECTRONIC CONTROL GEAR	LIGHT + FORM / HESS	HESS CITY ELEMENTS CE 200-2 AA 2xLevo3 O8 28W 500mA 3000K
B	IP65, TOP ELEMENT LUMINAIRE WITH NO SHIELD, MOUNTED AT 6.0m HEIGHT, ASYMMETRICAL LIGHT DISTRIBUTION	TBC	O8 AR	28W LED 500mA 3000K	INTEGRAL ELECTRONIC CONTROL GEAR	LIGHT + FORM / HESS	HESS CITY ELEMENTS CE 200-2 AR 2xLevo3 O8 28W 500mA 3000K
EX-SL	EXISTING STREET LIGHTS TO REMAIN	-	-	-	-	-	-

POWER LEGEND

SYMBOL	DESCRIPTION	HOUSING/COLOUR	SUPPLIER	PRODUCT No.
	MAIN SWITCH BOARD	316 STAINLESS STEEL	-	-
	ELECTRICAL / COMMS PIT CLASS C PIT 600X600 mm	-	ACO OR EQUAL	-
–E/C–	COMMS AND ELECTRICAL CONDUITS IN COMMON TRENCH REFER PLANS FOR SIZES	WHITE ORANGE	-	-

DRAWING LIST



A — **SITE PLAN**
N.T.S.@A1

Issue	Amendment	Date
P1	PRELIMINARY ISSUE	06-03-20

N

N.T.S.

T:\Projects\L162\L162R - Old Kings Parade Ground Foreshore\L162R-OG\L162R-EL.dwg - EL-001 - 06/03/2020 - 12:41:44 PM

Lead Consultant

Client
CITY OF PARRAMATTA

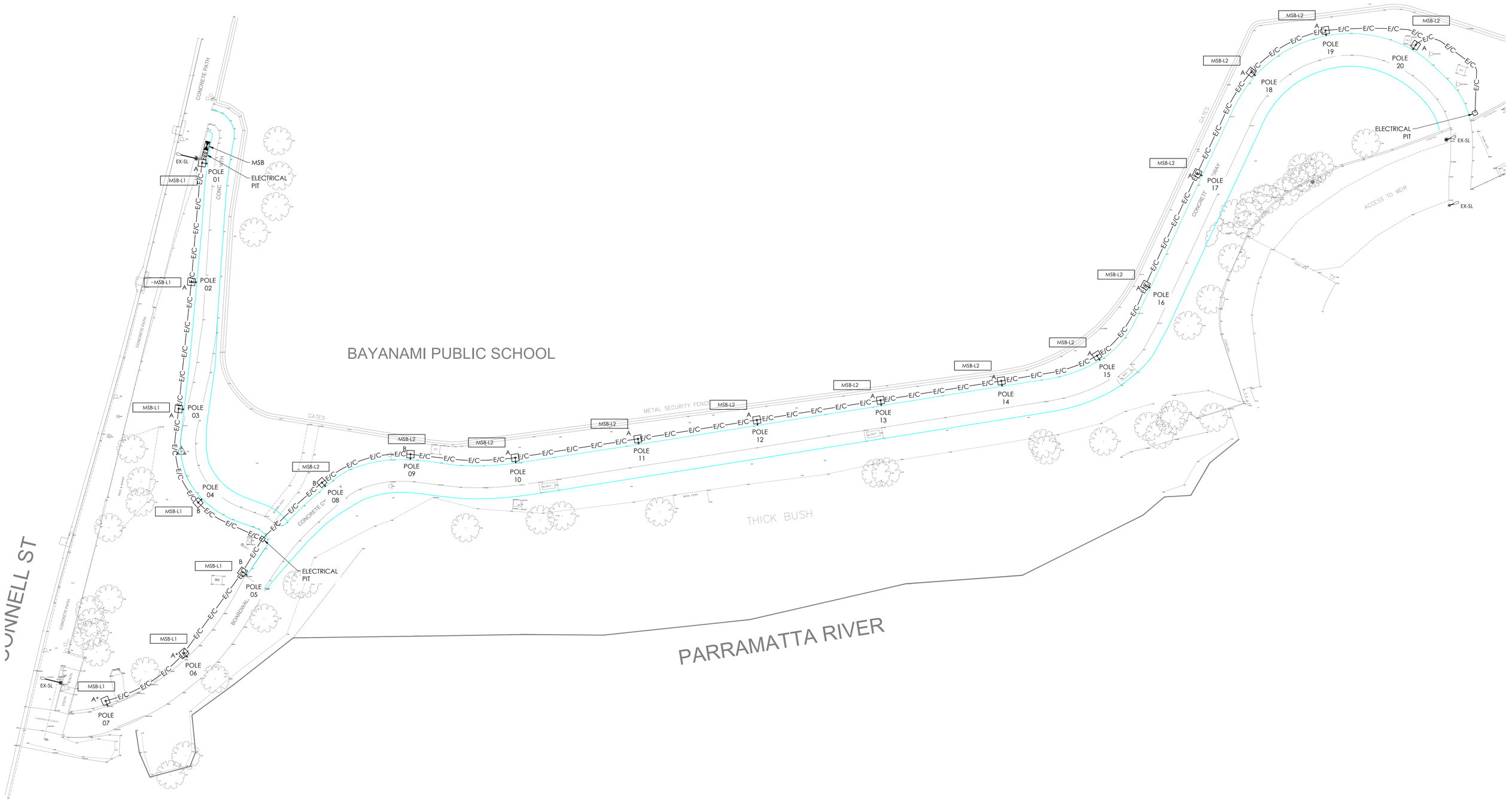
Lighting, Art & Science
Lighting Consultants, Electrical Engineers
Level 1, 41 Hume St, Crows Nest NSW 2065
p: +61 2 9436 0998 e: mail@laands.com.au

Project OLD KINGS PARADE GROUND
FORESHORE LIGHTING

Drawing LEGEND, DRAWING LIST & LOCATION PLAN

Drawn MA | Approv. RM | Date MAR 2020 | Scale N.T.S.

Project No L162R | Drawing No EL-001 | Rev P1



Issue	Amendment	Date
P1	PRELIMINARY ISSUE	06-03-20

Notes:
1. Pathways Lighting Design to Category P1 - AS/NZS 1158.3.1:2005:
   - Average Horizontal Illuminance > 7.0 lx
   - Point Horizontal Illuminance > 2.0 lx
   - Horizontal Uniformity Max/Avg < 10
   - Point Vertical Illuminance > 2.0 lx
2. Proposed larger path edge

Lead Consultant

Client
CITY OF PARRAMATTA

Lighting, Art & Science
Lighting Consultants, Electrical Engineers
Level 1, 41 Hume St, Crows Nest NSW 2065
p: +61 2 9436 0998 e: mail@laands.com.au

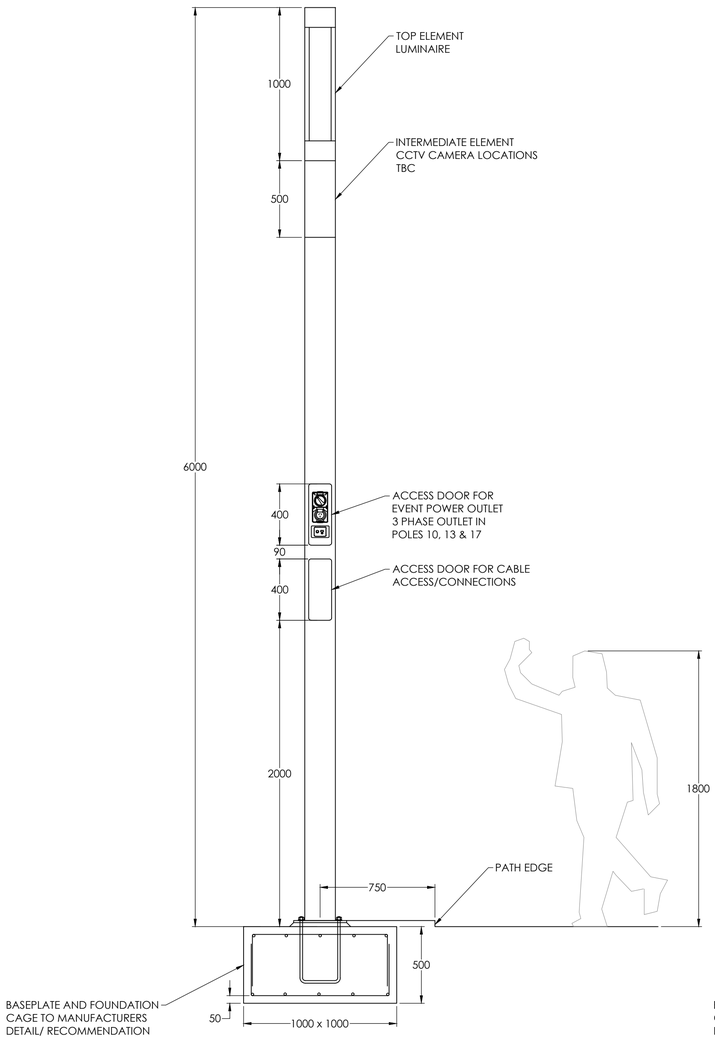
Project OLD KINGS PARADE GROUND FORESHORE LIGHTING

Drawing LIGHTING & ELECTRICAL LAYOUT

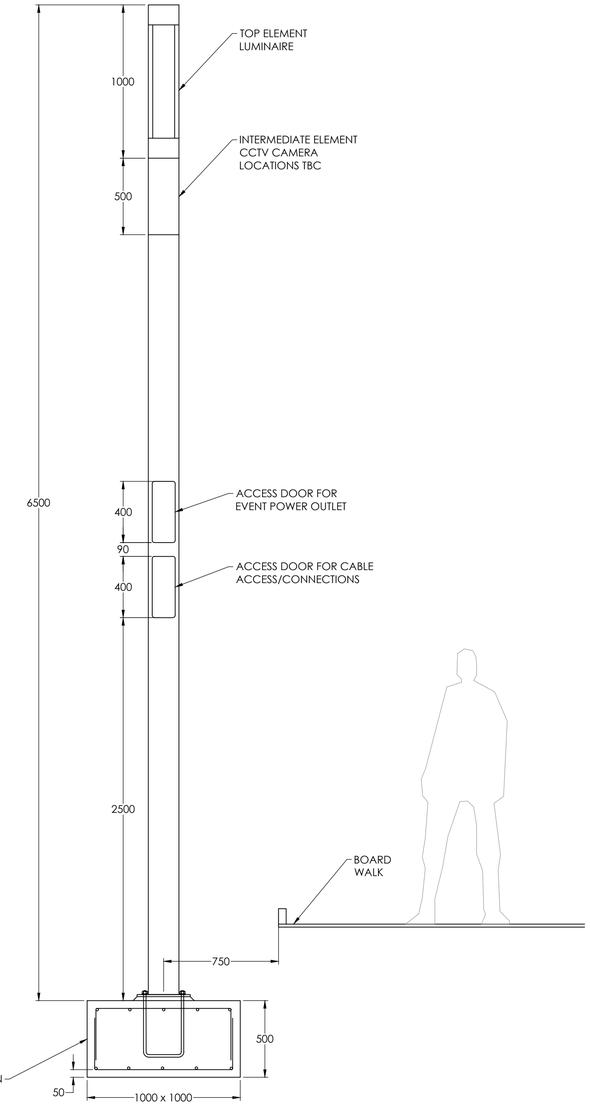
Drawn MA | Approv. RM | Date MAR 2020 | Scale 1:250@A1

Project No L162R | Drawing No EL-100 | Rev P1

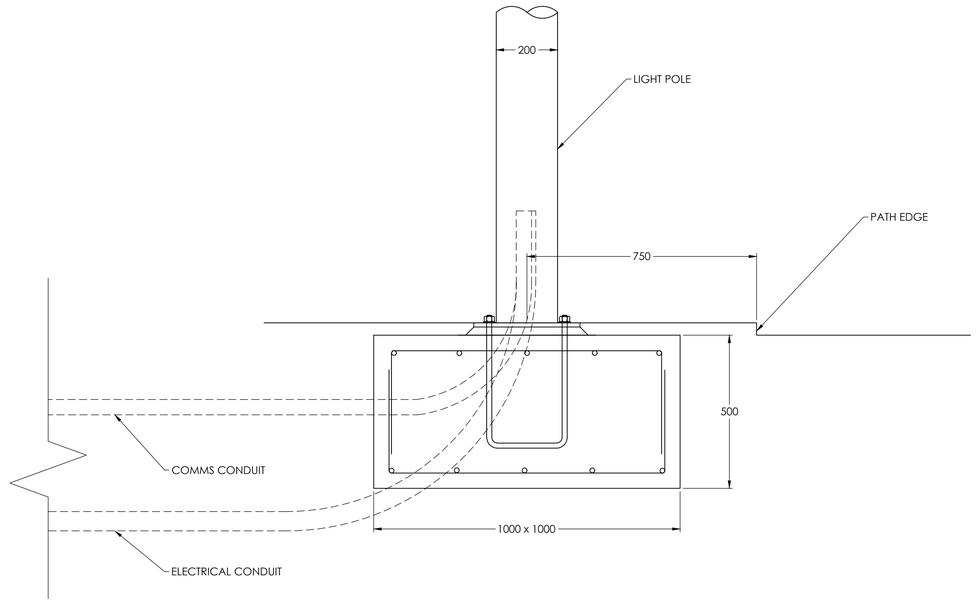
T:\Projects\L162\L162R - Old Kings Parade Ground Foreshore\L162R-DG\L162R-EL.dwg - EL-100 - 06/03/2020 - 12:41:59 PM



01 **TYPICAL POLE ELEVATION [A, B]**
1:20@A1



02 **TYPICAL POLE ELEVATION [A*]**
1:20@A1



03 **TYPICAL FOOTING DETAIL**
1:10@A1

04 **AA TOP ELEMENT IMAGE**
N.T.S.@A1

05 **AR TOP ELEMENT IMAGE**
N.T.S.@A1

Issue	Amendment	Date
P1	PRELIMINARY ISSUE	25-02-20

Notes:
1. Provide pole shop drawings
2. 3 Phase event power outlet inside lighting columns - Pole 10, Pole 13 & Pole 17

AS SHOWN

T:\Projects\L162\L162R - Old Kings Parade Ground Foreshore\L162R-DG\L162R-EL.dwg - EL-200 - 06/03/2020 - 12:42:15 PM

Lead Consultant

Client
CITY OF PARRAMATTA

Lighting, Art & Science
Lighting Consultants, Electrical Engineers
Level 1, 41 Hume St, Crows Nest NSW 2065
p: +61 2 9436 0998 e: mail@laands.com.au

Project OLD KINGS PARADE GROUND
FORESHORE LIGHTING

Drawing LIGHTING DETAILS

Drawn MA | Approv. RM | Date FEB 2020 | Scale AS SHOWN

Project No L162R | Drawing No EL-200 | Rev P1

A.2 Lighting technical drawing

Drawings produced by Edward Bennett

Drawing no. F-11-267713B

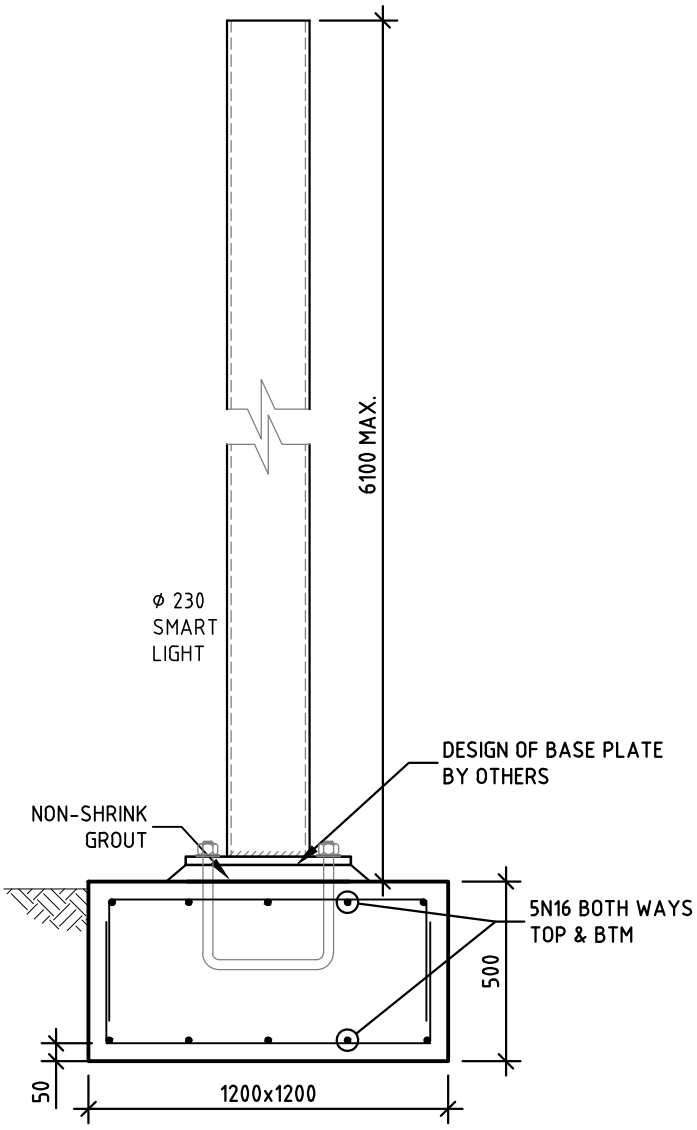
Amendment B, 6 May 2020

CIVIL & STRUCTURAL ENGINEERING
DESIGN SERVICES PTY. LTD. ACN. 051 307 852

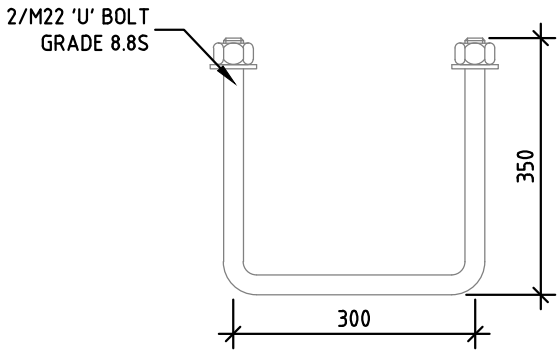
CONSULTING STRUCTURAL, CIVIL, GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

3 Wanniti Road BELROSE 2085

PHONE 61-02 9975 3899
FAX 61-02 9975 1943
MOBILE 0407 753 899
EMAIL hited@bigpond.net.au



FOOTING DETAILS
1:20



'U' BOLT DETAILS
1:10

NOTE:

FOOTINGS HAVE BEEN DESIGNED FOR MIN. 75 KPA SOIL BEARING CAPACITY.

DESIGN WIND SPEED:
45 M/S
TC: 2
REGION: A1-7

Registered Professional Engineer 198230
Mr Edward A. Bennett
MIEAust CPEng

Signature.....Date 05 / 12 / 2019

Register on the NPER in the Category of
Civil/Environmental/Structural/Geotechnical
National Professional Engineers Register

CLIENT: FORM AND LIGHT
PROJECT: FOOTING DETAILS FOR 6.1M LIGHT POLE TO BE INSTALLED IN PARRAMATTA

Drawn By: SD	Scale: AS SHOWN
Checked By: E. A. BENNETT M.I.E. Aust.	Drawing No.: F-11-267713B
Date: 05/12/2019	Amendment B-06/05/2020

Appendix B

Aerial photographs

B.1 Appendix Heading

Text here

LIR-01196 Aerial Photograph 1930 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1930

LAND INSIGHT & RESOURCES

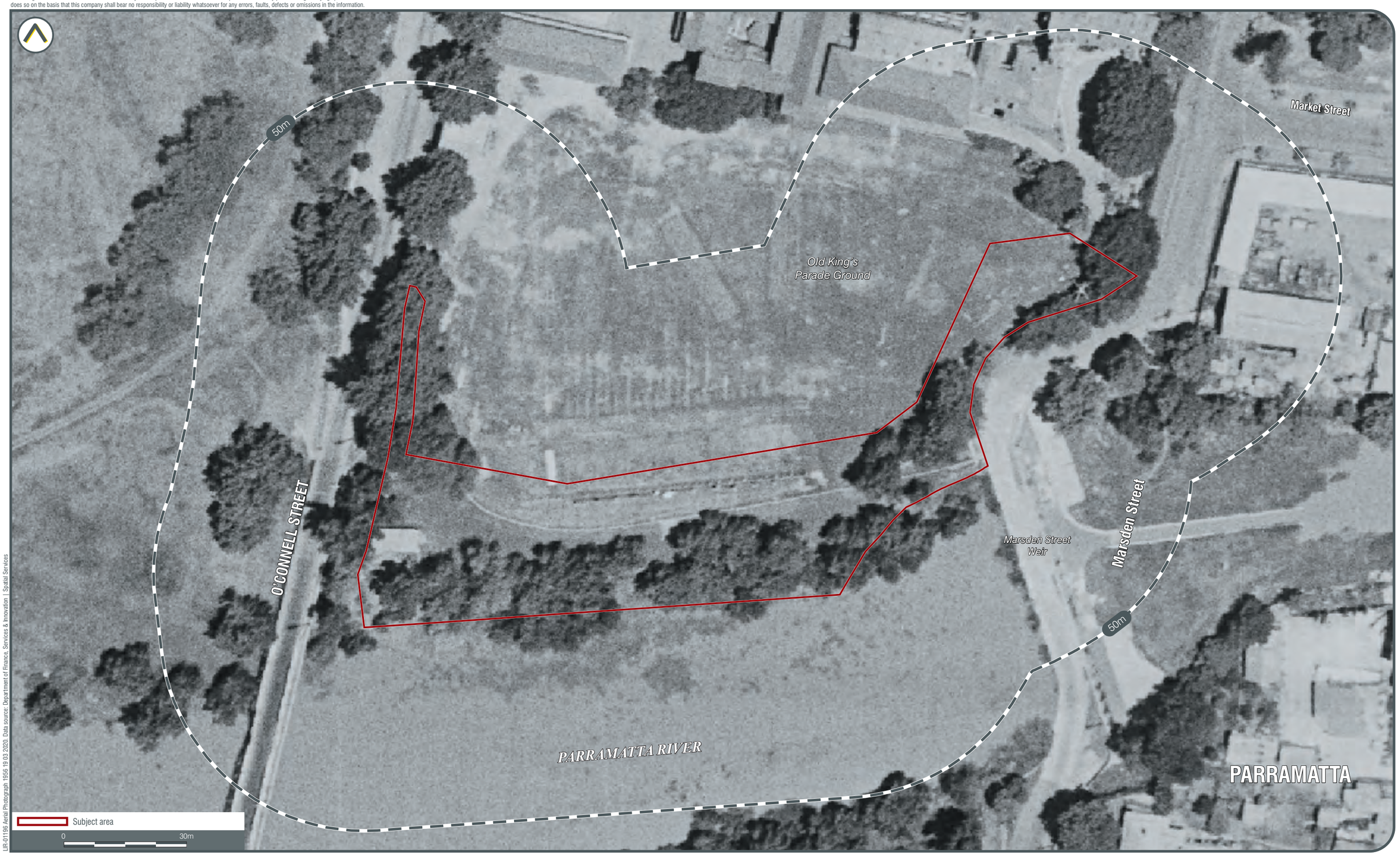
MAP 1

LIR-01196 Aerial Photograph 1943 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1943

LAND INSIGHT & RESOURCES

MAP 2

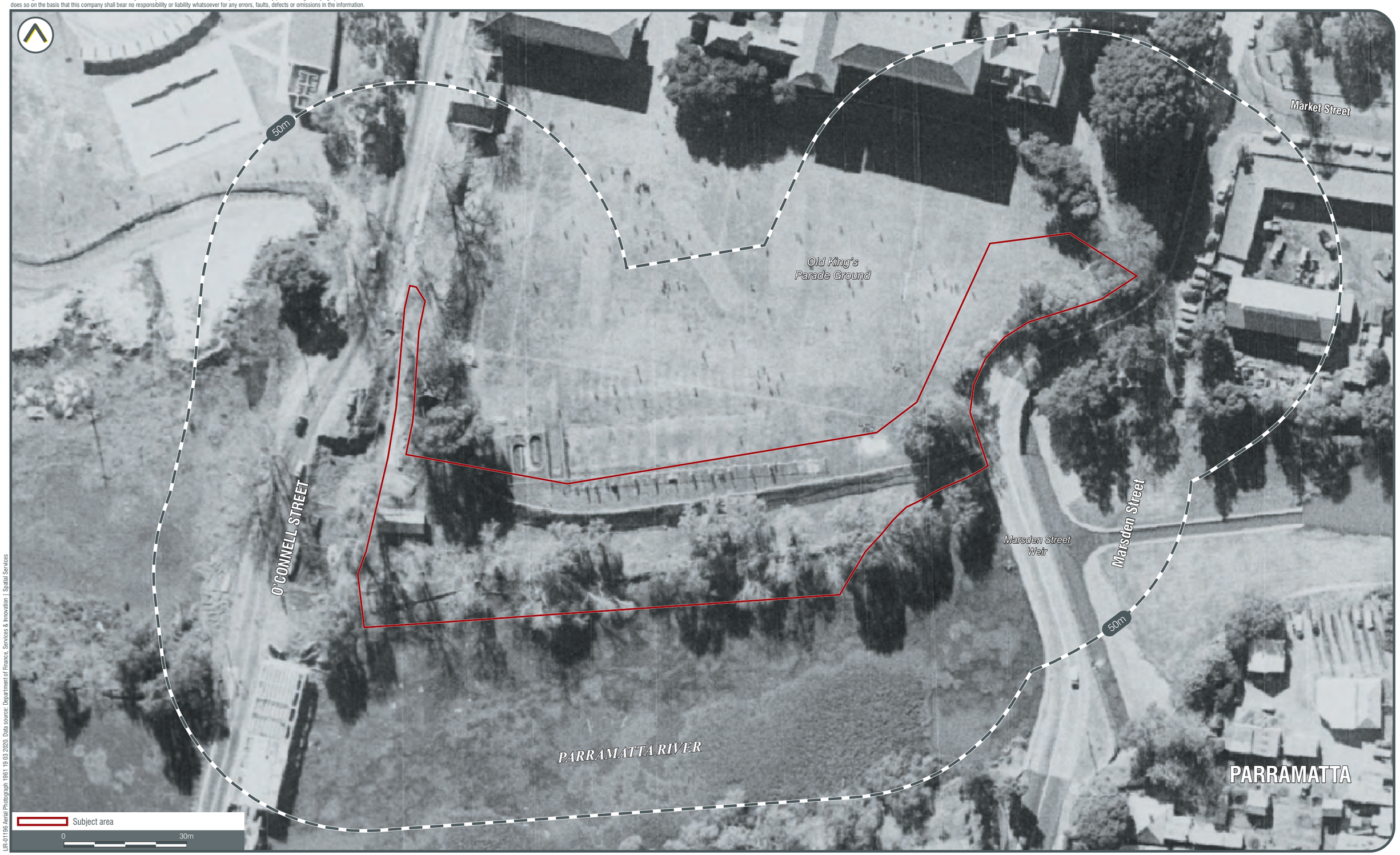


LIR-011196 Aerial Photograph 1956 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1956

LAND INSIGHT & RESOURCES

MAP 3



LIR-01196 Aerial Photograph 1961 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1961

LAND INSIGHT & RESOURCES

MAP 4

LIR-01196 Aerial Photograph 1965 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1965

LAND INSIGHT & RESOURCES

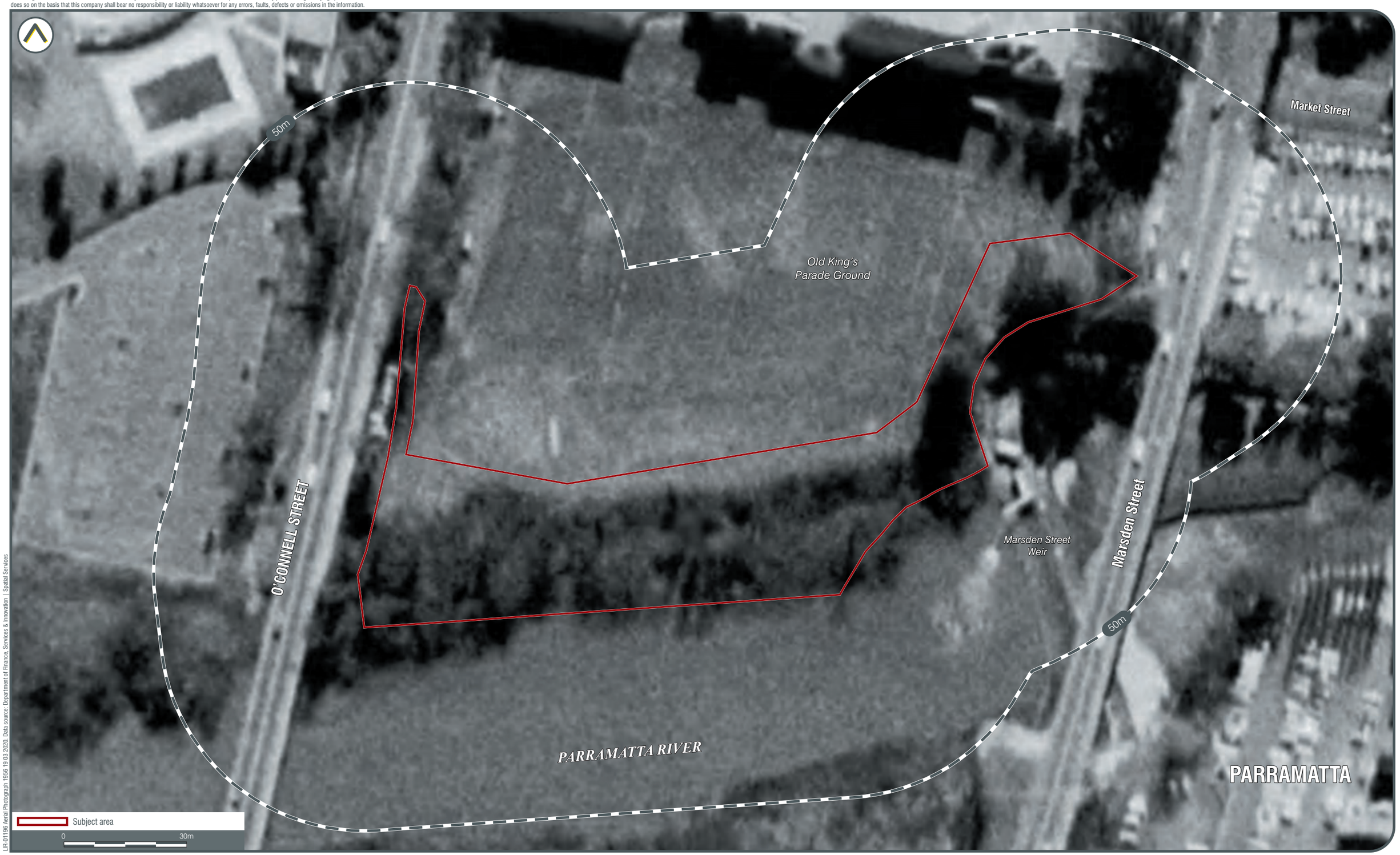
MAP 5

LIR-011196 Aerial Photograph 1970 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1970

LAND INSIGHT & RESOURCES

MAP 6



UR-01196 Aerial Photograph 1956 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1975

LAND INSIGHT & RESOURCES

MAP 7

LIR-01196 Aerial Photograph 1986 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1986

LAND INSIGHT & RESOURCES

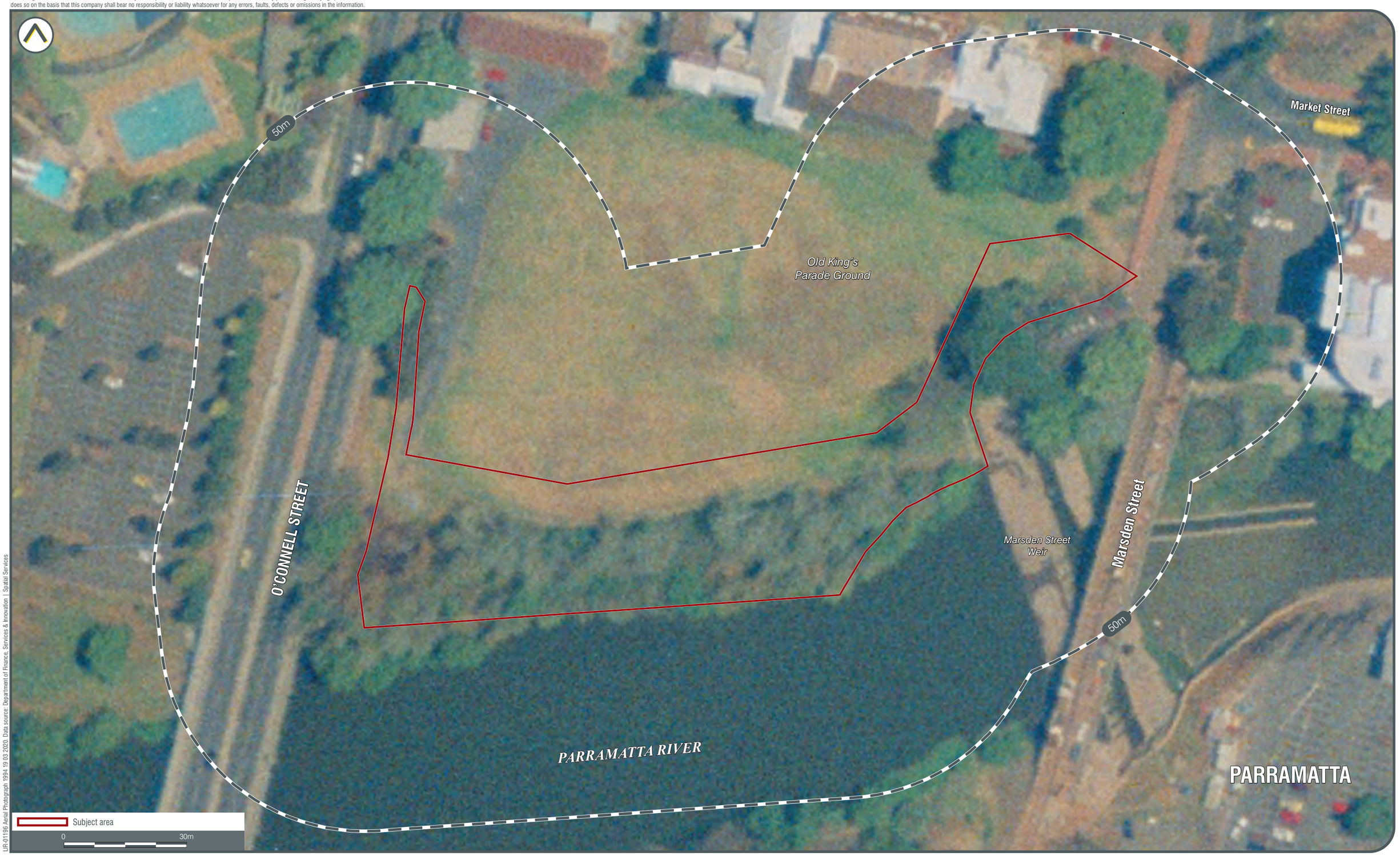
MAP 8

LIR-01196 Aerial Photograph 1991 19.03.2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1991

LAND INSIGHT & RESOURCES

MAP 9



LIR-01196 Aerial Photograph 1994 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1994

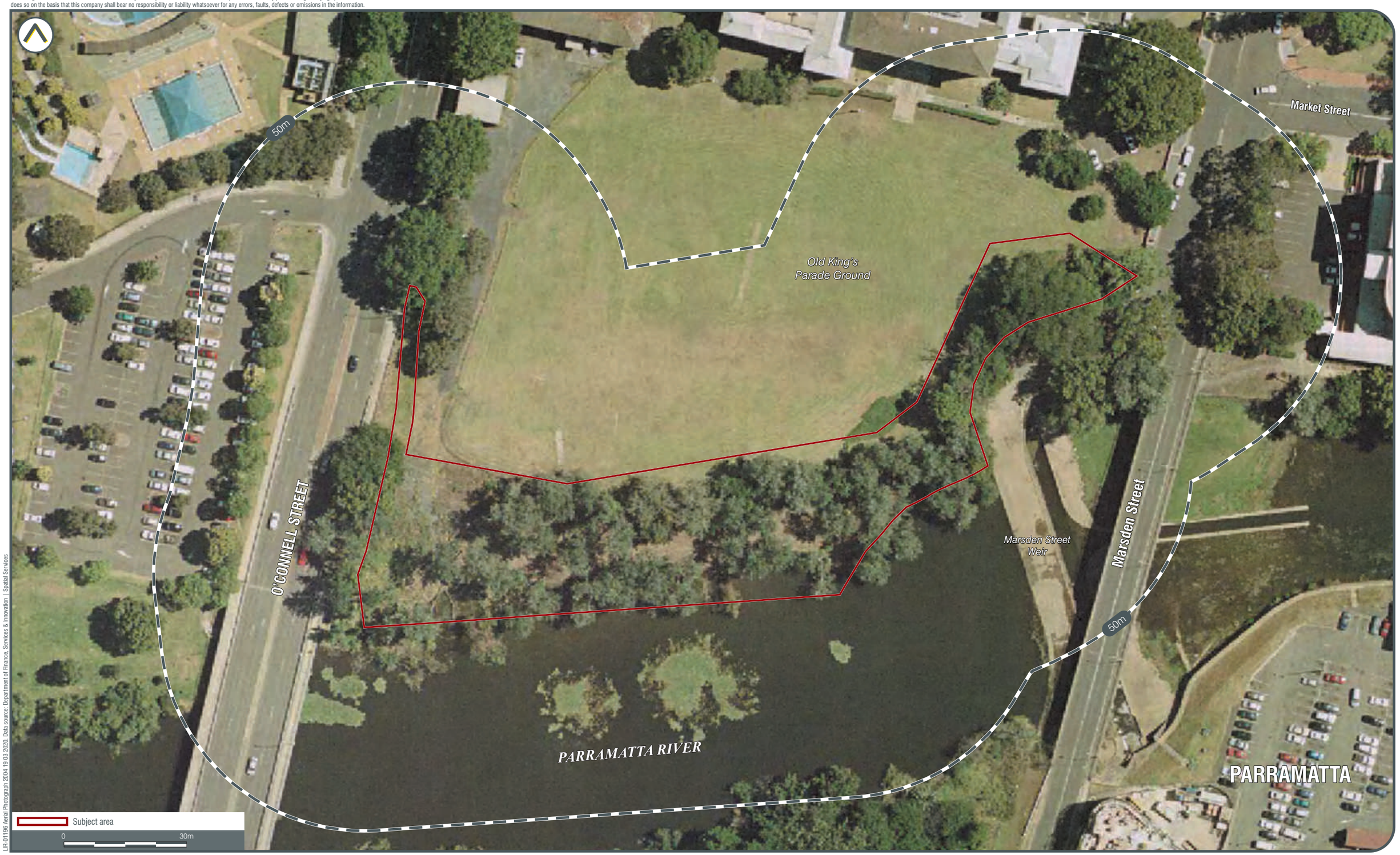
LAND INSIGHT & RESOURCES

MAP 10

AERIAL PHOTOGRAPH - 2002

LAND INSIGHT & RESOURCES

MAP 11



LIR-011195 Aerial Photograph 2004 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 2004

LAND INSIGHT & RESOURCES

MAP 12

LIR-01196 Aerial Photograph 2009 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 2009

LAND INSIGHT & RESOURCES

MAP 13

AERIAL PHOTOGRAPH - 2012

LAND INSIGHT & RESOURCES

MAP 14

LIR-01196 Aerial Photograph 2017 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 2017

LAND INSIGHT & RESOURCES

MAP 15

AERIAL PHOTOGRAPH - 2020

LAND INSIGHT & RESOURCES

MAP 16

Appendix D

Aboriginal Heritage Due Diligence Assessment – EMM Consulting Pty Ltd

Ground floor, 20 Chandos Street
St Leonards NSW 2065
PO Box 21
St Leonards NSW 1590

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

1 May 2020

Ron Pidcock
Portfolio Manager
City of Parramatta
126 Church Street
Parramatta NSW 2150

Re: Old Kings Parade Ground - Foreshore Lighting - Aboriginal heritage due diligence assessment

Dear Ron,

The City of Parramatta (CoP) has engaged EMM Consulting Pty Ltd (EMM Heritage) to complete an Aboriginal heritage due diligence assessment of proposed lighting installations along the existing pathway adjacent to the Old Kings Parade Ground (Lot 4 DP1132683; Figure 1.1). CoP is seeking advice on the potential heritage constraints, assessment and approval requirements for the project prior to construction.

This document presents an application of the NSW Department of Planning, Industry and Environment (DPIE) (formerly NSW Office of Environment and Heritage) *Due Diligence Code of Practice for the Protection of Aboriginal Objects* (DECCW 2010) to the proposed activity. This includes a review of the existing environmental and archaeological contexts of the region, and site inspection of each location to identify the presence of any Aboriginal objects that may constrain or affect the proposed activities. We then consider the risk of harm to Aboriginal objects and provide recommendations to either allow the works to proceed or outline future assessment and approval steps that would be required for them to occur.

Should you have any questions or concerns please do not hesitate to contact Georgia Burnett or myself on 02 9493 9500.

Yours sincerely

Dr Alan Williams FSA MAACAI
Associate Director, National Technical Lead, Aboriginal Heritage
awilliams@emmconsulting.com.au

1 Background

The City of Parramatta (CoP) has engaged EMM Consulting Pty Ltd (EMM Heritage) to complete an Aboriginal heritage due diligence assessment of lighting installations along the existing pathway adjacent to the Old Kings Parade Ground (Lot 4 DP1132683; Figure 1.1). Current design plans indicate that installing the lighting will disturb the ground surface, and up to 50cm below current surface levels. CoP is seeking advice on the potential heritage constraints, assessment and approval requirements for each site to determine development priorities.

1.1 Assessment framework

In NSW, Aboriginal objects, whether recorded or yet undiscovered, are afforded statutory protection under the *National Parks and Wildlife Act 1974*. Under Section 86 of the Act, it is an offence to disturb, destroy or deface Aboriginal objects without the approval of the Director General of the Department of Planning, Industry and Environment (DPIE). A breach of Section 86 of the *National Parks and Wildlife Act 1974* could result in prosecution and fines in excess of $1 million. The Department of Planning, Industry and Environment (DPIE) provides a series of guidelines as a framework for identifying and managing Aboriginal heritage and the cultural heritage interests of Aboriginal parties within development planning contexts. The Due Diligence process is the first step and is outlined in the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010) guidelines; and is intended to identify whether a proposed activity is likely to harm Aboriginal objects.

The *Environmental Planning and Assessment Act 1979* (EP&A Act) establishes the framework for cultural heritage values to be formally assessed in the planning and development consent process. The EP&A Act requires that environmental impacts are considered before land development and includes impacts on cultural heritage items and places as well as archaeological sites and deposits. The EP&A Act also requires that local governments prepare planning instruments, such as Local Environmental Plans (LEPs) and Development Control Plans (DCPs) to provide guidance at the local level of environmental assessment required, it also includes a range of planning instruments that can include Aboriginal objects, sites and places, although these would still generally be managed under the National Parks and Wildlife Act 1974.

Please note this letter report addresses only the proposed development of the study area as indicated in the design plans issued to EMM Heritage on 17 March 2020. It is an initial investigation of constraints and opportunities pertaining to identified existing and potential Aboriginal heritage sites and places on and/or in the immediate vicinity of the study area. It is not an Aboriginal Cultural Heritage Assessment (ACHA) and is not sufficient to support an application for an Aboriginal Heritage Impact Permit (AHIP), in accordance with section 90 of the *National Parks and Wildlife Act 1974*.

This letter report does not address historical or built heritage; a separate historical archaeological baseline assessment and statement of heritage impact is being prepared by EMM Heritage.

1.2 Methods

The due diligence guidelines provide a generic code of practice used to determine whether activities will harm an Aboriginal object and, if so, what measures can be taken to avoid that harm. A summary of the due diligence is shown in Plate 1.1. This report follows the due diligence guidelines. In summary, the assessment involves:

- a search of the Aboriginal Heritage Information System (AHIMS) database;
- consideration of the environmental context for the presence of Aboriginal objects or places;
- consideration of existing Aboriginal cultural heritage studies in the area and region for the presence of Aboriginal objects or places;
- a site inspection project area by an EMM archaeologist to identify any Aboriginal objects or areas of potential archaeological deposit (PAD); and
- determination of whether further heritage investigation and impact assessment is required.

If the due diligence assessment determines that Aboriginal objects or places are likely to be harmed, an AHIP is required to manage harm as defined by Part 6, Section 86 of the *National Parks and Wildlife Act 1974*.

1.3 Authorship

This report was authored by Georgia Burnett (EMM Archaeologist) and reviewed by Dr Alan Williams FSA MAACAI (Associate Director and National Technical Lead, Aboriginal Heritage).

Figure 1.1 The study area

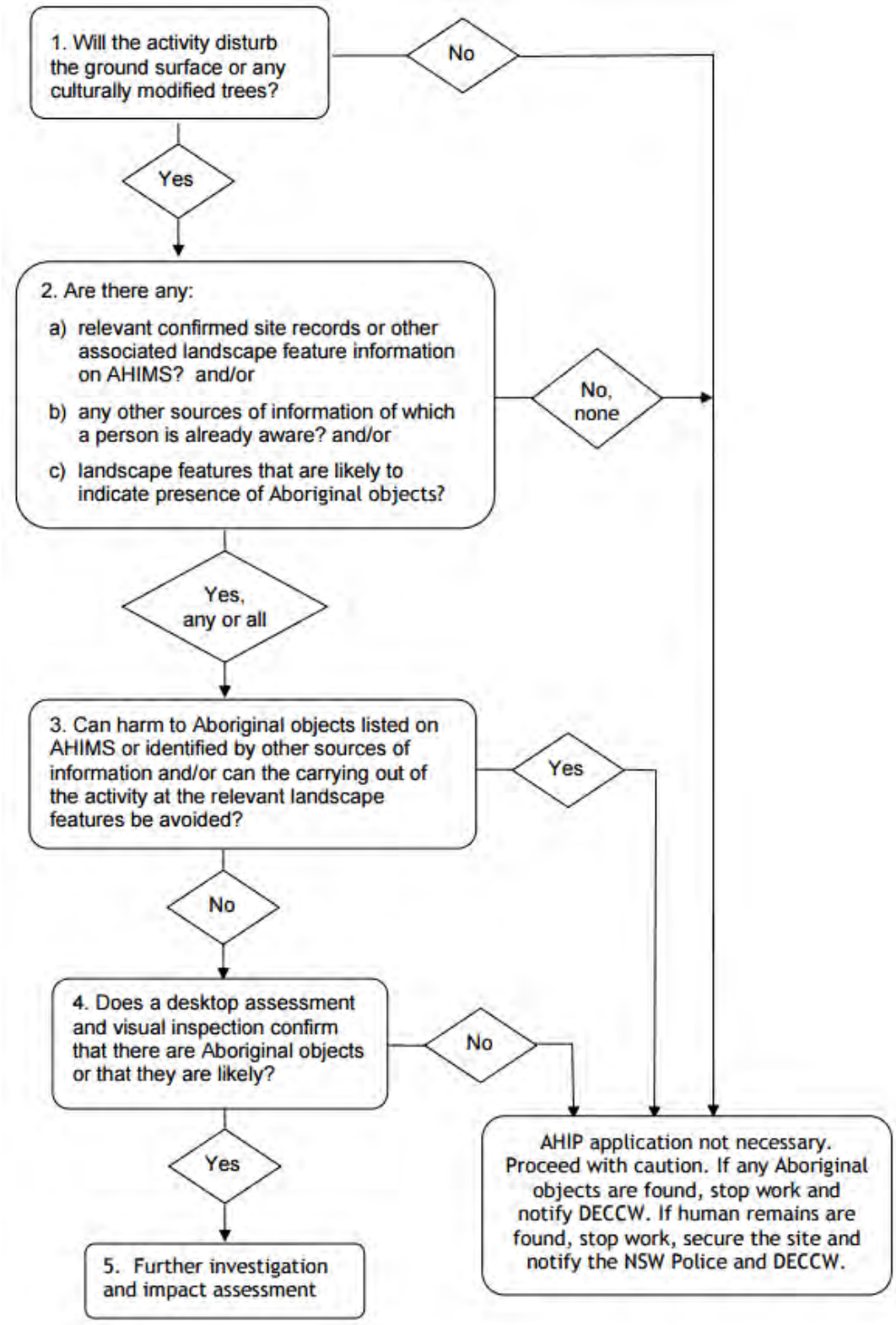


Plate 1.1 Due diligence process summary (Source: Due Diligence Code of Practice [DECCW 2010])

2 Environmental context

The environmental context is used to predict the spatial distribution, preservation and likelihood of archaeological material. Landscape features were an important factor for the choice of camping, transitory and ceremonial areas used by Aboriginal people. Natural resources, including raw stone materials and local flora and fauna, would have provided food, tools and material resources. These resources are linked to the topography, hydrology, geology and soil types in the region. Additionally, natural and anthropogenic (human-made) site formation processes influence the present location of archaeological material (e.g. if moved through disturbance), along with its preservation and archaeological integrity.

The study area is located on the Cumberland Plain, an extensive low-lying plain within the Sydney Basin. The subject area overlies the Bringelly sub-group of the Wianamatta Group shales, and the surficial geology is dominated by alluvial materials derived from the Wianamatta Group. The local topography is characterised by level to gently undulating alluvial floodplains adjacent Parramatta River. The local relief is typically up to 10m with slopes less than 30%. This landscape restricts the occurrence of some archaeological site types, such as rockshelters, rock engravings, and grinding grooves, which require sharp exposed sandstone relief not common in these areas. Conversely, surface artefact scatters and buried cultural material are likely to be more prevalent.

Soil mapping indicates the study area is situated on the fluvial Birrong soil profile. Within the context of the study area, this landscape comprises level to gently undulating floodplains along watercourses on the Cumberland Lowlands. The soil profile of this landscape is characterised by silty clay loam (<40cm) overlying hardsetting clay loam (<35cm) onto silty clay or clay. However, geotechnical and archaeological research has been extensive in the Parramatta CBD and environs, and has identified that much of Parramatta is underlain by a deep fluvial sand body variously referred to as the Parramatta Sand Sheet, Body or Terrace, as well as alluvial clays and muds of Clay Cliff Creek (Figure 2.3). (The latter unlikely to be near the study area, generally situated south of the CBD). As outlined in subsequent sections, this sand unit is of archaeological interest.

The Parramatta sand body was mapped by GroundTruth Consulting (2008) using a combination of landforms, contours and occasional excavations to indicate the extent of these units. Despite being largely desktop based, GroundTruth's map has proved robust over the last decade. Excavations within the sand body have found it to be largely situated between ~4-8m AHD, and constrained within ~200m of the Parramatta River. The deposit extends along the Parramatta River for approximately 2.5km, largely on the south side of the river, although there are also small sections on the north bank - the study area is situated within one of these pockets. Recent archaeological excavations on the north bank of the river at Bayanami Public School (formerly O'Connell Street Public School) and St. Patricks Cathedral have found variations within the sand sheet when compared to the south bank. Specifically, the sand sheet appears to be thinner and more constrained to the (within ~100m) of the Parramatta River (Extent 2018, 2019a).

Within the study area, mapping suggests that the southern half of the study area, including most of the existing pathway, may be underlain by more recently deposited Holocene silt and sand, rather than the deep alluvial deposits of the sand sheet (Figure 2.3). The soil material within this unit exhibited almost no soil profile development, suggesting that it may be active erosional sediments triggered by post-European destabilisation of the catchment (GroundTruth 2008). Based on GroundTruth mapping and previous subsurface assessments, described in detail below, it is likely the study area is positioned partially between the two soil profiles, with the northern portion retaining potential for the sand sheet and the southern half likely restricted to recently deposited and/or active erosional sediments.

Particular landforms are known to have been favoured locations for repeated or long-term occupation, and are therefore more likely to retain archaeological evidence of past Aboriginal use. Within the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010), DPIE specifies five landscape features which are likely to indicate the presence of Aboriginal objects: (i) within 200m of waterways; (ii) within a sand dune system; (iii) on a ridge top, ridge line or headland; (iv) within 200m below

or above a cliff face; and, (v) within 20m of or in a cave, rock shelter, or a cave mouth. The study area fulfils criterion (i), and arguably (ii) – while not a sand dune in terms of its formation processes, the sand body has many other aspects of this type of landform when considering its past anthropogenic use.

Offset against the landforms of archaeological interest is any disturbance that may have occurred within the study area. A series of historic aerials centred on the study area are provided in Appendix A. In the colonial period, the study area originally formed a portion of the large land grant given to Governor William Bligh in 1806; this grant was revoked by Governor Macquarie in 1814. Sometime during or after this, the study area formed part of a horticultural garden, and then formed the southern edge of the Old Kings School Parade Ground and oval when the school was founded in 1831 (Extent 2016a, 2016b;).

Previous excavations within the study area have identified a chronological series of historical landform modifications (Haglund and Tuck 2006:24):

i) Pre-European (pre-1788) – naturally sloping site with alternating alluvial sediment deposition and erosion associated with its position along the north bank of the Parramatta River (Plate 2.1);

ii) Early colonial (1788-1833) – site clearance and establishment of horticultural garden, in line with common agricultural practices in the early 19th century, likely resulted in erosion and/or removal of existing river bank topsoils;

iii) Mid-19th century (1833-1900) – establishment of Kings School in 1931, study area forms southern portion of the oval. The oval was prepared in stages (c. 1850 – 1870) and some portion, mostly in the northeast corner of the study area, was levelled up with introduced fill (Plate 2.2);

iv) Early 20th century (1900-1950) – considerable development of Kings School during 1920s, with grounds being brought up to current levels; involved the introduction of substantial amounts of fill material to increase the height of the southern portion of the oval (encompassing much of the study area) to match the oval's northern level; additionally, during WWII (likely pre-1943) zig-zag air-raid trenches were dug out in the southwest and south east portions of the Kings School grounds – these features overlap the current study area in the north east.

v) Late 20th century (1950+) to present day – O'Connell Street Bridge was constructed in the early 1960s, resulting in substantial subsurface impacts in the west; King School moves off site, and the Marsden Street Rehabilitation Centre is established (c. 1964), heritage pathway installed (c. 2006); superficial subsurface impacts associated with path construction (<50cm) within study area.

In summary, majority of the land incorporating the study area has been 'built up' to facilitate recreational activities associated with the Kings School oval. This development has involved the introduction of substantial amounts of fill material into the study area, and is discussed in more specific detail below.

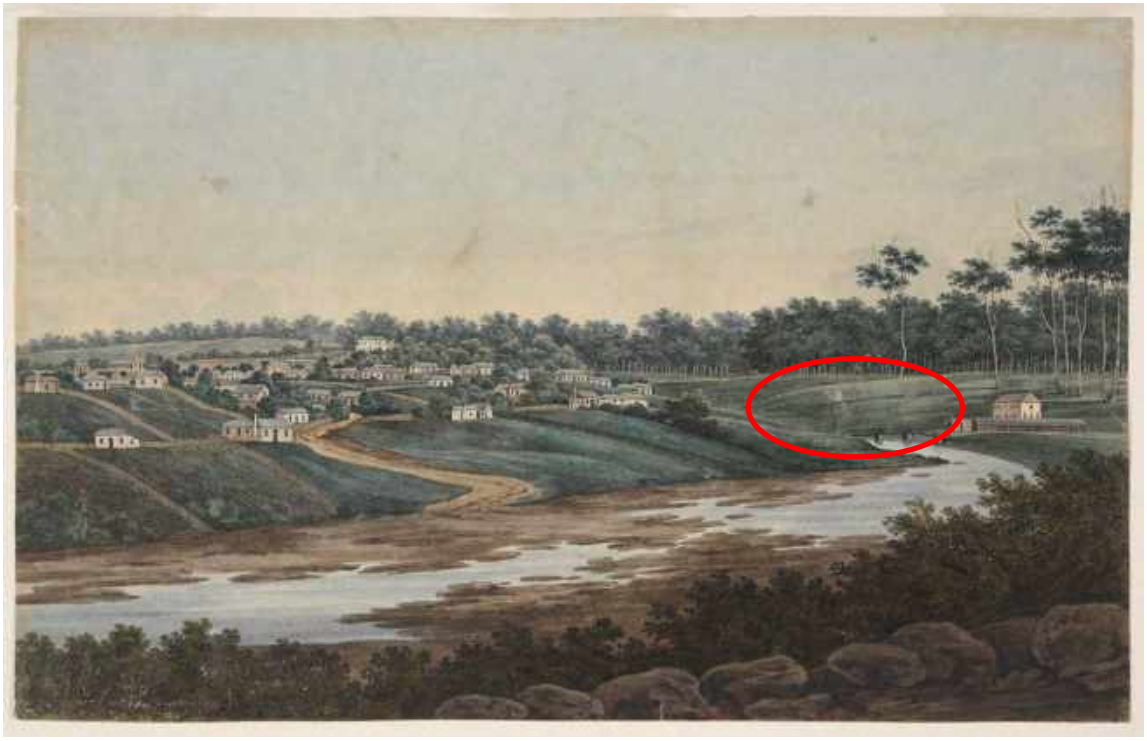


Plate 2.1 **The landing place at Parramatta, Port Jackson, [1809?]. The view is towards the west and the approximate location of the study area is indicated in red. (Source: SLNSW. Series 01: Australian paintings by J.W. Lewin, G.P. Harris, G.W. Evans and others, 1796-1809 vol 3 f.5. attributed to G.W. Evans)**

Plate 2.2 **The King's School, Parramatta (c. 1871). The view is towards the north from the eastern side of Marsden Street Weir. The study area is mostly outside the frame to the left, however note the substantial ground modifications along the riverbank in this locale. (Source: Mitchell Library, SLNSW. Album of photographs of Sydney & country New South Wales, ca. 1871 / American & Australasian Photographic Company [FL1075972])**

KEY

- Study area
- Train station
- Rail line
- Major road
- Minor road
- Named watercourse
- Named waterbody
- Local government area
- NPWS reserve (refer to inset)
- State forest (refer to inset)

Source: EMM (2020); Nearmap (2020); DFSI (2017); GA (2011); ASGC (2006)

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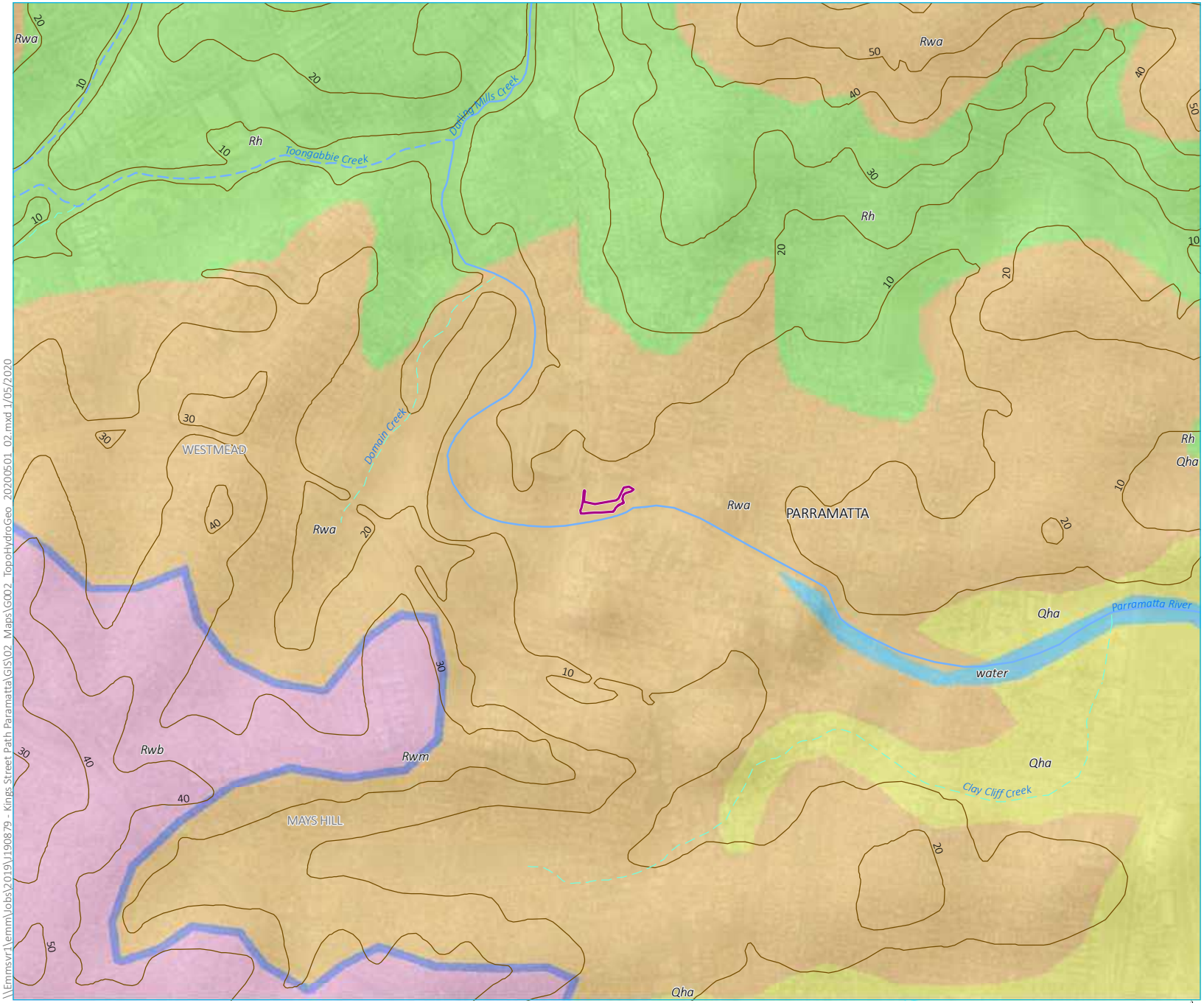
Regional setting

Old Kings Parade Ground - Foreshore Lighting
Aboriginal heritage due diligence
Figure 1.1

EMM
creating opportunities



Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006)

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Topology, hydrology and geology

Old Kings Parade Ground - Foreshore Lighting
Aboriginal heritage due diligence
Figure 2.1

EMM
creating opportunities

KEY

- Study area

Strahler stream order

- 1st order
- 3rd order
- 4th order

Soil landscapes

- Birrong
- Blacktown
- Deep Creek
- Disturbed Terrain
- Glenorie
- Gymea
- Lucas Heights
- Luddenham

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Source: EMM (2020); OEH (2018); DFSI (2017); GA (2011)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

Soil landscapes

Old Kings Parade Ground - Foreshore Lighting
Aboriginal heritage due diligence
Figure 2.2

EMM creating opportunities

3 Archaeological context

3.1 Regional archaeological investigations

Through cultural resource management (CRM) investigations, the Parramatta CBD has been shown to be largely situated on a Pleistocene alluvial terrace or levee of the river, within which significant archaeological material has been recovered. Only briefly referenced in published literature (e.g. McDonald 2008), it has been locally known for over a decade as being a significant archaeological deposit. A summary of key regional investigations within the sand sheet is summarised in Table 3.1.

Archaeologically, the deposit was originally identified in 2005, as part of a compliance-based excavation in advance of residential development. These excavations on the corner of George and Charles Street in the Parramatta CBD uncovered a ~1m deep sand unit, within which two phases of archaeological occupation were recovered (JMCHM 2005a). The site, ultimately identified as 'RTA-G1' (AHIMS 45-6-2673), was interpreted as reflecting ephemeral Late Pleistocene visitation to the river system, before a more systematic use and occupation of the locale in the Holocene. Five radiocarbon ages were recovered from the site, with the lowest date from below the assemblage (sieved residue charcoal from 80-100cm) returning an age of ~34ka (Wk-17435: 30,735 ± 407 years BP) and suggesting some of the earliest evidence of people in the Sydney Basin. Archaeological sites in the adjoining properties, also excavated in 2005, recovered a similar pattern of past occupation (Austral Archaeology 2007; JMCHM 2005b, 2006). In the case of CG1 (AHIMS 45-6-2648), as with RTA-G1, the assemblage suggested two major period of use, initially during the terminal Pleistocene (20-80cm) and again only in the last 2ka (<20cm). The upper assemblage, typologically dated to the late Holocene, a diverse range of tool types, including edge-ground hatchets and grindstones, along with a shark tooth thought to be used as a hair ornament in the past. Similar findings were made at CG2 and again at CG3 (JMCHM 2006; discussed in detail in Table 3.1). Both of these excavations recovered a dominance of IMTC suggesting they formed part of the earlier use of the region, but in neither case were chronological samples recovered. Spatially, these excavations all suggest foci of past occupation (>30 artefacts/m^2) were in the order of 25-35m^2 in size, interspersed amongst a wider background scatter of low-density stone artefacts (<10 artefacts/m^2).

Since 2005, the sand sheet has been subject to many compliance-based archaeological investigations. However, with these few exceptions, the findings of RTA-G1 and CG1 have not been replicated since 2005, with most investigations finding sterile, or near sterile, sand deposit elsewhere across Parramatta.

Archaeologically, evidence shows that parts of the sand unit were visited throughout the period of its formation in the terminal Pleistocene by a highly mobile and small population, likely as part of a broader point-to-point strategy (Williams et al. 2014) focussing on the larger river systems of the basin, including the Hawkesbury-Nepean and Georges Rivers. These sites are typically small (≤25m^2) and contain sparse expediently made stone artefacts dominated by IMTC raw materials. In the mid- to late Holocene, this point-to-point strategy was followed by more extensive visitation and occupation along the river system and the surrounding Cumberland Plain as populations in the region increased. These latter populations were undertaking a range of tool production and rejuvenation reflective of a more sedentary and/or home-base behaviour. Sites during this period are generally larger in size (≤100m^2), dominated by silcrete raw material, and contain a wide range of formal tool types (including backed artefacts, eloueras, edge-ground axes, etc).

3.2 Local archaeological investigations

There have been a number of archaeological studies in the Parramatta CBD, and indeed, on the northern bank of the Parramatta River. A selection of studies relevant to the project area have been summarised in Table 3.1.

In summary, sites in the vicinity of the study area are largely restricted to buried cultural material, both isolated finds and higher densities; and commonly areas considered to retain archaeological potential. These latter areas are identified based on ecological context and low levels of historic disturbance. Culturally modified trees (carved or scarred) are extremely rare, in large part due to the highly urbanised nature of the locale. Where present, culturally modified trees are retained in nature reserves with remnant vegetation, and within creek corridors.

The study area is encompassed within part of an alluvial sand sheet on the bank of the Parramatta River, and as such is archaeologically significant. However, based on a combination of desktop-based research and previous assessments within the study area, it is unlikely that this significant sand unit is present at depths within the proposed development footprint, nor is it likely present in all areas of the site. Previous excavations *within* the curtilage of the study area have found that the natural soils are present, but only under an extensive overburden of fill material (>45cm, and up to 80cm in some locations), likely brought into the study area in historic times to stabilise the riverbank, and/or to level the Old Kings School playing fields to the north. These previous investigations include works as part of the existing footpath (Haglund and Tuck 2006); and for gateposts installed as part of the new school fence only a few metres from the proposed impact footprint (Extent 2018). These latter works revealed disturbance to ~50cm. Neither investigation recovered substantial cultural materials in this area, if any (Table 3.1).

Additionally, the placement of the study area on the edge of the northern bank of the Parramatta River suggests that, rather than deep alluvial sand deposits, the site may be underlain by more recent active deposits – dating to the either the last few thousand years, or potentially even the post-European period (Figure 2.3). The area is subject to semi-regular flooding as observed in early 2020. As such, there is a strong likelihood that at least part of the study area is encompassed within highly active deposits within which little cultural material may be expected.

Table 3.1 Summary of local and regional Aboriginal archaeological studies

Author (Year)	Type of Investigation	Summary of works	Approximate distance to study area
JMCHM (2005a; 2005b; 2006) Austral Archaeology (2007)	Test excavation, salvage excavation	These assessments represent the first archaeological investigations into the sand sheet, in advance of residential development at a cluster of lots near the corner of Charles and George Street, Parramatta (109-113 George Street, 105A George Street, and 95-101 George Street). These excavations uncovered a ~1m deep sand unit, within which two phases of archaeological occupation were recovered (RTA-G1; AHIMS 45-6-2673). Approximately 5,000 stone artefacts (~38 artefacts/m^2) were distributed in two layers: an upper unit (0-40cm below surface), containing 75% of the stone artefact assemblage, composed of primarily silcrete raw materials, and containing a number of formal tool types associated with the mid- to late Holocene (e.g. backed artefacts, edge-ground axes); and, a lower unit (40-60cm below surface, with occasional artefacts to 80cm), containing 25% of the assemblage, composed of indurated mudstone/tuff/chert (IMTC) raw materials, and reflecting a more rudimentary technology. Subsequent investigations in the adjoining properties recovered a similar pattern of past occupation. In the case of CG1 (AHIMS 45-6-2648), some 460m^2 of excavation recovered 6,763 stone artefacts and 680 non-diagnostic pieces (32 artefacts/m^2) primarily from the upper 40cm of the soil profile. No chronological information was sourced from the site, but as with RTA-G1, the assemblage suggested two major periods of use: initially during the terminal Pleistocene (20-80cm) and again only in the last 2ka (<20cm). Notably, the upper assemblage recovered a diverse range of tool types, including edge-ground hatchets and grindstones, along with a shark tooth thought to be used as a hair ornament. Similar findings were made at CG2, where 601 artefacts were recovered from 65m^2 of manual excavation ($\bar{x}$=8.7/m2), in a bi-modal distribution mainly in the upper 40cm; and again at CG3 which recovered 847 artefacts from 123m^2 of manual excavation ($\bar{x}$=6.9/m^2) within a heavily truncated part of the sand unit.	~900m to the south east
Haglund and Tuck (2006)	Survey, test excavation	This assessment was undertaken in advance of the establishment of the pathway at the Old Kings Foreshore (AHIMS 45-6-2756). The study area was divided into two parts, area A (southern end of the former Old King's oval) and B (the riverbank south of the oval), and was subject to test excavations. Seven 1m^2 test pits were excavated across both areas; five in area A and 2 in area B. Excavations revealed that both areas featured deep introduced fill deposits, deposits that extend well below the proposed development impact related to the construction of the path (≤30cm). In area A, excavations revealed a fill material introduced to level the oval (dated via a crown seal c. 1920). Highly disturbed sand sheet soils were exposed at 40cm below ground surface, typically mixed with fill deposits; potential *in situ* sand deposit (or associated materials, such as the Holocene silt and sand) was exposed only at ~80cm below ground surface. In area B, no natural soil profile was encountered during the excavation, which extended ~45cm below ground surface and consisted entirely of fill material and recently deposited riverine muds.	Study area contained within the study

Table 3.1 Summary of local and regional Aboriginal archaeological studies

Author (Year)	Type of Investigation	Summary of works	Approximate distance to study area
		Overall, a very small number of artefacts (n=<10) were recovered from within fill deposits. Considering the disturbance observed throughout the site, it was interpreted that the artefacts were not in situ but had probably come from the general area. The assessment concluded that, considering the disturbance and likely introduced cultural material across the site, the proposed walkway route did not form an Aboriginal site and does not adjoin an area of high Aboriginal activity in the past.	
Extent (2018)	Test excavation, salvage excavation	This assessment was undertaken in advance of the redevelopment of O'Connell Street Public School (now Bayanami Public School). It represents the one of the few archaeological investigations on the north bank of the Parramatta River, and the first positive identification of the sand sheet in this locale. Overall, the investigations consisted of 11 2.4 m^2 test pits (TP1 – TP11), followed by an 25m^2 open salvage area centred on where significant cultural material was identified (TP5). All excavation showed the sand unit present underneath an extensive overburden of fill (between 40cm and 70cm overburden across the site). Overall, the salvage excavations recovered 151 artefacts – 57 from TP5, and 94 artefacts from the subsequent 25m^2 salvage area (of which TP5 formed the central test pit on the southern edge), ~70m north of the current study area. Majority of artefacts (n=123, 81.47%) were recovered from a band 70-90cm below ground surface. OSL samples from the excavation indicate that the site was likely occupied from the Pleistocene to early Holocene (17-5,000 years ago), with peak artefact concentrations between ~16-11,000 years ago. The excavations also suggest the sand sheet is thinner on the northern bank than on the southern bank (~80cm), and that the extent and depth of this deposit is heavily influenced by landform and distance to the river. Notably, one artefact comprised of exotic material (andalusite hornfels) was recovered from the salvage area; the closest natural occurrence is in the Megalong Valley, west of the Blue Mountains. Of interest to the current assessment, in addition to the works described above, is that eight additional test pits were excavated along the fence line of the school's oval in advance of the proposed installation of gate posts. Several of these are within a few metres of the proposed development. One additional artefact was recovered from the ground surface during these investigations near the fence line; no artefacts were recovered from within the sand sheet, which was present under an overburden of fill (up to ~50cm below ground surface). The excavations suggested that the terrace thins in thickness from the west to east (~80cm to ~55cm); and then thins again with increased distance to the river (~55cm to ~35cm).	Adjacent lot to the north
Extent (2019)	Survey, test excavation	This assessment was undertaken in advance of residential and religious redevelopment at St Patrick's Cathedral and the Diocese of Parramatta office spaces. The excavation consisted of 19 1m^2 test pits in a systematic ~20m grid across the study area, and test excavated registered site AHIMS 45-6-3159. Excavations revealed a shallow, heavily reworked and, in some places, truncated natural soil profile of sandy clay, in line with the Birrong soil landscape, under extensive amounts of introduced fill and historic deposits. No evidence of the sand sheet was within the study area. Fourteen Aboriginal objects were recovered from the excavations, and one additional artefact was located on the ground surface of the carpark within introduced stabilising gravels.	200-300m to the north

3.3 Register searches

DPIE maintains the Aboriginal Heritage Information Management System (AHIMS), a database of known and registered Aboriginal sites in NSW. An AHIMS search was undertaken on 13 March 2020 (ID: 490989) encompassing an area of 4km^2 around the study area. The results can be found in Table 3.2, Figure 3.1, and Appendix A. The search identified 75 sites within the search area; six sites have been destroyed as a result of authorised impacts, and 13 have been partially destroyed. Additionally, two sites have been investigated and determined to not be archaeological sites, and one has been deleted from the AHIMS database; these three sites, along with the six destroyed sites, have been excluded from the following discussion, bringing the total number of sites to 66.

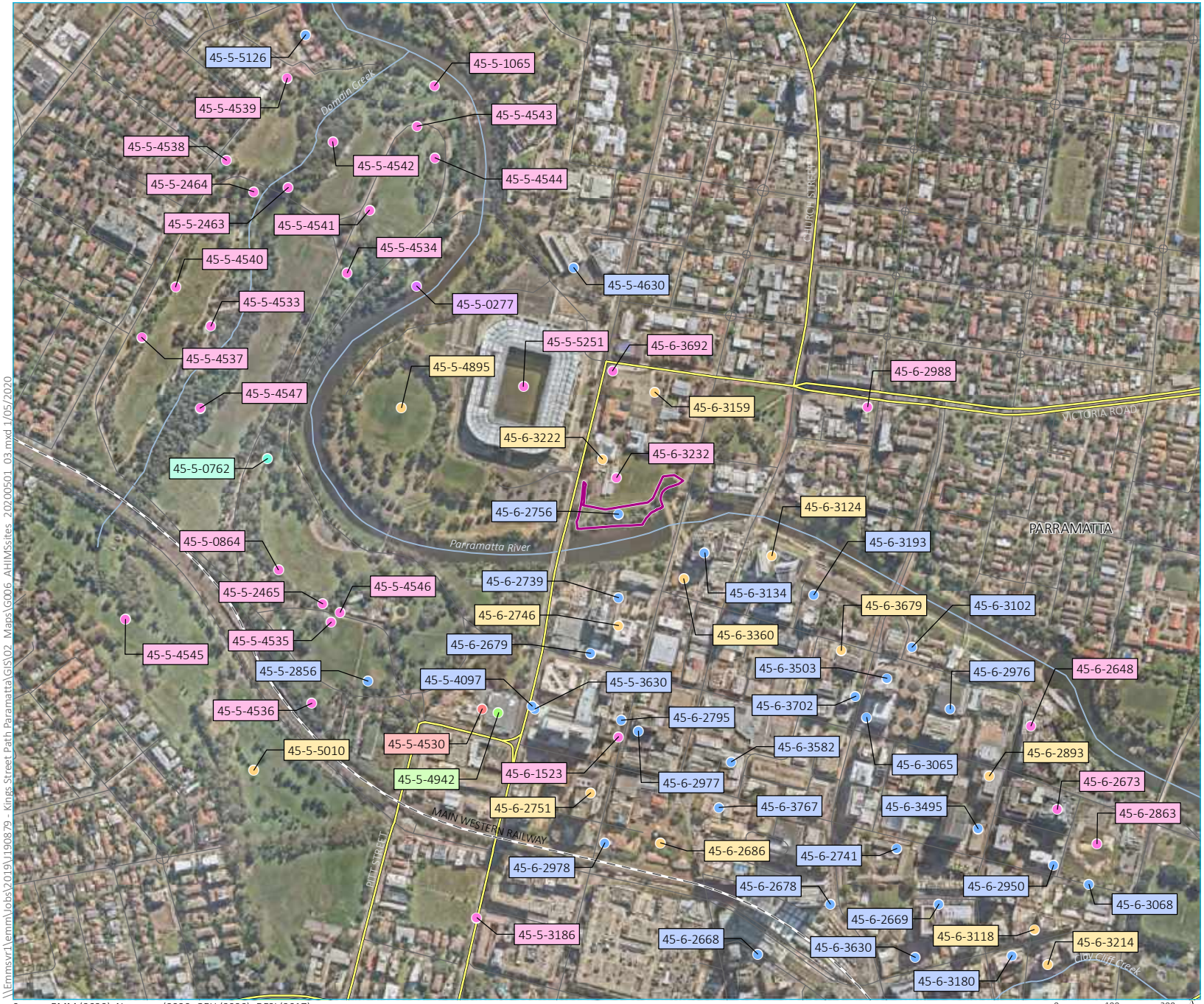
DPIE has a list of specific site features, which are used to describe all sites registered in AHIMS. A site can have one or more site features. For the 66 sites, four site features are recorded; the various combinations of these have been summarised in Table 3.2. The recorded sites within the search area are dominated by potential archaeological deposits (PADs), artefact scatters and/or isolated artefacts, and combination of the two (n=64, 97%). This is likely to be due to proximity to water within the study area, which presented an important resource for Aboriginal people, and the potential for the Parramatta sand sheet unit to be present. With respect to site distribution, it should be noted that the clustering of sites within the Parramatta CBD is more likely explained by the amount of development in this area, rather than any discernible archaeological patterning.

There is one registered AHIMS sites located within the study area. AHIMS 45-6-2756 is registered as a Potential Archaeological Deposit (PAD). The site card for this site is not available, although further details regarding the site can be found in the associated report (Haglund and Tuck 2006; Table 3.1). Excavation within the curtilage of AHIMS 45-6-2756 revealed extensive fill deposits (≤80cm) resulting from efforts to 'build up' the study area as to be level with the northern portion of the playing field oval. Natural soils, likely truncated, were encountered at depths under the fill; it is unclear whether the natural soil is the sand unit or more recently deposited alluvium. In any case, very few Aboriginal objects were recovered during the test excavation (n=<10), and were recovered exclusively from within fill deposits introduced to the study area. The assessment concluded that, considering the disturbance and likely introduced cultural material across the site, the proposed walkway route did not form an Aboriginal site and does not adjoin an area of high Aboriginal activity in the past. However, this finding has not been reflected on the AHIMS register. No further mitigation work at the site was deemed necessary following the test excavations, due to the level of fill material. More recent excavations of a fence line adjacent the proposed works (Extent 2018) identified similar findings, but recovered no cultural material in either the fill or the under-lying sand unit.

In addition to the above, the study area is within the curtilage of an area heritage listed on the Parramatta Local Environment Plan (LEP) (items I00826 and I00771; 'Marsden Rehabilitation Centre (and potential archaeological site)') and the NSW State Heritage Register (SHR) (#00826; 'Marsden Rehabilitation Centre Group'). While the item on the LEP is noted only for its post-colonial values, the SHR listing briefly mentions the potential value of the site to Aboriginal people. Additionally, the study area is within a zone of high Aboriginal heritage sensitivity on the Parramatta Development Control Plan (DCP).

Table 3.2 Summary of AHIMS results (valid and partially destroyed sites only)

Site features	Number of sites	Percentage of total (%)
Artefact	28	42.42
Potential Archaeological Deposit (PAD)	24	36.36
Artefact, Potential Archaeological Deposit (PAD)	12	18.18
Artefact, Potential Archaeological Deposit (PAD), Hearth	1	1.51
Artefact, Modified Tree (Carved or Scarred)	1	1.51
Total	**66**	**100**



KEY

- Study area
- Rail line
- Major road
- Minor road
- Named watercourse

AHIMS site

- Artefact
- Artefact, Hearth
- Artefact, Modified tree
- Artefact, Potential archaeological deposit (PAD)
- Artefact, Hearth, Potential archaeological deposit (PAD)
- Modified tree
- Potential archaeological deposit (PAD)

Source: EMM (2020); Nearmap (2020; OEH (2020); DFSI (2017)

0 100 200 m

GDA 1994 MGA Zone 56

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Nearby AHIMS sites

Old Kings Parade Ground - Foreshore Lighting
Aboriginal heritage due diligence
Figure 3.1

EMM creating opportunities

4 Site inspection

A site inspection of the study area was undertaken on 25 March 2020 by Georgia Burnett and Anthony Dakhoul (EMM Heritage). The study area was inspected to identify any previously recorded Aboriginal objects and areas of potential that may be present. Topographically, the study area is located on the north bank of the Parramatta River, and comprises a public walkway on the foreshore of the river bounded by O'Connell Street in the west and Marsden Street in the east (Plate 4.1 – Plate 4.12).

The site inspection confirmed that the study area has been subject to significant disturbance since European contact, and this disturbance has likely removed and/or buried any natural soil profile at depths likely below those currently proposed for the activity. The major source of disturbance within the study area is the infilling of the foreshore to level the surface of what was previously Old Kings Parade Ground (Plate 4.1 & Plate 4.2). Modern disturbance has also likely the study area further, as various services were observed, typically aligned to the pathway. Notably, many of these services appear to be water related services, which have relatively deep subsurface impacts. The level, elevated terrace that forms the historic Old Kings Parade Ground drops sharply (~2m) down to the river, though the profile of this section could not be investigated due vegetation overgrowth and poor visibility. This unnatural and sharp slope supports previous assessments which identified high levels of fill material that have historically been used to 'build up' the study area (Plate 4.3 & Plate 4.4).

Further, the site inspection also confirmed the significant impacts from construction associated with road upgrades to O'Connell Street in the west (Plate 4.5 & Plate 4.6) and Marsden Street in the east (Plate 4.7 & Plate 4.8). Near O'Connell Street, the study area has been cut and built up to accommodate the road upgrades; at Marsden Street, the driveway leading down to the weir cuts into the modified terrace that forms the study area, though no soil profile could be observed as the section is walled.

The ground surface visibility was generally low to nil (<10%) across the study area, as most of the area has been turfed and/or overlain with mulch/leaf litter (Plate 4.9 & Plate 4.10). Some ground surface exposures were observed, particularly on the O'Connell Street side of the study area (Plate 4.11). These exposures exhibited grey-brown sandy loam with many introduced gravels, largely fragmented road base and crushed concrete aggregate, all suggestive of fill and/or reworked materials (Plate 4.12). No Aboriginal objects were observed or identified on the ground surface within these areas of exposure, or across the study area.

In summary, the site inspection confirmed the findings of the desktop assessment. Specifically, that the study area has largely been built up in the post-colonial period to accommodate a larger playing field for the Old Kings School. Natural soil profiles may still be present underneath significant overburden, but not likely at levels which may be impacted by the current proposed development. No evidence of Aboriginal objects, shell, culturally modified trees or outcropping were observed, and no areas of subsurface potential were identified that are within the proposed development impact zone.

Plate 4.1. The pathway, view facing east. Note the level topography, from the school (left) to the edge of the terrace (right).

Plate 4.2. The edge of the terracing, view facing east. Note to the right of frame, the steep slope (~60°) downwards to the river.

Plate 4.3. The southern side of the pathway, view facing east. Note the thick vegetation (left frame).

Plate 4.4. Detail of vegetation and slope dropping down the terrace, view facing south.

Plate 4.5. The study area facing O'Connell Street (background), viewing facing south west.

Plate 4.6. Detail of modification on east side of O'Connell Street within the study area, view facing north west.

Plate 4.7. The study area (background) from Marsden Street, view facing west. Note the landscape modification/elevation change from the driveway leading to the weir (foreground) as compared to the study area.

Plate 4.8. Driveway off Marsden Street, leading down to the weir, view facing southwest . Observations suggest a steeper natural slope than the path to the weir itself (Plate 2.2), suggesting more substantive earthworks at this location.

Plate 4.9. Example of turfing across study area, view facing east.

Plate 4.10. Example of mulching and/or leaf litter observed in study area, viewing facing east.

Plate 4.11. Example of exposure near O'Connell Street, view facing west.

Plate 4.12. Detail of ground surface exposure.

5 Conclusion and recommendations

This assessment investigated the study area, and the potential for Aboriginal objects to occur. Based on the environment and archaeological background of the region, the main evidence of past Aboriginal occupation would be present in the form of buried artefacts (clusters or isolated finds) and potential archaeological deposits found at depth within a deep sand unit referred to as the Parramatta Pleistocene Sand Sheet (PPSS). This sand unit is of archaeological interest, and significant cultural materials have been recovered from excavations outside the study area from within this deposit. Sites in the vicinity of the project area are largely restricted to buried cultural material within the PPSS, both isolated and denser artefact scatters, as well as areas considered of potential to contain them. The study area is nominally on the edges of these deposits.

Specifically, mapping of the study area suggests that a significant part is situated in the more recent and modern alluvial deposits of the Parramatta River. Archaeological potential of this deposit is considered low, as it is an active environment with no established topsoil development and therefore lacks the capacity to retain archaeological material. Where the sand sheet is possibly present, in the north eastern portion of the study area, previous archaeological excavations have revealed an extensive introduction of soil materials to depths of at least 45cm below current surface (and extending up to 80cm in some parts).It was considered that some of the fill material may have been redistributed from immediately north of the study area, though likely some fill was introduced from elsewhere. Desktop research indicates that this was in large part to elevate the nearby playing fields of the former Old Kings School Parade Ground, though significant disturbance has occurred across the site including development impacts from road/infrastructure upgrades in the east and west, and the installation of services within the lot.

A registered potential archaeological deposit (PAD), AHIMS 45-6-2756, is located within the study area. However, previous excavations within AHIMS 45-6-2756 determined that the archaeological potential of this site was low, and did not form an Aboriginal site (a fact that has not been updated in the AHIMS database). Subsequent more recent excavations of a new school fence some 2-3m from the proposed activity similarly found no cultural material.

In summary, it is concluded that the proposed works are spatially within soil profiles that have been demonstrated to contain significant cultural materials. However, these deposits if present, are likely to be present only some >45cm below the current surface (and in some cases much deeper). The proposed works are unlikely to extend below these depths, and therefore would result in no direct impact to the underlying in situ soil profiles or associated cultural materials.

The minimal nature of the works would indicate that indirect harm to cultural materials is unlikely to occur, however the proponent should be aware of the issue and ensure it is suitably considered prior to any activity. DPIE generally considers the burial of any natural soil profile as an indirect impact to cultural materials, given its ability to affect the stratigraphic integrity (i.e. differential movement) of cultural materials within under-lying the soil profile; and which can therefore be considered ‘harm’. For much of the study area, the introduction of between 45 and 80cm of fill material have already contributed to such impacts; and as such, the replacement of minor amounts of material could be considered as ‘negligible impact’ under the due diligence guidelines - this is a poorly defined term that indicates minor movement of Aboriginal objects is not considered an impact under the Act. Given the poor definition of ‘negligible impact’ in the due diligence guidelines, it is recommended that: i) the advice from an engineer is sought in relation to the potential impact of the weight differences from any activity where additional material may be proposed; and ii) where the proponent has concerns, advice from DPIE should be sought in relation to their view of the activity, and whether ‘negligible impact’ would apply.

5.1 Recommendations

Based on the information presented above, it is considered that the works may proceed with caution and in accordance with the following recommendations:

- based on existing information, the surface of the study area is characterised by modern fill materials to depths of at least 45cm, and in some areas 80cm below surface, beneath which the Parramatta Terrace Sand Sheet – a highly significant cultural deposit – may be present. Any proposed activities constrained to these upper fill deposits are considered to have low risk of harming Aboriginal objects, and can proceed with caution and without further assessment. Given the sensitivity of the study area, and the relatively shallow expression of the sand sheet, any activities should proceed only under archaeological supervision. Specifically, that an archaeologist and/or Aboriginal stakeholder be present to monitor any excavation works to reduce the risk of inadvertent impact, and manage the process in the event cultural material is observed. It must be noted that the nature of disturbance does not preclude the potential for isolated finds, which is a common site type across the region, even in disturbed contexts. In the event of unexpected Aboriginal objects, sites or places (or potential Aboriginal objects, site or places) are discovered during construction, all works in the vicinity should cease and the proponent should determine the subsequent course of action in consultation with a heritage professional and/or the relevant State government agency as appropriate;

- a previously documented potential archaeological deposit, AHIMS 45-6-2756, is within the curtilage of the study area. Test excavations in 2006 determined that this is not an Aboriginal site, and the area does not adjoin an area of high Aboriginal activity in the past. The proponent should liaise with DPIE to have the status of the site changed to 'not a site' on the AHIMS database, since it currently forms a heritage constraint. This may require the completion of an Aboriginal Site Impact Recording Form to be submitted to the database;

- this documentation may be summarised within and/or appended to a Development Application (DA), Statement of Environmental Effects (SEE) or Review of Environment Factors (REF). If any Aboriginal objects are later identified within the proposed activity area, this report cannot be used to support an application for an Aboriginal Heritage Impact Permit (AHIP). Such an application would require more detailed investigation involving a formal process of Aboriginal community consultation and the preparation of an Aboriginal Cultural Heritage Assessment (ACHA);

- this document does not address requirements for historical archaeological potential, which is being addressed under a separate historical baseline assessment and statement of heritage impact also prepared by EMM Heritage in 2020; and

- if human skeletal material less than 100 years old is discovered, the *Coroners Act 2009* requires that all works should cease and the NSW Police and the NSW Coroner's Office should be contacted. Traditional Aboriginal burials (older than 100 years) are protected under the *National Parks and Wildlife Act 1974* and should not be disturbed. Interpreting the age and nature of skeletal remains is a specialist field and an appropriately skilled archaeologist or physical anthropologist should therefore be contacted to inspect the find and recommend an appropriate course of action. Should the skeletal material prove to be archaeological Aboriginal remains, notification of DPIE and the Local Aboriginal Land Council will be required. Notification should also be made to the Commonwealth Minister for the Environment, under the provisions of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.

References

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Appendix A

AHIMS Data

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : J190879

Client Service ID : 490989

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-6-2648	Charles/George 1	AGD	56	315690	6256470	Open site	Valid	Artefact : -		99538,102196
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**	1433,1682,2176,2240,2353,3049,3509	
45-6-2678	SSP1 (formerly Smith Street PAD)	AGD	56	315330	6256150	Open site	Destroyed	Potential Archaeological Deposit (PAD) : -		99518,102196, 103782
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**	1848,2561	
45-6-2668	Argyle St	AGD	56	315200	6256060	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102196,103782
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**	1764,2155	
45-6-2669	Kendall Street, Harris Park	AGD	56	315525	6256150	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102196,103782
	Contact	**Recorders**	Jim Wheeler					**Permits**	1767	
45-6-2673	RTA-G1	GDA	56	315842	6256510	Open site	Valid	Artefact : -		100552,102196,103782
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**	1841,2176,3050,3509	
45-6-2679	Parramatta Children's Court	AGD	56	314900	6256600	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102196,103782
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**	1850,1973,2117,3847	
45-6-2863	Cumberland Press Site	GDA	56	315913	6256448	Open site	Valid	Artefact : 89		103782
	Contact	**Recorders**	Ms.Laila Haglund,Ms.Tory Stening					**Permits**	2865,3307,3509,3816	
45-6-2976	George St PAD 1	GDA	56	315650	6256690	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Comber Consultants Pty Limited,Mr.David Nutley					**Permits**	3509	
45-6-2977	Macquarie St PAD 3	GDA	56	315090	6256650	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Comber Consultants Pty Limited,Mr.David Nutley					**Permits**	3509	
45-5-4097	O'Connell St PAD1	GDA	56	314900	6256695	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Comber Consultants Pty Limited,Mr.David Nutley					**Permits**	3509	
45-6-2978	41 Hunter Street PAD	GDA	56	315030	6256450	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Mr.Alexander Beben					**Permits**	3419	

Report generated by AHIMS Web Service on 13/03/2020 for Georgia Burnett for the following area at Datum :GDA, Zone : 56, Eastings : 314000 - 316000, Northings : 6256000 - 6258000 with a Buffer of 0 meters. Additional Info : Due diligence assessment for King St path. Number of Aboriginal sites and Aboriginal objects found is 75

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : J190879

Client Service ID : 490989

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-6-3193	Riverbank Square PAD	GDA	56	315405	6256895	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Ms.Ngaire Richards					**Permits**		
45-6-3180	21 Hassall Street	GDA	56	315761	6256247	Open site	Partially Destroyed	Potential Archaeological Deposit (PAD) : 1		103758
	Contact	**Recorders**	Ms.Ngaire Richards					**Permits**	3906,3975	
45-5-5251	Western Sydney Stadium	GDA	56	314884	6257269	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Ms.Jillian Comber,Comber Consultants Pty Limited					**Permits**		
45-6-3767	85-97 Macquarie St	GDA	56	315235	6256513	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Comber Consultants Pty Limited,Ms.Tory Stening					**Permits**		
45-6-3702	Smith St PAD1	GDA	56	315480	6256713	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Comber Consultants Pty Limited,Ms.Jillian Comber					**Permits**	4513	
45-6-1523	George St Parramatta;Family Law Courts;	AGD	56	314950	6256450	Open site	Valid	Artefact : -	Open Camp Site	1809,102196,103782
	Contact	**Recorders**	Val Attenbrow,Doctor.Edward Higginbotham					**Permits**		
45-5-1065	Parra Park 3;PP 3;	AGD	56	314620	6257620	Open site	Valid	Artefact : -	Open Camp Site	102142,102196
	Contact	**Recorders**	Michael Guider					**Permits**		
45-5-0864	Governors Bathhouse;	AGD	56	314340	6256750	Open site	Partially Destroyed	Artefact : -	Open Camp Site	102142,102196
	Contact	**Recorders**	Michael Guider					**Permits**	3822	
45-5-0277	Cumberland Oval;Parramatta;	AGD	56	314588	6257260	Open site	Destroyed	Modified Tree (Carved or Scarred) : -	Scarred Tree	223,260,1018,102142,102196
	Contact	**Recorders**	Cook					**Permits**		
45-5-0762	Parramatta Park	AGD	56	314320	6256950	Open site	Partially Destroyed	Artefact : -, Modified Tree (Carved or Scarred) : -	Open Camp Site,Scarred Tree	102142,102196
	Contact	**Recorders**	Val Attenbrow					**Permits**	3822	
45-5-2856	Parramatta Park Macquarie Entrance PAD	AGD	56	314500	6256550	Open site	Partially Destroyed	Potential Archaeological Deposit (PAD) : -		98738,103133
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	1647,3822	

Report generated by AHIMS Web Service on 13/03/2020 for Georgia Burnett for the following area at Datum :GDA, Zone : 56, Eastings : 314000 - 316000, Northings : 6256000 - 6258000 with a Buffer of 0 meters. Additional Info : Due diligence assessment for King St path. Number of Aboriginal sites and Aboriginal objects found is 75

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-6-2686	Civic Place PAD	GDA	56	315130	6256450	Open site	Partially Destroyed	Potential Archaeological Deposit (PAD) : -, Artefact : -		99666,99791,103115,103782
	Contact	**Recorders**	Doctor.Jo McDonald,Niche Environment and Heritage,Niche Environment and Heri					**Permits**	1960,3749,3890,3897,3983,3988,4044,414(	
45-6-2751	Marsden St Carpark	AGD	56	314900	6256350	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		102196,103782
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**	2243	
45-6-2739	PADUNknown	AGD	56	314950	6256700	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102196,103782
	Contact	**Recorders**	Haglund and Associates					**Permits**		
45-6-2746	Old Hospital Site Parramatta Health Services Precinct	AGD	56	314950	6256650	Open site	Valid	Potential Archaeological Deposit (PAD) : -, Artefact : -		99798,100551,100558,102196,103782
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**	2160,2507	
45-6-2741	Parramatta Transport Interchange PAD	AGD	56	315450	6256250	Open site	Valid	Potential Archaeological Deposit (PAD) : -		99438,99497,102196,103782
	Contact	**Recorders**	Doctor.Susan Mcintyre-Tamwoy					**Permits**	2121	
45-6-2893	95-101 George St (GSP AD)	GDA	56	315720	6256570	Open site	Valid	Potential Archaeological Deposit (PAD) : -, Artefact : -		101078,103782
	Contact	**Recorders**	Megan Mebberson					**Permits**	3509	
45-5-3630	Macquarie St PAD	AGD	56	314800	6256500	Open site	Destroyed	Potential Archaeological Deposit (PAD) : -		103782
	Contact	**Recorders**	Comber Consultants Pty Limited,Comber Consultants Pty Limited					**Permits**	3107,3302	
45-6-3102	Phillip Street PAD 1	GDA	56	315581	6256801	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Mr.Dominic Steele					**Permits**	3755	
45-6-2988	7-9 Victoria Road Parramatta	GDA	56	315502	6257233	Open site	Valid	Artefact : 9		
	Contact	**Recorders**	GML Heritage Pty Ltd + Context - Surry Hills,Ms.Anita Yousif					**Permits**	3488	
45-6-3068	GS PAD 1 184-188 George Street	GDA	56	315899	6256375	Open site	Destroyed	Potential Archaeological Deposit (PAD) : 1		103962

Report generated by AHIMS Web Service on 13/03/2020 for Georgia Burnett for the following area at Datum :GDA, Zone : 56, Eastings : 314000 - 316000, Northings : 6256000 - 6258000 with a Buffer of 0 meters. Additional Info : Due diligence assessment for King St path. Number of Aboriginal sites and Aboriginal objects found is 75

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Mr.Dominic Steele					**Permits**	3584	
45-6-3065	PHILLIP ST PAD 1	GDA	56	315500	6256675	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Mr.Dominic Steele					**Permits**		
45-5-4630	Parramatta Leagues Club PAD	GDA	56	314974	6257483	Open site	Not a Site	Potential Archaeological Deposit (PAD) : -		103589
	Contact	**Recorders**	GML Heritage Pty Ltd + Context - Surry Hills,Doctor.Tim Owen,Doctor.Tim Owen					**Permits**	3958	
45-5-4530	Parramatta RSL PAD	GDA	56	314810	6256690	Open site	Partially Destroyed	Hearth : -, Potential Archaeological Deposit (PAD) : -, Artefact : -		104179
	Contact	**Recorders**	GML Heritage Pty Ltd + Context - Surry Hills,GML Heritage Pty Ltd + Context - Surry					**Permits**	3819,3853,3935,4364	
45-6-3159	Catholic Diocese Parramatta PAD	GDA	56	315120	6257259	Open site	Partially Destroyed	Artefact : -, Potential Archaeological Deposit (PAD) : -		104276
	Contact	**Recorders**	Extent Heritage Pty Ltd - Pyrmont - Individual users,Miss.Diana Cowie,Mrs.Laressa					**Permits**	4300	
45-5-4533	Paddocks Playground Parra Park	GDA	56	314323	6257378	Open site	Partially Destroyed	Artefact : -		
	Contact	**Recorders**	Ms.Tory Stening					**Permits**	3822	
45-5-4534	Parramatta Park - Location C	GDA	56	314568	6257473	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Annie Bickford					**Permits**		
45-5-4535	Parramatta Park - Location E	GDA	56	314539	6256846	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Val Attenbrow					**Permits**		
45-5-4536	Parramatta Park - Location G	GDA	56	314504	6256700	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Val Attenbrow					**Permits**		
45-5-4537	Parramatta Park - Location H	GDA	56	314199	6257357	Open site	Partially Destroyed	Artefact : -		
	Contact	**Recorders**	Val Attenbrow					**Permits**	3822	
45-5-4538	Parramatta Park - Location J	GDA	56	314351	6257676	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Val Attenbrow					**Permits**	3994	
45-5-4539	Parramatta Park - Location K	GDA	56	314460	6257823	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Val Attenbrow					**Permits**	3994	
45-5-4540	Parramatta Park - Location I	GDA	56	314260	6257448	Open site	Partially Destroyed	Artefact : -		
	Contact	**Recorders**	Val Attenbrow					**Permits**	3822	
45-5-4542	Parramatta Park - Location L	GDA	56	314542	6257709	Open site	Valid	Artefact : -		

Report generated by AHIMS Web Service on 13/03/2020 for Georgia Burnett for the following area at Datum :GDA, Zone : 56, Eastings : 314000 - 316000, Northings : 6256000 - 6258000 with a Buffer of 0 meters. Additional Info : Due diligence assessment for King St path. Number of Aboriginal sites and Aboriginal objects found is 75

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Val Attenbrow					**Permits**	3994	
45-5-4543	Parramatta Park - Location N	GDA	56	314693	6257737	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Val Attenbrow					**Permits**		
45-5-4544	Parramatta Park - Location O	GDA	56	314725	6257680	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Val Attenbrow					**Permits**		
45-5-4545	Parramatta Park - Location S	GDA	56	314170	6256851	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Dominic Steele					**Permits**		
45-5-4546	Parramatta Park - Location D	GDA	56	314555	6256864	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Val Attenbrow					**Permits**		
45-5-4547	Parramatta Park - Location F	GDA	56	314304	6257230	Open site	Partially Destroyed	Artefact : -		
	Contact	**Recorders**	Val Attenbrow					**Permits**	3994	
45-5-4541	Parramatta Park - Location M	GDA	56	314608	6257586	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Val Attenbrow					**Permits**		
45-6-3503	32 Smith Street	GDA	56	315536	6256745	Open site	Partially Destroyed	Potential Archaeological Deposit (PAD) : 1		103963,10396 4,103965
	Contact	**Recorders**	AMAC Group P/L,Mr.Benjamin Streat					**Permits**	4268,4347	
45-6-3360	Parramatta Riverside PAD 1	GDA	56	315172	6256924	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Biosis Pty Ltd - Sydney,Biosis Pty Ltd - Wollongong,Mr.James Cole,Mrs.Samantha K					**Permits**	4250,4379	
45-6-3692	VOC IF1	GDA	56	315044	6257297	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Rose Bay,Ms.Jennifer Norfolk					**Permits**		
45-6-3630	Hassall St PAD	GDA	56	315587	6256244	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Comber Consultants Pty Limited,Ms.Jillian Comber					**Permits**	4412,4527	
45-5-4942	Parramatta RSL Artefact Scatter 1 (PRSL AS-01)	GDA	56	314839	6256683	Open site	Destroyed	Artefact : -, Hearth : -		
	Contact	**Recorders**	Artefact - Cultural Heritage Management - Rose Bay,Artefact - Cultural Heritage Ma					**Permits**	4235	
45-6-3679	Stage One PAD	GDA	56	315454	6256795	Open site	Not a Site	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Niche Environment and Heritage,Niche Environment and Heritage,Ms.Clare Anders					**Permits**	4522	
45-6-3582	Macquarie Street PAD	GDA	56	315257	6256595	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Miss.Alandra Tasire,Comber Consultants Pty Limited					**Permits**		

Report generated by AHIMS Web Service on 13/03/2020 for Georgia Burnett for the following area at Datum :GDA, Zone : 56, Eastings : 314000 - 316000, Northings : 6256000 - 6258000 with a Buffer of 0 meters. Additional Info : Due diligence assessment for King St path. Number of Aboriginal sites and Aboriginal objects found is 75

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-5126	Cumberland West	GDA	56	314493	6257901	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Comber Consultants Pty Limited,Ms.Jillian Comber					**Permits**	4363,4468	
45-6-3495	116 Macquarie St Parramatta	GDA	56	315700	6256475	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		103782
	Contact	**Recorders**	Comber Consultants Pty Limited,Ms.Alandra Tasire					**Permits**		
45-5-5010	Parramatta Park PAD_1	GDA	56	314400	6256580	Open site	Valid	Potential Archaeological Deposit (PAD) : -, Artefact : -		
	Contact	**Recorders**	Niche Environment and Heritage,Niche Environment and Heritage,Mr.Samuel Rich					**Permits**	4256	
45-5-2465	Parramatta Regional Park (IF3)	GDA	56	314524	6256879	Open site	Partially Destroyed	Artefact : -	Isolated Find	102142,102196
	Contact	**Recorders**	Ms.Jillian Comber,J Steel					**Permits**	3822	
45-5-2463	Parramatta Regional Park (IF1)	GDA	56	314462	6257627	Open site	Valid	Artefact : -	Isolated Find	102142,102196
	Contact	**Recorders**	J Steel					**Permits**	3994	
45-5-2464	Parramatta Regional Park (IF2)	GDA	56	314400	6257619	Open site	Valid	Artefact : -	Isolated Find	102196
	Contact	**Recorders**	J Steel					**Permits**		
45-5-3186	Marsden Street	GDA	56	314800	6256315	Open site	Valid	Artefact : 4		102196,103782
	Contact T Russell	**Recorders**	Doctor.Edward Higginbotham					**Permits**		
45-6-2756	Parramatta Rehabilitation Centre (formerly O'Connell St PAD)	AGD	56	314950	6256850	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102196,103782
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**	2317,2414,2511	
45-6-2795	150 Marsden Street Parramatta PAD	AGD	56	314955	6256480	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		102196,103782
	Contact T Russell	**Recorders**	Austral Expert Services Pty Ltd					**Permits**	2404	
45-6-2950	Macquarie St PAD 2	GDA	56	315835	6256410	Open site	Destroyed	Potential Archaeological Deposit (PAD) : -		102144,103782
	Contact	**Recorders**	Ms.Jillian Comber,Comber Consultants Pty Limited					**Permits**	3238,3366	
45-6-3124	330 Church St Artefact Scatter	GDA	56	315330	6256965	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Doctor.Julie Dibden					**Permits**		

Report generated by AHIMS Web Service on 13/03/2020 for Georgia Burnett for the following area at Datum :GDA, Zone : 56, Eastings : 314000 - 316000, Northings : 6256000 - 6258000 with a Buffer of 0 meters. Additional Info : Due diligence assessment for King St path. Number of Aboriginal sites and Aboriginal objects found is 75

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : J190879

Client Service ID : 490989

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-6-3118	Clay Cliff Creek Levee	GDA	56	315801	6256294	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		102992,102997,102998
	Contact	**Recorders**	Ms.Fenella Atkinson					**Permits**	3788	
45-6-3134	Lennox Bridge Car Park PAD	GDA	56	315209	6256970	Open site	Partially Destroyed	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Miss.Felicity Barry					**Permits**	3797,4094,4537	
45-5-4895	Old Kings Oval Artefact Scatter 1	GDA	56	314665	6257231	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	AECOM Australia Pty Ltd - Sydney,Artefact - Cultural Heritage Management - Rose					**Permits**	4307,4461	
45-6-3232	Test recording	GDA	56	315051	6257106	Open site	Deleted	Artefact : -		
	Contact	**Recorders**	DPIE,Mr.Stewart Watters					**Permits**		
45-6-3222	Old Kings School AS1	GDA	56	315026	6257139	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Extent Heritage Pty Ltd - Pyrmont - Individual users,Ms.Ngaire Richards					**Permits**		
45-6-3214	Wigram & Hassall St AS	GDA	56	315825	6256231	Open site	Valid	Artefact : 1, Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Extent Heritage Pty Ltd - Pyrmont - Individual users,Mr.Alistair Hobbs					**Permits**	4043	

Report generated by AHIMS Web Service on 13/03/2020 for Georgia Burnett for the following area at Datum :GDA, Zone : 56, Eastings : 314000 - 316000, Northings : 6256000 - 6258000 with a Buffer of 0 meters. Additional Info : Due diligence assessment for King St path. Number of Aboriginal sites and Aboriginal objects found is 75

Appendix B

Aerial photographs

LIR-01196 Aerial Photograph 1930 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1930

LAND INSIGHT & RESOURCES

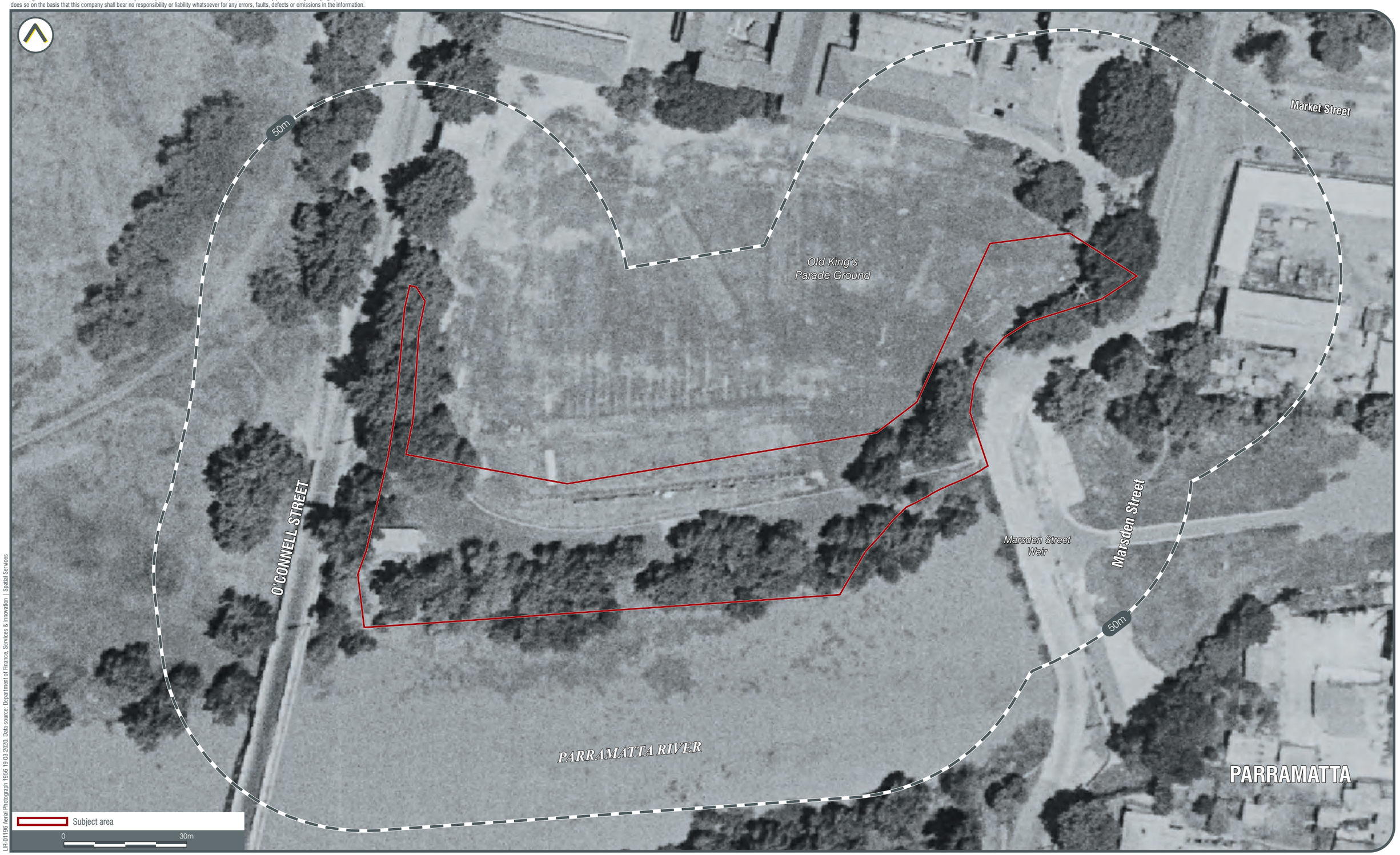
MAP 1

LIR-011196 Aerial Photograph 1943 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1943

LAND INSIGHT & RESOURCES

MAP 2

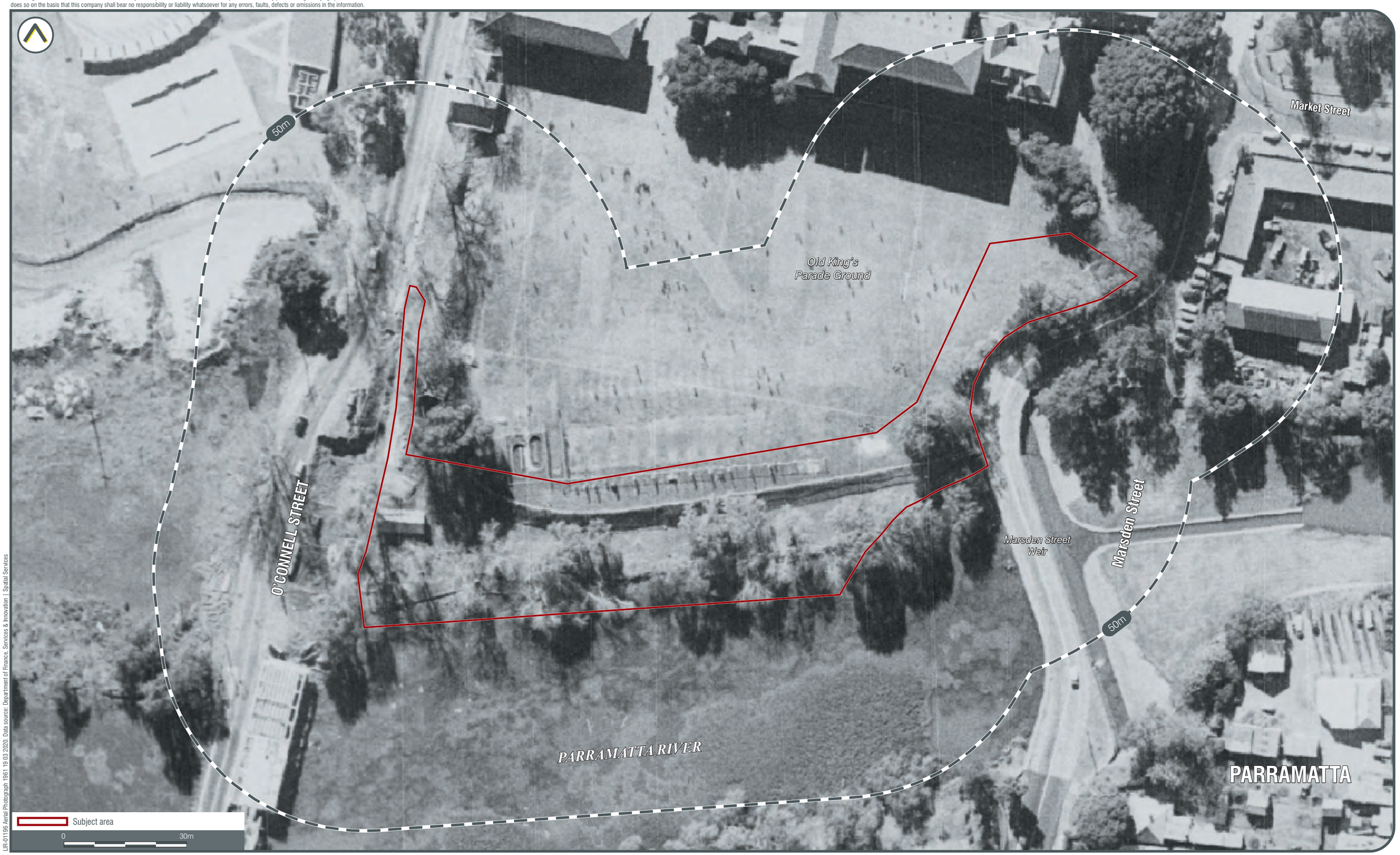


LIR-011196 Aerial Photograph 1956 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1956

LAND INSIGHT & RESOURCES

MAP 3



LIR-01196 Aerial Photograph 1961 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1961

LAND INSIGHT & RESOURCES

MAP 4

LIR-01196 Aerial Photograph 1965 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1965

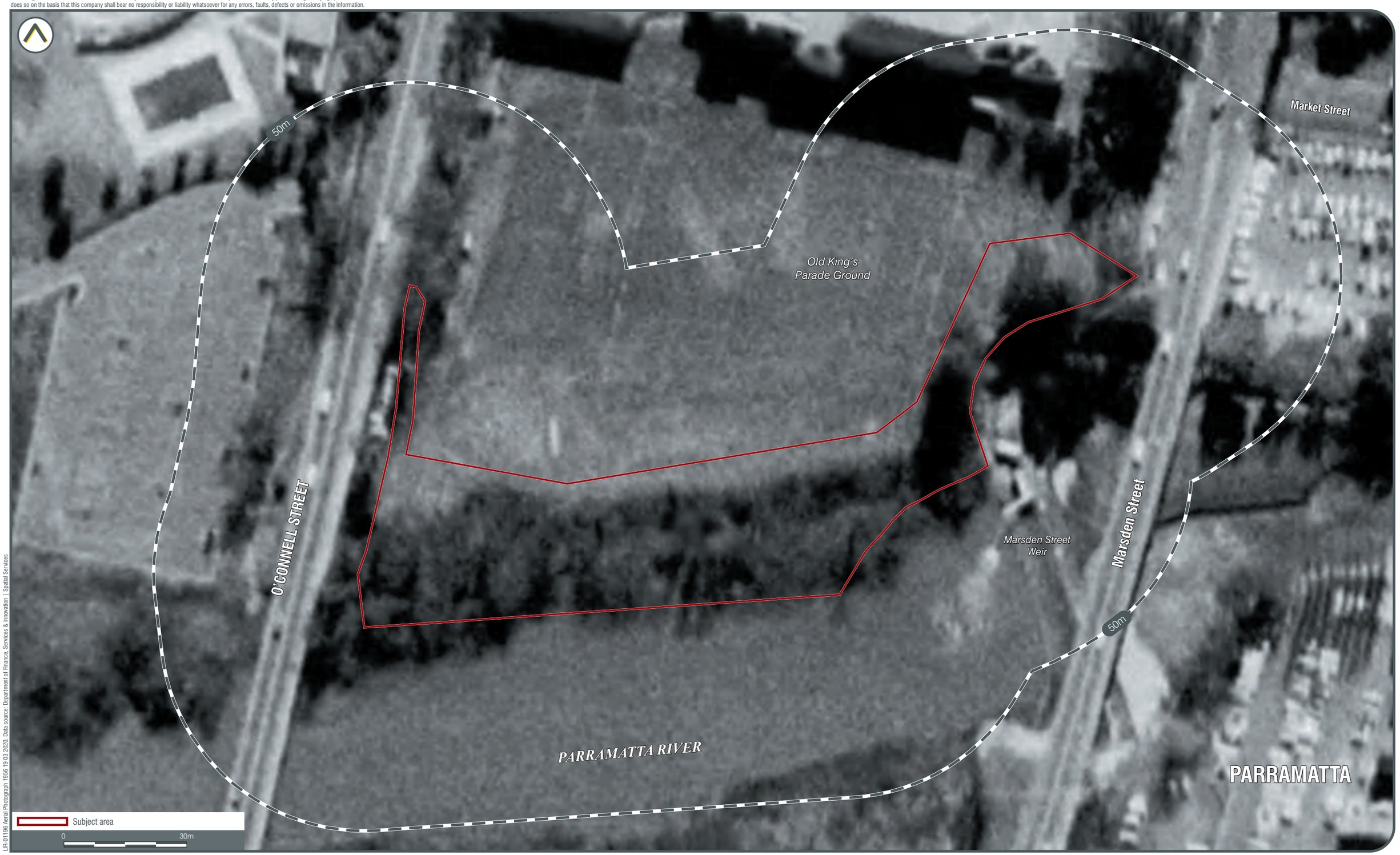
LAND INSIGHT & RESOURCES

MAP 5

AERIAL PHOTOGRAPH - 1970

LAND INSIGHT & RESOURCES

MAP 6



UR-01196 Aerial Photograph 1956 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1975

LAND INSIGHT & RESOURCES

MAP 7

LIR-01196 Aerial Photograph 1986 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1986

LAND INSIGHT & RESOURCES

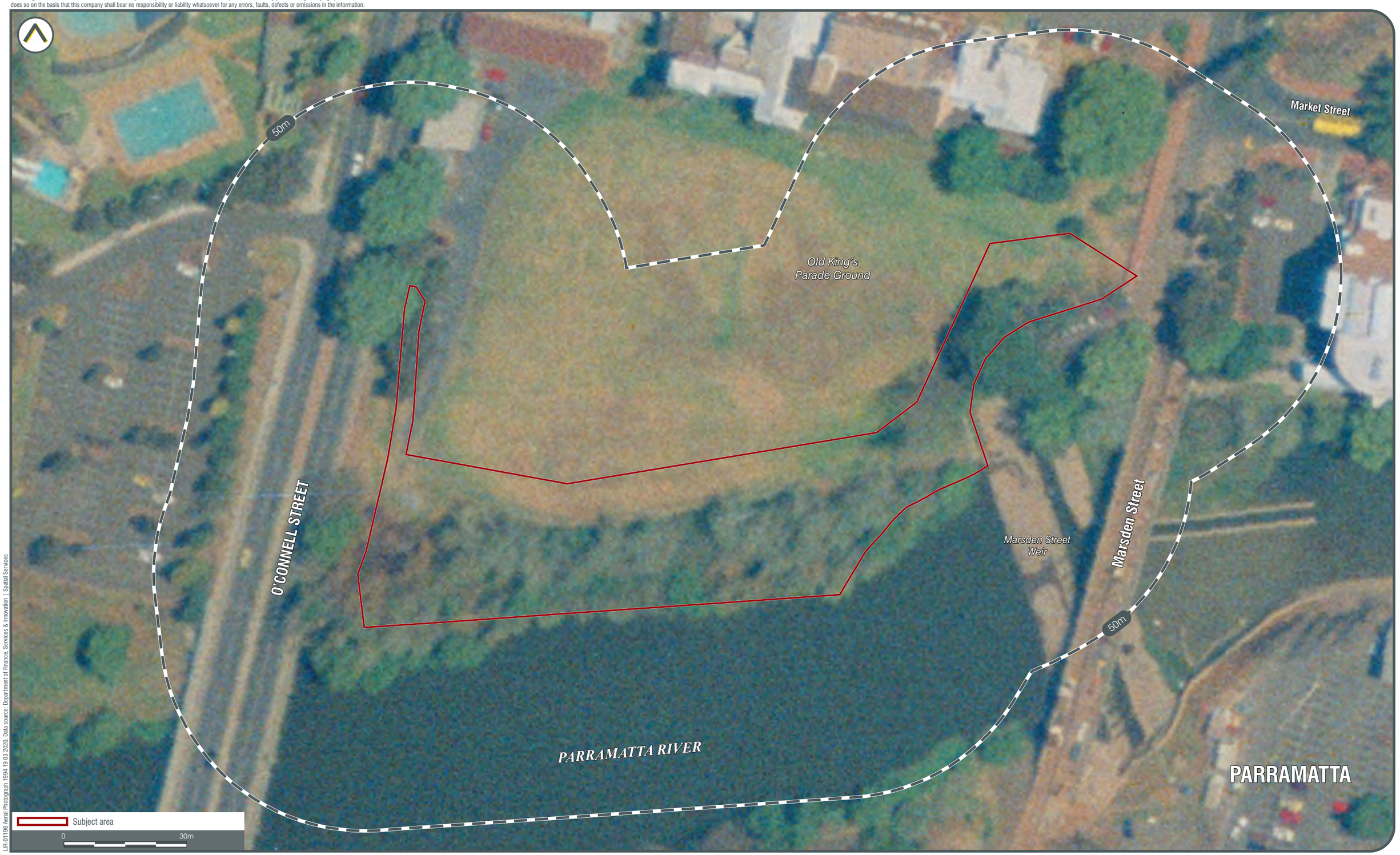
MAP 8

LIR-011196 Aerial Photograph 1991 19.03.2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1991

LAND INSIGHT & RESOURCES

MAP 9

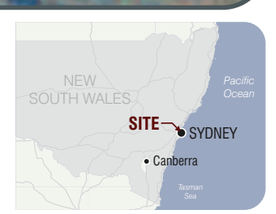


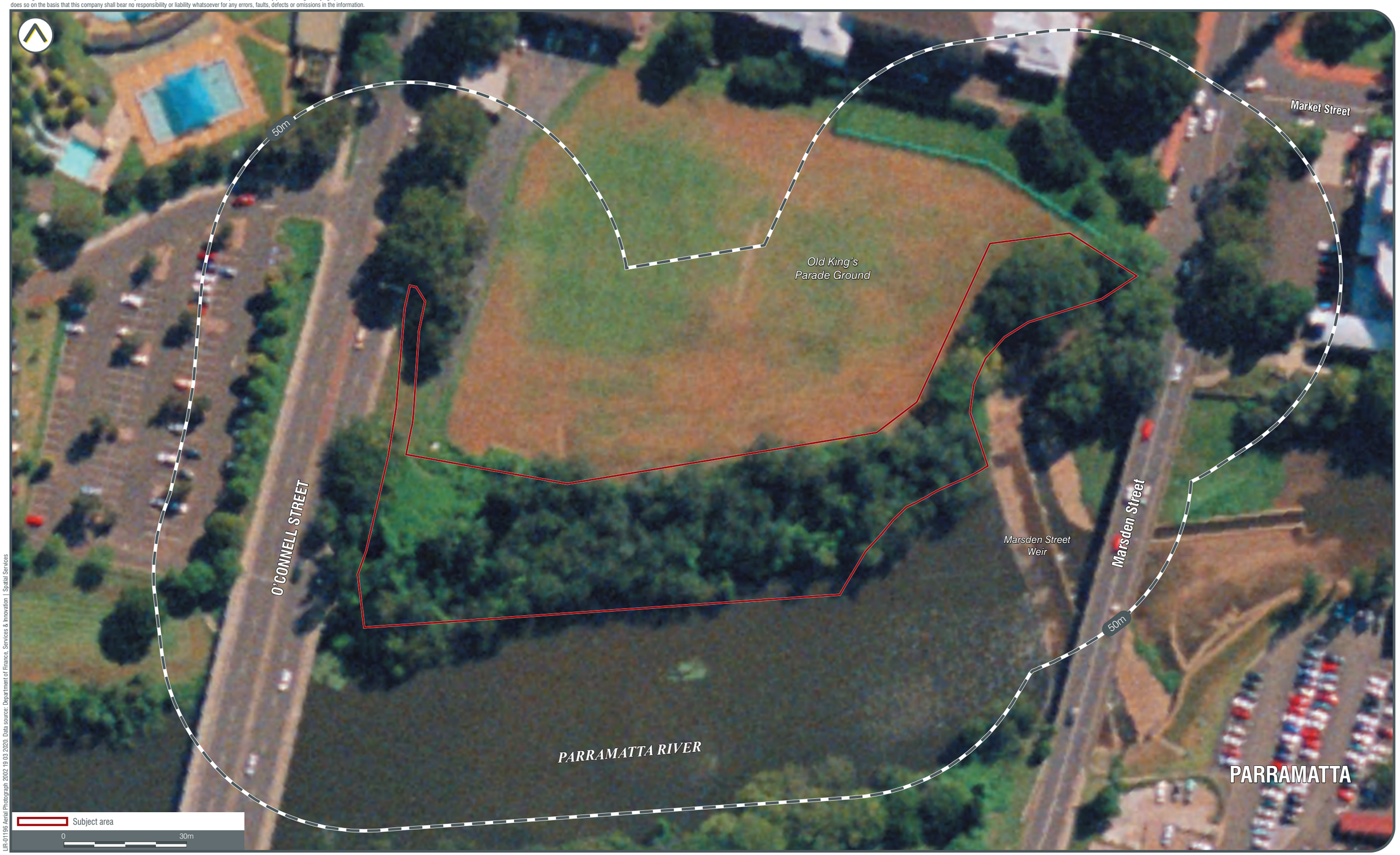
LIR-01196 Aerial Photograph 1994 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1994

LAND INSIGHT & RESOURCES

MAP 10

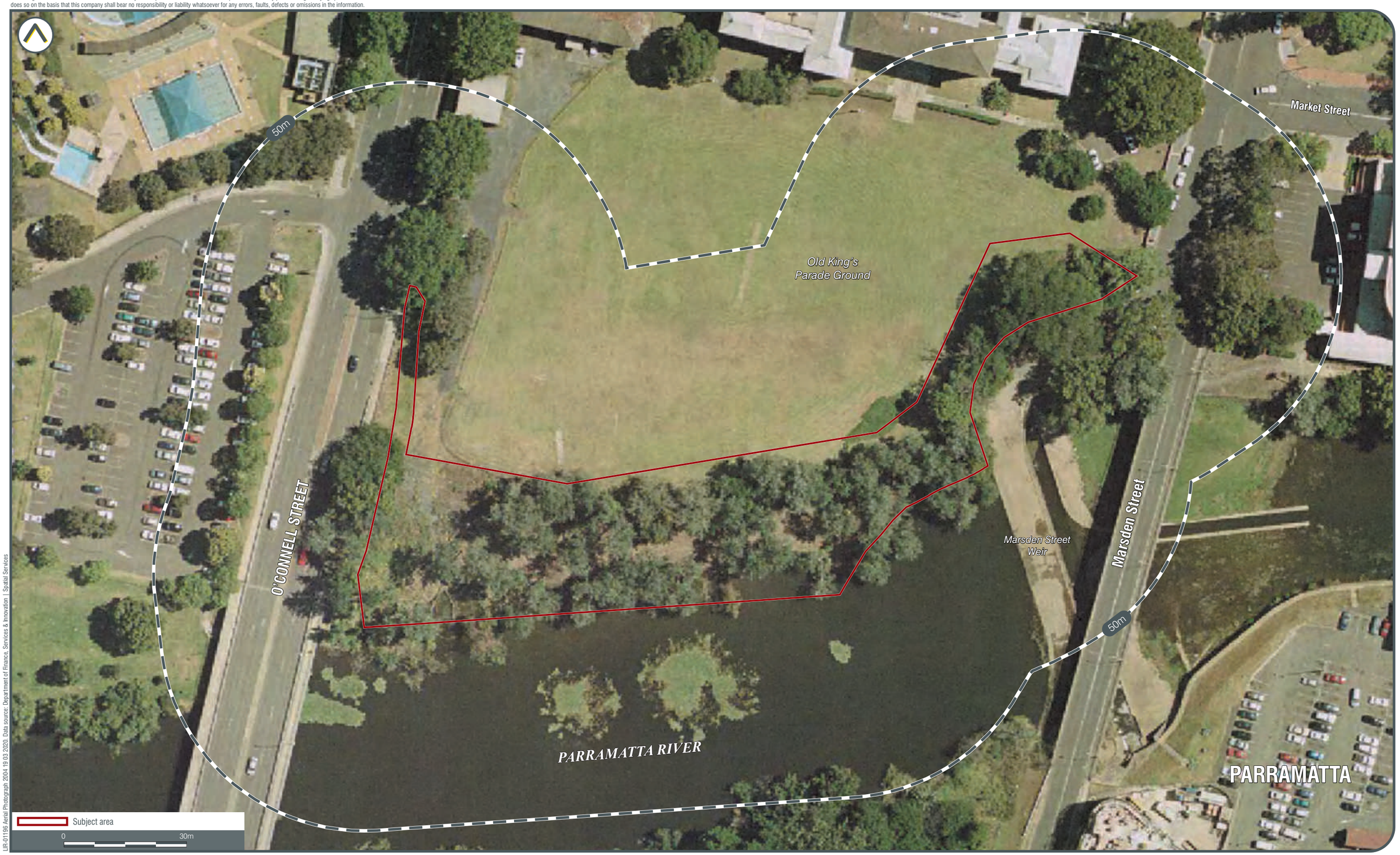




AERIAL PHOTOGRAPH - 2002

LAND INSIGHT & RESOURCES

MAP 11



LIR-011195 Aerial Photograph 2004 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 2004

LAND INSIGHT & RESOURCES

MAP 12

AERIAL PHOTOGRAPH - 2009

LAND INSIGHT & RESOURCES

MAP 13

AERIAL PHOTOGRAPH - 2012

LAND INSIGHT & RESOURCES

MAP 14

LIR-01196 Aerial Photograph 2017 19 03 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 2017

LAND INSIGHT & RESOURCES

MAP 15

AERIAL PHOTOGRAPH - 2020

LAND INSIGHT & RESOURCES

MAP 16

Appendix E

Interim Waste Classification Report – Alliance Geotechnical Pty Ltd

Alliance Geotechnical
ENGINEERING | ENVIRONMENTAL | TESTING
Your On-Site Geotechnical & Environmental Specialists

T: 1800 288 188
E: office@allgeo.com.au
W: www.allgeo.com.au
P: PO Box 275
Seven Hills NSW, 1730

City of Parramatta Council **24 April 2020**
126 Church Street,
Parramatta NSW 2150

Report Number: 10673-ER-1-1
Project Name: Old Kings School Foreshore Lightning
Site Location: 24A O'Connell St, PARRAMATTA NSW 2150
Report Type: Interim Waste Classification Report
Sample Locations: HA01 to HA04

Table 1 Summary Table

Material Assessed	*Insitu* soil materials from below site surface to the depth of excavation (~0.6 metres below ground level (m bgl)).
Material Classification	
HA01	***General Solid Waste TCLP1/SCC1 (non-putrescible)***
HA02	***Restricted Solid Waste TCLP2/SCC2 (non-putrescible) containing Special Waste (Asbestos)***
HA03	***General Solid Waste TCLP1/SCC1 (non-putrescible) including Acid Sulphate Soils***
HA04	***General Solid Waste CT1 (non-putrescible)***

Based on Alliance Geotechnical Pty Ltd.'s (AG) assessment, fieldwork observations and laboratory analytical data, as of the date of this report, the insitu material assessed would be classified as outlined in **Table 1 above** as per the NSW EPA *Waste Classification Guidelines 2014* (WCG EPA, 2014).

1. Introduction

Alliance Geotechnical Pty Ltd (AG) was engaged by City of Parramatta (the client) to assess the *insitu* soil materials located around 24A O'Connell Street, Parramatta NSW (refer to **Figure 1, Attachment 1).** The purposes of the assessment was to understand the contamination characteristics (if any) of soil materials to facilitate offsite disposal.

The following investigation/classification has been undertaken with reference to the relevant sections of NSW *Acid Sulfate Soils Manual* (ASSM, 1998) and the WCG EPA, 2014.

2. History and production of waste

AG was informed by the client that the *insitu* soil materials will be excavated for the proposed installation of lighting poles.

Further information on the history and production of waste in this area was not provided to AG.

3. Potential contaminating activities

Based on AG's understanding of site history, there is a medium to high potential for soil contaminating activities to have occurred at the site due to potential uncontrolled filling activities.

4. Acid sulfate soils

A review of the Prospect/Parramatta River Acid Sulfate Soil Risk Map (1:25,000 scale) indicates that the site lies on an area classed as *'Disturbed Terrain'* which may include filled areas, which often occur during reclamation of low-lying swamps for urban development. Other disturbed terrain includes areas which have been mined or dredged, or have undergone heavy ground disturbance through general urban development or construction of dams or levees. Soil investigations to assess these areas for acid sulfate potential were deemed required.

5. Fieldwork

The site was visited by an appropriately experienced environmental consultant from AG on 31 March 2020, and the following observations were made:

- A total of four (4) boreholes (HA01 to HA04) were drilled using a hand auger;
- The boreholes were drilled to depths ranging 0.6m to 0.65m (bgs). The boreholes were logged and soil samples were collected at regular depth intervals or change in stratigraphy (refer to **Figure 2, Attachment 1** and **Site Photographs, Attachment 2**);
- A total of 8 soil samples were collected to facilitate laboratory analysis;
- The soil material was generally comprised of alluvial Silty CLAY/Silty SAND/Clayey SAND, fine to coarse grained/ low to medium plasticity, yellow-brown-red;
- During sample collection no suspected asbestos containing material (ACM) or other contamination such as hydrocarbon odours, foreign materials or staining were noted within the *insitu* soil materials on site; and
- No shells or jarosite was noted during the sample collection activities.

Please refer to **Attachment 5, Borehole Logs** for further details.

6. Quantity of materials

AG understands from the client that the excavation for the proposed lighting pads is estimated to 1m x 1m and about 0.5m in depth. For excavation of 20 light poles and trenching involved, the total volume (assuming 900 lineal meters) may range from $80m^3$ – $90m^3$.

The frequency of soil sampling was consistent with the requirements of NSW EPA *Sampling Design Guidelines 1995*.

7. Laboratory analysis

A total of eight (8) soil samples (collected from HA01 to HA04) were scheduled for analysis at a NATA accredited laboratory for a selected range of the following parameters:

- arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc (Heavy metals);
- total recoverable hydrocarbons (TRHs);
- polycyclic aromatic hydrocarbons (PAHs);
- benzene, toluene, ethylbenzene, total xylene (BTEX);
- pH/EC;
- pHf and pHfox;
- chromium reducible sulfur (CRS);
- polychlorinated biphenyls (PCBs);
- organochlorine pesticides (OCPs); and
- asbestos ID.

All of the eight soil samples collected were scheduled at a NATA accredited laboratory analysis for field screening (pHf and pHfox). Based on the pH screening results, three of these samples were further analysed for chromium reducible sulfur (CRS).

The results of the analysis are presented in **Tables 1 and 2, Attachment 3** and **Laboratory Documentation, Attachment 4**.

7.1. Soil sampling and transportation

Upon inspection and logging of the material, soil samples were recovered by an appropriately experienced environmental consultant from AG and sent to a NATA accredited laboratory for analysis. The samples were recovered from site using disposable nitrile gloves and transferred into laboratory supplied 250mL glass jars, which were sealed with Teflon lids, leak proof plastic bags wrapped tightly with duct tape for ASS (to minimise contact with air and avoid moisture loss) and zip lock sealed 500mL asbestos bags. The sealed samples were placed into a chilled esky and transported to Eurofins Scientific | mgt, under Chain of Custody (COC) procedures. A new pair of nitrile gloves were used at each sample location to prevent cross-contamination.

7.2. Laboratory quality assurance and quality control

Eurofins Scientific | mgt is registered by NATA for chemical testing (1261) and quality system compliance to ISO/IEC 17025. A component of this quality system is checks on the analytical equipment to assess the accuracy of the results. Duplicates, spikes and blanks were not collected. However, based on the following AG considers the quality of the data to be acceptable:

- Primary samples were analysed by a NATA accredited laboratory;
- No evidence of odours or staining was observed in samples collected;
- Soil samples were collected using disposable gloves, in order to reduce the risk of cross contamination;
- Samples were placed in insulated containers with ice during storage and transport;
- Laboratory results for samples analysed for volatile contaminants of concern were less than the limit of reporting;
- Laboratory analytical results of primary samples were within the expected ranges in the context of this project and based on field observations; and
- AG considers the risk of volatile losses during storage and handling to be low.

8. Laboratory results

8.1. Acid sulfate soils assessment

Assessment of soil material for acid sulfate soils (ASS) can be divided into two components, preliminary screening and further chemical confirmatory analysis. Measuring the pH values of soil are an initial indication of the potential for ASS. However, depending on results of initial screening, soil material also requires chemical analysis, by a NATA accredited laboratory, comprising of chromium reducible sulfur suite (CRS) to confirm ASS and assess the potential for adverse environmental impact.

The indicators of ASS and the assessment criteria are provided in *Acid Sulfate Soil Management Guidelines,* NSW Acid Sulfate Soil Management Advisory Committee, August 1998 (ASSMAC, 1998).

8.1.1. Field screening

Soil pH can provide an indication of the likelihood of ASS as well as the efficacy of treatment of ASS. Field screening pH (pHf) provides a measure of the likelihood of actual ASS. To provide an indication of the likelihood of potential ASS, peroxide is added to the soil and the pH measured (pHfox). A summary of the values and the associated management measures are outlined in **Table 8.1** below.

Table 8.1 pH_F and pH_{FOX} Indicators of ASS

pH_F Value	pH_{FOX} Value	pH Change	Effervescence	Management
Greater than 5.5	Greater than 4.5	Less than 2	Non to mild	AASS and PASS unlikely. No action required.

Greater than 5.6	less than 3	Greater than 2	Mild - extreme	PASS suitable for burial below the water table within 16 hours.
Greater than 4.5 but less than 6	Greater than 3.5	Less than 1	Non to mild	AASS and PASS unlikely. No action required.
Greater than 4 but less than 5.6	less than 3	Greater than 1	Mild - strong	Some AASS possible and PASS may exist. Material requires treatment.
Less than or equal to 4	Less than 4	Less than 1	Non to mild	AASS are likely. Material requires treatment.
Less than or equal to 4	less than 3	Greater than 2	Mild - strong	AASS and PASS likely. Material requires treatment.

8.1.2. Field Peroxide Testing

Soil samples subjected to pH field screen analysis and returned the following results:

- All soil samples analysed reported pHf above the preliminary 'actual acid sulphate soil' screening criterion of pHf ≤4. The lowest result (pHf 6) was reported at sampling points HA03 (0-0.2m) and HA04(0.4-0.6m).

- Most soil samples analysed reported pHfox greater than the preliminary screening criterion pHfox ≤3.5 except for soil samples HA03 (0-0.2m) and HA03 (0.4-0.6m). These samples were selected for further CRS analysis along with HA01 (0-0.2m) (due to the differential in change of pH after oxidization).

A total of three (3) soil samples were subjected to chromium reducible sulfur suite laboratory analysis. The chromium reducible sulfur laboratory analytical results were compared with the action criteria adopted that would trigger a need for an acid sulfate soils management plan (ASSMP). For the purpose of selecting site specific action criteria, AG has assumed that the soil type present on site is 'coarse texture sands to loamy sands' and less than 1,000 tonnes of soil would be disturbed as part of the proposed works.

The sulfur trail and acid trail analytical results for the soil samples analysed did not trigger the adopted action criteria (0.03 % S oxidisable and 18 mol H+ / tonne, respectively) in any of the soil samples except for sample HA03 (0-0.2m).

Based on the above and results shown on Table 2 (attached), acid sulfate soils are present in HA03 (0-0.2m) and would require management as per an ASSMP. The ASSMP should be prepared by suitably qualified environmental consultant.

8.2. Waste classification assessment

The 6-step classification procedure in WCG EPA, 2014 was followed, with the results presented in **Table 8.2** below.

Table 8.2. NSW EPA *Waste Classification Guidelines* (2014) – 6 Step Classification Procedure

Step		Material Observation
1	*Is the waste special waste?*	**HA01 - No** **HA02 – Yes (Asbestos)** **HA03 - No** **HA04 - No**
2	*Is the waste liquid waste?*	**No.**
3	*Is the waste pre-classified?*	**No.**
4	*Does the waste possess hazardous characteristics*	**No.**
5	*Waste classification using chemical assessment.*	**Yes.**

Step		Material Observation
6	*Is the waste putrescible or non-putrescible?*	**Non-putrescible.** The fill does not contain materials considered to be putrescible. *

*wastes that are generally not classified as putrescible include soils, timber, garden trimmings, agricultural, forest and crop materials, and natural fibrous organic and vegetative materials (WCG EPA, 2014).

9. Material classification

Based on AGs assessment, fieldwork observations and laboratory analytical data, of the date of this report, the *insitu* soil material assessed as per the WCG EPA, 2014 would be classified as:

HA01 General Solid Waste TCLP1/SCC1 (non-putrescible)
HA02 Restricted Solid Waste TCLP2/SCC2 (non-putrescible) containing Special Waste (Asbestos)
HA03 General Solid Waste TCLP1/SCC1 (non-putrescible) including Acid Sulphate Soils
HA04 General Solid Waste CT1 (non-putrescible)

AG notes that the materials have been classified for the purposes of offsite disposal to an NSW EPA licensed facility.

If the material was to be excavated and disposed based on the currently available data, AG recommends that:

- Material at HA03 be treated for ASS as per the NSW *Acid Sulfate Soils Manual* (ASSM, 1998) and re-tested for classification before disposal or disposed at a facility that is licensed to receive untreated acid sulfate soils;
- the waste be handled by suitably licensed contractors, and disposed of to an appropriately NSW EPA licenced waste receiving facility; and
- the waste generator retains transport and tipping records for all waste removed from site.

Should unexpected finds be uncovered during excavation of the *insitu* material described in this waste classification, works are to cease and a suitably qualified environmental consultant engaged to assess the potential implication with regard to this waste classification.

This conclusion must be read in conjunction with the statement of limitations presented in **Section 10.**

10. Statement of limitations

The findings presented in this report are based on chemical analysis, physical observations made during a site inspection, and anecdotal information that were made available during the course of this investigation. To the best of our knowledge, these observations represent a reasonable interpretation of the general condition of the site at the time of report completion.

This report has been prepared solely for the use of the client to whom it is addressed and no other party is entitled to rely on its findings.

No warranties are made as to the information provided in this report. All conclusions and recommendations made in this report are of the professional opinions of personnel involved with the project and while normal checking of the accuracy of data has been conducted, any circumstances outside the scope of this report or which are not made known to personnel and which may impact on those opinions is not the responsibility of Alliance Geotechnical Pty Ltd.

Should you need any further information, please do not hesitate to contact the undersigned.

For and on behalf of,
Alliance Geotechnical Pty Ltd

Sam Inameti
Environmental Consultant

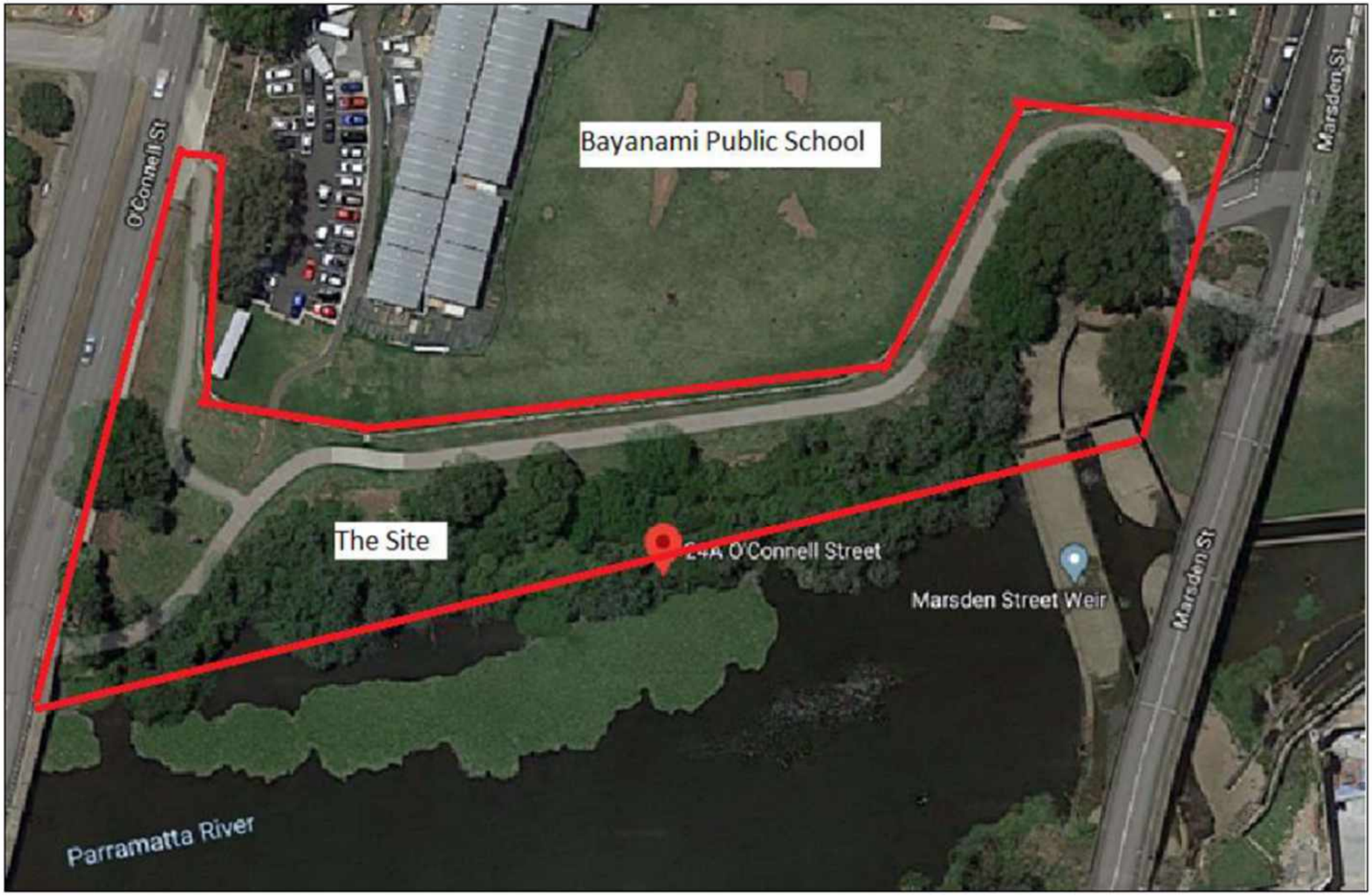
Reviewed by:

Mehran Asadabadi
Senior Environmental Scientist

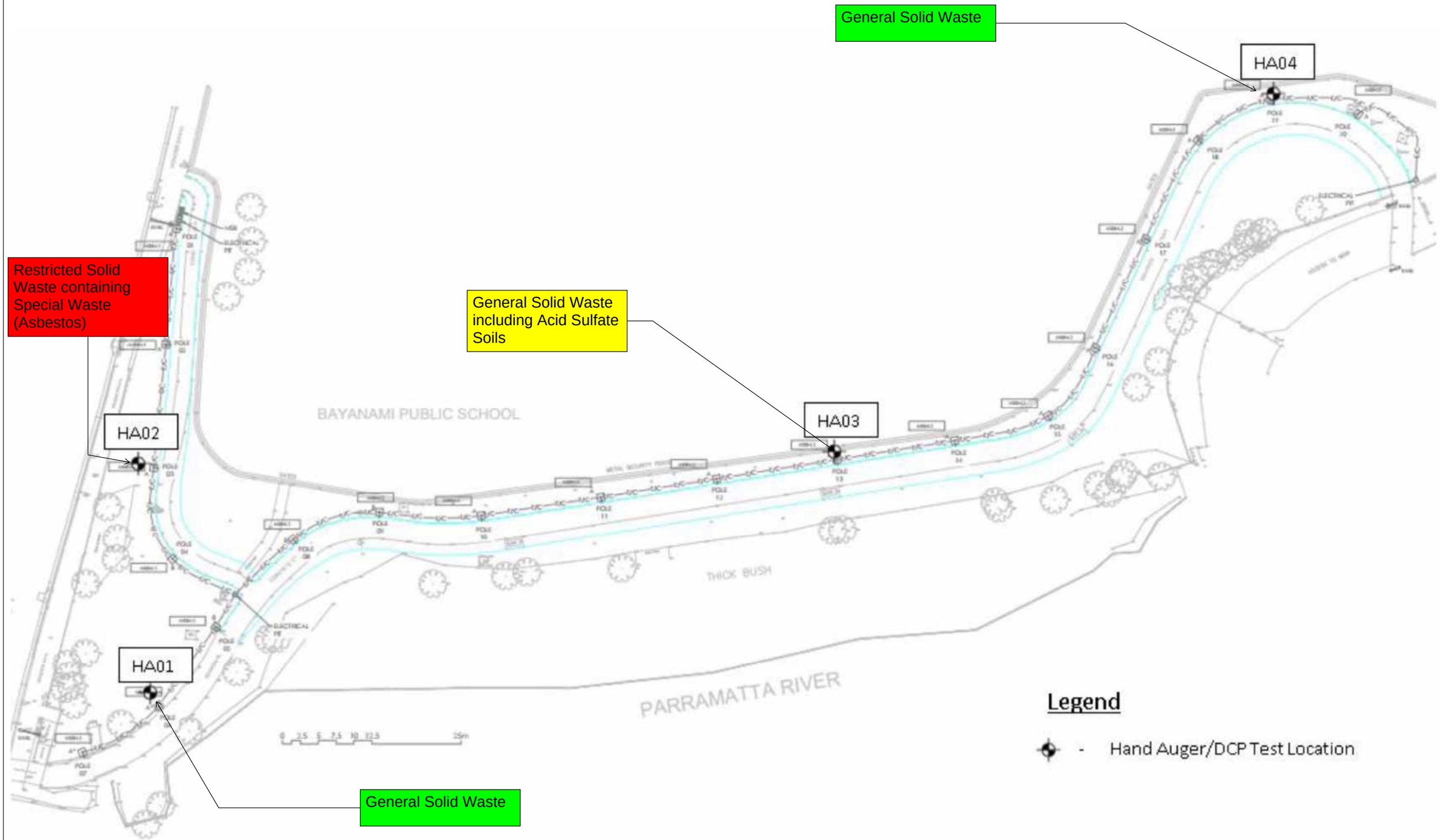
Attachments:

1) *Figures*
2) *Site Photograph*
3) *Results Summary Tables*
4) *Laboratory Reports and Chain of Custody Documentation*
5) *Borehole Logs*

ATTACHMENT 1
FIGURES



Alliance Geotechnical ENGINEERING | ENVIRONMENTAL | TESTING Manage the earth, eliminate the risk	Site Locality				
	Client Name:	City of Parramatta Council	N	Figure Number:	1
	Project Name:	Old Kings School Foreshore Lighting		Figure Date:	20 April 2020
	Project Location:	24A O'Connell St, Parramatta NSW 2150		Report Number:	10673-ER-1-1



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Sample Location

Client Name:	City of Parramatta Council	N	Figure Number:	2
Project Name:	Old Kings School Foreshore Lighting		Figure Date:	20 April 2020
Project Location:	24A O'Connell St, Parramatta NSW 2150		Report Number:	10673-ER-1-1

ATTACHMENT 2
SITE PHOTOGRAPHS

Photograph 1. Sandy CLAY - *in situ* soil materials located at HA03.

Photograph 2. Alluvial SAND - *in situ* soil materials located at HA02.

Photograph 3. Silty CLAY - *in situ* soil materials located at HA01.

ATTACHMENT 3
RESULTS SUMMARY TABLES

Table 1
Old Kings Parade, Parramatta NSW
Soil Results & Waste Assessment Criteria
10673-ER-1-1

												Sample ID	HA01 (0-0.2)	HA01 (0.4-0.6)	HA02 (0-0.2)	HA02 (0.4-0.6)	HA03 (0-0.2)	HA03 (0.4-0.6)	HA04 (0-0.2)	HA04 (0.4-0.6)
												Reference	S20-Ap02264	S20-Ap02265	S20-Ap02266	S20-Ap02267	S20-Ap02268	S20-Ap02269	S20-Ap02270	S20-Ap02271
												Date Sampled	31/03/2020	31/03/2020	31/03/2020	31/03/2020	31/03/2020	31/03/2020	31/03/2020	31/03/2020
												Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Group	Analyte	Units	PQL	GSW Criteria CT1	GSW Criteria TCLP1 (mg/L)	GSW Criteria SCC1 (mg/kg)	RSW Criteria CT2	RSW Criteria TCLP2 (mg/L)	RSW Criteria SCC2 (mg/kg)	DATASET AVERAGE	DATASET MINIMUM	DATASET MAXIMUM							
Metals	Arsenic	mg/kg	2	100	*	500	400	20	2000	7.4	3.7	13	13	13	3.7	5	7.3	4.2	5	7.9
	Cadmium	mg/kg	0.4	20	*	100	80	4	400	1.1	0.5	1.9	1.9	0.8	< 0.4	0.5	< 0.4	< 0.4	< 0.4	< 0.4
	Chromium	mg/kg	5	100	*	1,900	400	20	7,600	28	9.7	47	39	35	17	15	47	11	9.7	16
	Copper	mg/kg	5	*	*	*	*	*	*	150.5	9.2	1000	87	1000	22	27	29	9.2	15	15
	Lead	mg/kg	5	100	*	1,500	400	*	6,000	433	16	2200	390	420	110	2200	88	180	62	16
	TCLP Lead	mg/L	0.4	*	5	*	*	20	*	0.14	0.02	0.37	0.02	0.05	*	0.37	*	0.1	*	*
	Mercury	mg/kg	0.1	4	*	50	16	0.8	200	0.8	0.2	3.2	0.4	0.9	0.5	3.2	0.4	0.2	0.2	< 0.1
	Nickel	mg/kg	5	40	*	1,050	160	8	4,200	14.5	5.1	37	37	18	12	6.8	14	< 5	5.1	8.3
	Zinc	mg/kg	5	*	*	*	*	*	*	321.3	22	830	830	710	150	600	120	76	62	22
PAHS	Acenaphthylene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Acenaphthene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Anthracene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benz(a)anthracene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(a)pyrene	mg/kg	0.5	0.8	0.04	10	3.2	0.16	23	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(a)pyrene TEQ (lower bound) *	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(a)pyrene TEQ (medium bound) *	mg/kg	0.5	*	*	*	*	*	*	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Benzo(a)pyrene TEQ (upper bound) *	mg/kg	0.5	*	*	*	*	*	*	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	Benzo(b&j)fluoranthene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(g.h.i)perylene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Benzo(k)fluoranthene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Chrysene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Dibenz(a.h)anthracene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Fluoranthene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Fluorene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Indeno(1.2.3-cd)pyrene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Naphthalene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Phenanthrene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Pyrene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Total PAH*	mg/kg	0.5	200	N/A	200	800	N/A	800	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
TRH/BTEX	Naphthalene	mg/kg	0.5	*	*	*	*	*	*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	TRH C_6 - C_9	mg/kg	20	650	N/A	650	2,600	N/A	2,600	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
	TRH C_{10}-C_{36}	mg/kg	50	10,000	N/A	10,000	40,000	N/A	40,000	55	55	55	< 50	< 50	< 50	< 50	55	< 50	< 50	< 50
	Benzene	mg/kg	0.1	10	*	18	40	*	72	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Ethylbenzene	mg/kg	0.1	600	*	1,080	2,400	*	4,320	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	m&p-Xylenes	mg/kg	0.2	*	*	*	*	*	*	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	o-Xylene	mg/kg	0.1	*	*	*	*	*	*	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Toluene	mg/kg	0.1	288	*	518	1,152	*	2,073	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Xylenes - Total	mg/kg	0.3	1,000	*	1,800	4,000	200	7,200	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Asbestos	Asbestos ID	%	0.001	Detection	*	Detection	Detection	*	Detection	ND	ND	ND	ND	ND	ND	Detection	ND	ND	ND	ND
OC Pesticides	Endosulfan[a]	mg/kg	0.05	60	3	108	240	*	432	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	Scheduled Chemicals[b]	mg/kg	<0.1	<50	N/A	<50	<50	*	<50	<0.1	<0.1	<0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PCB	Polchlorinated Biphenyls	mg/kg	0.5	<50	N/A	<50	<50	*	<50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Concentration exceeding General Solid Waste Criteria CT1 (NSW EPA Waste Classification Guidelines)
Concentration exceeding General Solid Waste Criteria TCLP1 (mg/L) (NSW EPA Waste Classification Guidelines)
Concentration exceeding General Solid Waste Criteria SCC1 (mg/kg) (NSW EPA Waste Classification Guidelines)
Concentration exceeding Restricted Solid Waste Criteria CT2 (NSW EPA Waste Classification Guidelines)
Concentration exceeding Restricted Solid Waste Criteria TCLP2 (mg/L) SCC1 (mg/kg) (NSW EPA Waste Classification Guidelines)
Concentration exceeding Restricted Solid Waste Criteria SCC2 (mg/kg) (NSW EPA Waste Classification Guidelines)

* = No currently available criterion
- = No sample analysed
N/A = No TCLP analysis is required. Chemicals are assessed using SCC1 and SCC2.
a = Endosulfan means the total of Endosulfan I, Endosulfan II and Endosulfan Sulfate
b = Scheduled Chemicals means the total of Aldrin, Alpha-BHC, Beta-BHC, Gamma-BHC (Lindane), Delta BHC, Chlordane, DDD, DDE, DDT, Dieldrin, Endrin and Endrin Aldehyde
ND = Not Detected

Table 2
Old Kings Parade, Parramatta NSW
Acid sulfate soils assessment
10673-ER-1-1

						Sample ID	HA01 (0-0.2)	HA01 (0.4-0.6)	HA02 (0-0.2)	HA02 (0.4-0.6)	HA03 (0-0.2)	HA03 (0.4-0.6)	HA04 (0-0.2)	HA04 (0.4-0.6)
						Reference	S20-Ap02264	S20-Ap02265	S20-Ap02266	S20-Ap02267	S20-Ap02268	S20-Ap02269	S20-Ap02270	S20-Ap02271
						Date Sampled	31/03/2020	31/03/2020	31/03/2020	31/03/2020	31/03/2020	31/03/2020	31/03/2020	31/03/2020
						Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Group	**Analyte**	**Units**	**PQL**	**ASSMAC (1998) Sandy to loamy sands**	**DATASET AVERAGE**	**DATASET MINIMUM**	**DATASET MAXIMUM**							
Field Screen	phf	pH Units	0	<4	**7.0**	**6**	**8.6**	8.3	7.2	7.2	8.6	6	6.1	6.7	6
	pHfox	pH Units	0	<3.5	**4.7**	**3.3**	**7**	5	4.9	4.6	7	3.3	3.4	3.8	5.2
	Reaction Rating	pH Units	0	XX	**4.0**	**4**	**4**	4	4	4	4	4	4	4	4
Chromium Reducible	CRS Suite - Net Acidity (Sulphur Units)	% S	0.02	> 0.03	**0.04**	**0.02**	**0.05**	< 0.02	-	-	-	0.05	0.02	-	-
	CRS Suite - Net Acidity (Acidity Units)	mol H+/tonne	10	> 18	**23.5**	**13**	**34**	<10	-	-	-	34	13	-	-
	Liming Rate	Kg CaCo3/T	1.0		**2.5**	**2.5**	**2.5**	<1	-	-	-	2.5	<1	-	-

Concentration exceed/less than the preliminary acid sulphate screening criteria.
Concentration exceeding the adopted action criteria (Table 4.4 ASSMAC Manual)
*** = No currently available criterion**
- = No sample analysed

ATTACHMENT 4
LABORATORY REPORTS AND CHAIN OF CUSTODY DOCUMENTATION

Alliance Geotechnical
10 Welder Road
Seven Hills
NSW 2147

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mehran Asadabadi**

Report **711476-S**
Project name OLD KINGS PARADE
Project ID 10673
Received Date Apr 01, 2020

Client Sample ID			**HA01 (0-0.2)**	**HA01 (0.4-0.6)**	**HA02 (0-0.2)**	**HA02 (0.4-0.6)**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Ap02264**	**S20-Ap02265**	**S20-Ap02266**	**S20-Ap02267**
Date Sampled			**Mar 31, 2020**	**Mar 31, 2020**	**Mar 31, 2020**	**Mar 31, 2020**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	102	117	110	110
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5

Client Sample ID			HA01 (0-0.2)	HA01 (0.4-0.6)	HA02 (0-0.2)	HA02 (0.4-0.6)
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Ap02264	S20-Ap02265	S20-Ap02266	S20-Ap02267
Date Sampled			Mar 31, 2020	Mar 31, 2020	Mar 31, 2020	Mar 31, 2020
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	72	85	75	96
p-Terphenyl-d14 (surr.)	1	%	70	86	66	97
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dibutylchlorendate (surr.)	1	%	76	84	103	119
Tetrachloro-m-xylene (surr.)	1	%	70	93	70	82
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1221	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1232	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1242	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1248	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1254	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1260	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PCB*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibutylchlorendate (surr.)	1	%	76	84	103	119
Tetrachloro-m-xylene (surr.)	1	%	70	93	70	82

Client Sample ID			HA01 (0-0.2)	HA01 (0.4-0.6)	HA02 (0-0.2)	HA02 (0.4-0.6)
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Ap02264	S20-Ap02265	S20-Ap02266	S20-Ap02267
Date Sampled			Mar 31, 2020	Mar 31, 2020	Mar 31, 2020	Mar 31, 2020
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	13	13	3.7	5.0
Cadmium	0.4	mg/kg	1.9	0.8	< 0.4	0.5
Chromium	5	mg/kg	39	35	17	15
Copper	5	mg/kg	87	1000	22	27
Lead	5	mg/kg	390	420	110	2200
Mercury	0.1	mg/kg	0.4	0.9	0.5	3.2
Nickel	5	mg/kg	37	18	12	6.8
Zinc	5	mg/kg	830	710	150	600
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.3	7.2	7.2	8.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.0	4.9	4.6	7.0
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
% Moisture	1	%	26	22	21	16

Client Sample ID			HA03 (0-0.2)	HA03 (0.4-0.6)	HA04 (0-0.2)	HA04 (0.4-0.6)
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Ap02268	S20-Ap02269	S20-Ap02270	S20-Ap02271
Date Sampled			Mar 31, 2020	Mar 31, 2020	Mar 31, 2020	Mar 31, 2020
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	55	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	55	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	103	118	73	106
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100

Client Sample ID			HA03 (0-0.2)	HA03 (0.4-0.6)	HA04 (0-0.2)	HA04 (0.4-0.6)
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Ap02268	S20-Ap02269	S20-Ap02270	S20-Ap02271
Date Sampled			Mar 31, 2020	Mar 31, 2020	Mar 31, 2020	Mar 31, 2020
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	93	91	98	80
p-Terphenyl-d14 (surr.)	1	%	100	80	96	77
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Toxaphene	1	mg/kg	< 1	< 1	< 1	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dibutylchlorendate (surr.)	1	%	122	85	100	83
Tetrachloro-m-xylene (surr.)	1	%	79	86	97	78

Client Sample ID			HA03 (0-0.2)	HA03 (0.4-0.6)	HA04 (0-0.2)	HA04 (0.4-0.6)
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Ap02268	S20-Ap02269	S20-Ap02270	S20-Ap02271
Date Sampled			Mar 31, 2020	Mar 31, 2020	Mar 31, 2020	Mar 31, 2020
Test/Reference	LOR	Unit				
Polychlorinated Biphenyls						
Aroclor-1016	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1221	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1232	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1242	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1248	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1254	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aroclor-1260	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PCB*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibutylchlorendate (surr.)	1	%	122	85	100	83
Tetrachloro-m-xylene (surr.)	1	%	79	86	97	78
Heavy Metals						
Arsenic	2	mg/kg	7.3	4.2	5.0	7.9
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	47	11	9.7	16
Copper	5	mg/kg	29	9.2	15	15
Lead	5	mg/kg	88	180	62	16
Mercury	0.1	mg/kg	0.4	0.2	0.2	< 0.1
Nickel	5	mg/kg	14	< 5	5.1	8.3
Zinc	5	mg/kg	120	76	62	22
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	6.1	6.7	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	3.4	3.8	5.2
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
% Moisture	1	%	22	11	14	13

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Apr 07, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Apr 07, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Apr 07, 2020	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Apr 07, 2020	
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Sydney	Apr 07, 2020	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Organochlorine Pesticides	Sydney	Apr 07, 2020	14 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Polychlorinated Biphenyls	Sydney	Apr 07, 2020	28 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Metals M8	Sydney	Apr 07, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Acid Sulfate Soils Field pH Test	Brisbane	Apr 06, 2020	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
% Moisture	Sydney	Apr 01, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

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Phone : 0800 856 450
IANZ # 1290

Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: OLD KINGS PARADE
Project ID: 10673

Order No.:
Report #: 711476
Phone: 1800 288 188
Fax: 02 9675 1888

Received: Apr 1, 2020 6:04 PM
Due: Apr 8, 2020
Priority: 5 Day
Contact Name: Mehran Asadabadi

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Alliance WAC Suite 2:TRH/BTEXN/PAH/M8/OCP/PCB/Asb
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217							X	X
Brisbane Laboratory - NATA Site # 20794						X		
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	HA01 (0-0.2)	Mar 31, 2020		Soil	S20-Ap02264	X	X	X
2	HA01 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap02265	X	X	X
3	HA02 (0-0.2)	Mar 31, 2020		Soil	S20-Ap02266	X	X	X
4	HA02 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap02267	X	X	X
5	HA03 (0-0.2)	Mar 31, 2020		Soil	S20-Ap02268	X	X	X
6	HA03 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap02269	X	X	X
7	HA04 (0-0.2)	Mar 31, 2020		Soil	S20-Ap02270	X	X	X
8	HA04 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap02271	X	X	X
Test Counts						8	8	8

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.2			0.2	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.5			0.5	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.5			0.5	Pass	
Aroclor-1242	mg/kg	< 0.5			0.5	Pass	
Aroclor-1248	mg/kg	< 0.5			0.5	Pass	
Aroclor-1254	mg/kg	< 0.5			0.5	Pass	
Aroclor-1260	mg/kg	< 0.5			0.5	Pass	
Total PCB*	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	104			70-130	Pass	
TRH C10-C14	%	78			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	92			70-130	Pass	
Toluene	%	122			70-130	Pass	
Ethylbenzene	%	124			70-130	Pass	
m&p-Xylenes	%	127			70-130	Pass	
o-Xylene	%	125			70-130	Pass	
Xylenes - Total*	%	126			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	107			70-130	Pass	
TRH C6-C10	%	105			70-130	Pass	
TRH >C10-C16	%	80			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	92			70-130	Pass	
Acenaphthylene	%	121			70-130	Pass	
Anthracene	%	113			70-130	Pass	
Benz(a)anthracene	%	103			70-130	Pass	
Benzo(a)pyrene	%	100			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Benzo(b&j)fluoranthene	%	98			70-130	Pass	
Benzo(g.h.i)perylene	%	92			70-130	Pass	
Benzo(k)fluoranthene	%	91			70-130	Pass	
Chrysene	%	99			70-130	Pass	
Dibenz(a.h)anthracene	%	97			70-130	Pass	
Fluoranthene	%	100			70-130	Pass	
Fluorene	%	107			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	107			70-130	Pass	
Naphthalene	%	99			70-130	Pass	
Phenanthrene	%	108			70-130	Pass	
Pyrene	%	96			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	87			70-130	Pass	
4.4'-DDD	%	121			70-130	Pass	
4.4'-DDE	%	98			70-130	Pass	
4.4'-DDT	%	126			70-130	Pass	
a-BHC	%	106			70-130	Pass	
Aldrin	%	88			70-130	Pass	
b-BHC	%	97			70-130	Pass	
d-BHC	%	98			70-130	Pass	
Dieldrin	%	95			70-130	Pass	
Endosulfan I	%	117			70-130	Pass	
Endosulfan II	%	130			70-130	Pass	
Endosulfan sulphate	%	110			70-130	Pass	
Endrin	%	125			70-130	Pass	
Endrin aldehyde	%	79			70-130	Pass	
Endrin ketone	%	98			70-130	Pass	
g-BHC (Lindane)	%	94			70-130	Pass	
Heptachlor	%	81			70-130	Pass	
Heptachlor epoxide	%	117			70-130	Pass	
Hexachlorobenzene	%	109			70-130	Pass	
Methoxychlor	%	127			70-130	Pass	
LCS - % Recovery							
Polychlorinated Biphenyls							
Aroclor-1016	%	82			70-130	Pass	
Aroclor-1260	%	116			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	99			70-130	Pass	
Cadmium	%	98			70-130	Pass	
Chromium	%	98			70-130	Pass	
Copper	%	98			70-130	Pass	
Lead	%	99			70-130	Pass	
Mercury	%	100			70-130	Pass	
Nickel	%	98			70-130	Pass	
Zinc	%	95			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	S20-Ap02324	NCP	%	82			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	S20-Ap02324	NCP	%	83			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Fluoranthene	S20-Ap12828	NCP	%	108			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	S20-Ap12828	NCP	%	88			70-130	Pass	
4.4'-DDD	S20-Ap12828	NCP	%	121			70-130	Pass	
4.4'-DDE	S20-Ap12828	NCP	%	101			70-130	Pass	
4.4'-DDT	S20-Ap12828	NCP	%	119			70-130	Pass	
a-BHC	S20-Ap12828	NCP	%	107			70-130	Pass	
Aldrin	S20-Ap12828	NCP	%	86			70-130	Pass	
b-BHC	S20-Ap12828	NCP	%	101			70-130	Pass	
d-BHC	S20-Ap12828	NCP	%	107			70-130	Pass	
Dieldrin	S20-Ap12828	NCP	%	104			70-130	Pass	
Endosulfan I	S20-Ap12828	NCP	%	121			70-130	Pass	
Endosulfan II	S20-Ap12828	NCP	%	125			70-130	Pass	
Endosulfan sulphate	S20-Ap12828	NCP	%	111			70-130	Pass	
Endrin aldehyde	S20-Ap12828	NCP	%	96			70-130	Pass	
Endrin ketone	S20-Ap12828	NCP	%	93			70-130	Pass	
g-BHC (Lindane)	S20-Ap12828	NCP	%	99			70-130	Pass	
Heptachlor	S20-Ap12828	NCP	%	89			70-130	Pass	
Heptachlor epoxide	S20-Ap12828	NCP	%	110			70-130	Pass	
Hexachlorobenzene	S20-Ap12828	NCP	%	114			70-130	Pass	
Methoxychlor	W20-Ap08093	NCP	%	122			70-130	Pass	
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1016	S20-Ap12828	NCP	%	80			70-130	Pass	
Aroclor-1260	S20-Ap12828	NCP	%	104			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S20-Ap04448	NCP	%	109			70-130	Pass	
Cadmium	S20-Ap04448	NCP	%	102			70-130	Pass	
Chromium	S20-Ap04448	NCP	%	100			70-130	Pass	
Copper	S20-Ap04448	NCP	%	98			70-130	Pass	
Lead	S20-Ap04448	NCP	%	100			70-130	Pass	
Mercury	S20-Ap04448	NCP	%	105			70-130	Pass	
Nickel	S20-Ap04448	NCP	%	112			70-130	Pass	
Zinc	S20-Ap02198	NCP	%	95			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S20-Ap02265	CP	%	97			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S20-Ap02265	CP	%	88			70-130	Pass	
Toluene	S20-Ap02265	CP	%	110			70-130	Pass	
Ethylbenzene	S20-Ap02265	CP	%	113			70-130	Pass	
m&p-Xylenes	S20-Ap02265	CP	%	115			70-130	Pass	
o-Xylene	S20-Ap02265	CP	%	115			70-130	Pass	
Xylenes - Total*	S20-Ap02265	CP	%	115			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S20-Ap02265	CP	%	98			70-130	Pass	
TRH C6-C10	S20-Ap02265	CP	%	100			70-130	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S20-Ap02265	CP	%	94			70-130	Pass	
Acenaphthylene	S20-Ap02265	CP	%	90			70-130	Pass	
Anthracene	S20-Ap02265	CP	%	100			70-130	Pass	
Benz(a)anthracene	S20-Ap02265	CP	%	86			70-130	Pass	
Benzo(a)pyrene	S20-Ap02265	CP	%	102			70-130	Pass	
Benzo(b&j)fluoranthene	S20-Ap02265	CP	%	87			70-130	Pass	
Benzo(g.h.i)perylene	S20-Ap02265	CP	%	107			70-130	Pass	
Benzo(k)fluoranthene	S20-Ap02265	CP	%	92			70-130	Pass	
Chrysene	S20-Ap02265	CP	%	97			70-130	Pass	
Dibenz(a.h)anthracene	S20-Ap02265	CP	%	103			70-130	Pass	
Fluorene	S20-Ap02265	CP	%	78			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S20-Ap02265	CP	%	76			70-130	Pass	
Naphthalene	S20-Ap02265	CP	%	92			70-130	Pass	
Phenanthrene	S20-Ap02265	CP	%	80			70-130	Pass	
Pyrene	S20-Ap02265	CP	%	76			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Endrin	S20-Ap10186	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Total PCB*	S20-Ap04879	NCP	%	92			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S20-Ap02264	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S20-Ap02264	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S20-Ap02264	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S20-Ap02264	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S20-Ap02264	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S20-Ap02264	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S20-Ap02264	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S20-Ap02264	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S20-Ap02264	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	S20-Ap02264	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S20-Ap02264	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S20-Ap02264	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S20-Ap02264	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S20-Ap02264	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S20-Ap02264	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Chrysene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	W20-Ap08101	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	W20-Ap08101	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	W20-Ap08101	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1221	W20-Ap08101	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1242	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1248	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1254	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1260	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Total PCB*	W20-Ap08101	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	S20-Ap02265	CP	pH Units	7.2	6.9	pass	30%	Pass	
Reaction Ratings*	S20-Ap02265	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S20-Ap02267	CP	mg/kg	5.0	4.0	21	30%	Pass	
Cadmium	S20-Ap02267	CP	mg/kg	0.5	0.5	8.0	30%	Pass	
Chromium	S20-Ap02267	CP	mg/kg	15	13	11	30%	Pass	
Copper	S20-Ap02267	CP	mg/kg	27	21	27	30%	Pass	
Lead	S20-Ap02267	CP	mg/kg	2200	2000	9.0	30%	Pass	
Mercury	S20-Ap02267	CP	mg/kg	3.2	3.3	5.0	30%	Pass	
Nickel	S20-Ap02267	CP	mg/kg	6.8	6.6	4.0	30%	Pass	
Zinc	S20-Ap02267	CP	mg/kg	600	590	1.0	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Ap02268	CP	%	22	22	3.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Andrew Black	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Gabriele Cordero	Senior Analyst-Metal (NSW)
Myles Clark	Senior Analyst-SPOCAS (QLD)
Nibha Vaidya	Senior Analyst-Asbestos (NSW)

Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Certificate of Analysis

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NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025–Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Alliance Geotechnical
10 Welder Road
Seven Hills
NSW 2147

Attention:	Mehran Asadabadi
Report	711476-AID
Project Name	OLD KINGS PARADE
Project ID	10673
Received Date	Apr 01, 2020
Date Reported	Apr 14, 2020

Methodology:

Asbestos Fibre Identification	Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques. *NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.*
Unknown Mineral Fibres	Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity. *NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.*
Subsampling Soil Samples	The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) is employed. *NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.*
Bonded asbestos-containing material (ACM)	The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination.The resultant material is then further examined in accordance with AS 4964 - 2004. *NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.*
Limit of Reporting	The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w). The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence NATA Accreditation does not cover the performance of this service (non-NATA results shown with an asterisk). *NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos".This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.*

Project Name OLD KINGS PARADE
Project ID 10673
Date Sampled Mar 31, 2020
Report 711476-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
HA01 (0-0.2)	20-Ap02264	Mar 31, 2020	Approximate Sample 164g Sample consisted of: Brown coarse-grained clayey soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
HA01 (0.4-0.6)	20-Ap02265	Mar 31, 2020	Approximate Sample 141g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
HA02 (0-0.2)	20-Ap02266	Mar 31, 2020	Approximate Sample 191g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
HA02 (0.4-0.6)	20-Ap02267	Mar 31, 2020	Approximate Sample 151g Sample consisted of: Brown coarse-grained soil and rocks	Chrysotile and amosite asbestos detected in fibre cement material. Amosite asbestos detected in fibre plaster material. Approximate raw weight of asbestos containing material = 4.2g Total estimated asbestos content in the sample = 0.42g* Total estimated asbestos concentration = 0.28% w/w* Synthetic mineral fibre detected. Organic fibre detected. No trace asbestos detected.
HA03 (0-0.2)	20-Ap02268	Mar 31, 2020	Approximate Sample 133g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
HA03 (0.4-0.6)	20-Ap02269	Mar 31, 2020	Approximate Sample 241g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
HA04 (0-0.2)	20-Ap02270	Mar 31, 2020	Approximate Sample 149g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
HA04 (0.4-0.6)	20-Ap02271	Mar 31, 2020	Approximate Sample 119g Sample consisted of: Brown coarse-grained clayey soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Sydney	Apr 01, 2020	Indefinite

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Christchurch
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Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: OLD KINGS PARADE
Project ID: 10673

Order No.:
Report #: 711476
Phone: 1800 288 188
Fax: 02 9675 1888

Received: Apr 1, 2020 6:04 PM
Due: Apr 8, 2020
Priority: 5 Day
Contact Name: Mehran Asadabadi

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Alliance WAC Suite 2:TRH/BTEXN/PAH/M8/OCP/PCB/Asb
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217							X	X
Brisbane Laboratory - NATA Site # 20794						X		
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	HA01 (0-0.2)	Mar 31, 2020		Soil	S20-Ap02264	X	X	X
2	HA01 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap02265	X	X	X
3	HA02 (0-0.2)	Mar 31, 2020		Soil	S20-Ap02266	X	X	X
4	HA02 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap02267	X	X	X
5	HA03 (0-0.2)	Mar 31, 2020		Soil	S20-Ap02268	X	X	X
6	HA03 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap02269	X	X	X
7	HA04 (0-0.2)	Mar 31, 2020		Soil	S20-Ap02270	X	X	X
8	HA04 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap02271	X	X	X
Test Counts						8	8	8

Internal Quality Control Review and Glossary

General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
5. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

% w/w: weight for weight basis	grams per kilogram
Filter loading:	fibres/100 graticule areas
Reported Concentration:	fibres/mL
Flowrate:	L/min

Terms

Dry	Sample is dried by heating prior to analysis
LOR	Limit of Reporting
COC	Chain of Custody
SRA	Sample Receipt Advice
ISO	International Standards Organisation
AS	Australian Standards
WA DOH	Reference document for the NEPM. Government of Western Australia, Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009), including supporting document Recommended Procedures for Laboratory Analysis of Asbestos in Soil (2011)
NEPM	National Environment Protection (Assessment of Site Contamination) Measure, 2013 (as amended)
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded and/or sound condition. For the purposes of the NEPM, ACM is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
AF	Asbestos Fines. Asbestos containing materials, including friable, weathered and bonded materials, able to pass a 7mm x 7mm sieve. Considered under the NEPM as equivalent to “non-bonded / friable”.
FA	Fibrous Asbestos. Asbestos containing materials in a friable and/or severely weathered condition. For the purposes of the NEPM, FA is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory’s remit to assess degree of friability.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres in the matrix.

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N/A	Not applicable

Asbestos Counter/Identifier:

Chamath JHM Annakkage	Senior Analyst-Asbestos (NSW)

Authorised by:

Laxman Dias	Senior Analyst-Asbestos (NSW)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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ABN – 50 005 085 521 web : www.eurofins.com.au e.mail : EnviroSales@eurofins.com

Australia

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NATA # 1261 Site # 18217

Brisbane
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NATA # 1261 Site # 20794

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Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: OLD KINGS PARADE
Project ID: 10673

Order No.:
Report #: 711476
Phone: 1800 288 188
Fax: 02 9675 1888

Received: Apr 1, 2020 6:04 PM
Due: Apr 8, 2020
Priority: 5 Day
Contact Name: Mehran Asadabadi

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Alliance WAC Suite 2:TRH/BTEXN/PAH/M8/OCP/PCB/Asb
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217							X	X
Brisbane Laboratory - NATA Site # 20794						X		
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	HA01 (0-0.2)	Mar 31, 2020		Soil	S20-Ap02264	X	X	X
2	HA01 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap02265	X	X	X
3	HA02 (0-0.2)	Mar 31, 2020		Soil	S20-Ap02266	X	X	X
4	HA02 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap02267	X	X	X
5	HA03 (0-0.2)	Mar 31, 2020		Soil	S20-Ap02268	X	X	X
6	HA03 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap02269	X	X	X
7	HA04 (0-0.2)	Mar 31, 2020		Soil	S20-Ap02270	X	X	X
8	HA04 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap02271	X	X	X
Test Counts						8	8	8

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Melbourne
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Site # 1254 & 14271

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NATA # 1261 Site # 20794

Perth
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Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**Alliance Geotechnical**
Contact name:	Mehran Asadabadi
Project name:	OLD KINGS PARADE
Project ID:	10673
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Apr 1, 2020 6:04 PM
Eurofins reference:	**711476**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Mehran Asadabadi - mehran@allgeo.com.au.

Note: A copy of these results will also be delivered to the general Alliance Geotechnical email address.

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

Unit F3 Bld F, 16 Mars Rd, Lane Cove West, NSW 2066 02 9900 8400 EnviroSampleNSW@eurofins.com
Unit 1, 21 Smallwood Pl, Murarrie, QLD 4172 07 3902 4600 EnviroSampleQLD@eurofins.com
Unit 2, 91 Leach Highway, Kewdale WA 6105 08 9251 9600 EnviroSampleWA@eurofins.com
2 Kingston Town Close, Oakleigh, VIC 3166 03 8564 5000 EnviroSampleVic@eurofins.com

Company	ALLIANCE GEOTECHNICAL	Project №	10673	Project Manager	Mez
Address	10 WELDER ROAD, SEVEN HILLS NSW	Project Name	Old Kings Parade	EDD Format (ESdat, EQuIS, Custom)	
Contact Name	Mez				
Phone №	0431 077 941				
Special Directions					
Purchase Order					
Quote ID №					

Sampler(s)	Eric Wu	
Handed over by		
Email for Invoice	admin@~~e~~allges.com.au	
Email for Results	enviro@	

Analytes (Note: Where metals are required, please specify "Total" or "Filtered"). SUITE code must be listed to attract SUITE pricing

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	Alliance WAC Suite 2	pH field screen	Containers: 1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	HA01 (0-0.2)	31/03	S									1	2	
2	↓ (0.4-0.6)											1	2	
3	HA02 (0-0.2)											1	2	
4	↓ (0.4-0.6)											1	2	
5	HA03 (0-0.2)											1	2	
6	↓ (0.4-0.6)											1	2	
7	HA04 (0-0.2)											1	2	
8	↓ (0.4-0.6)											1	2	
9														
10														
	Total Counts													

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)

- ☐ Overnight (9am)*
- ☐ 1 Day* ☐ 2 Day*
- ☐ 3 Day* ☑ 4 Day
- ☐ Other ( )

* Surcharges apply

Method of Shipment	☑ Courier (#)	☐ Hand Delivered	☐ Postal	Name	Mehran A.	Signature		Date	1/04/20	Time	4:00pm
Eurofins | mgt Laboratory Use Only	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	1/4/2020	Time	6:20PM	Temperature	9.5°C
	Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date	__/__/__	Time	__:__	Report №	711476

Alliance Geotechnical
10 Welder Road
Seven Hills
NSW 2147

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mehran Asadabadi**

Report **713557-S**
Project name ADDITIONAL OLD KINGS PARADE
Project ID 10673
Received Date Apr 14, 2020

Client Sample ID			**HA01 (0-0.2)**	**HA03 (0-0.2)**	**HA03 (0.4-0.6)**
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S20-Ap19002**	**S20-Ap19003**	**S20-Ap19004**
Date Sampled			**Mar 31, 2020**	**Mar 31, 2020**	**Mar 31, 2020**
Test/Reference	LOR	Unit			
Chromium Suite					
pH-KCL	0.1	pH Units	8.0	5.0	5.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	34	13
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	0.054	0.020
Chromium Reducible Sulfur[S04]	0.005	% S	0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	3.2	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	1.4	n/a	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	280	n/a	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	0.45	n/a	n/a
ANC Fineness Factor		factor	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	0.05	0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	34	13
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	2.5	< 1
Extraneous Material					
<2mm Fraction	0.005	g	57	39	65
>2mm Fraction	0.005	g	2.9	2.1	< 0.005
Analysed Material	0.1	%	95	95	100
Extraneous Material	0.1	%	4.8	5.0	< 0.1
% Moisture	1	%	27	17	11

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Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Chromium Reducible Sulfur Suite			
Chromium Suite	Brisbane	Apr 17, 2020	6 Week
- Method: LTM-GEN-7070 Chromium Reducible Sulfur Suite			
Extraneous Material	Brisbane	Apr 17, 2020	6 Week
- Method: LTM-GEN-7050/7070			
% Moisture	Brisbane	Apr 20, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

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IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: ADDITIONAL OLD KINGS PARADE
Project ID: 10673

Order No.:
Report #: 713557
Phone: 1800 288 188
Fax: 02 9675 1888

Received: Apr 14, 2020 3:32 PM
Due: Apr 21, 2020
Priority: 5 Day
Contact Name: Mehran Asadabadi

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	USA Leaching Procedure	Chromium Reducible Sulfur Suite	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217						X	X		
Brisbane Laboratory - NATA Site # 20794								X	X
Perth Laboratory - NATA Site # 23736									
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	HA01 (0.0-0.2)	Mar 31, 2020		US Leachate	S20-Ap18998	X	X		
2	HA01 (0.4-0.6)	Mar 31, 2020		US Leachate	S20-Ap18999	X	X		
3	HA02 (0.4-0.6)	Mar 31, 2020		US Leachate	S20-Ap19000	X	X		
4	HA03 (0.4-0.6)	Mar 31, 2020		US Leachate	S20-Ap19001	X	X		
5	HA01 (0-0.2)	Mar 31, 2020		Soil	S20-Ap19002			X	X
6	HA03 (0-0.2)	Mar 31, 2020		Soil	S20-Ap19003			X	X
7	HA03 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap19004			X	X
Test Counts						4	4	3	3

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Chromium Suite									
pH-KCL			%	100			80-120	Pass	
Acid trail - Titratable Actual Acidity			%	100			80-120	Pass	
Chromium Reducible Sulfur			%	94			80-120	Pass	
Acid Neutralising Capacity (ANCbt)			%	106			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Chromium Suite				Result 1	Result 2	RPD			
pH-KCL	P20-Ap20565	NCP	pH Units	8.1	8.2	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P20-Ap20565	NCP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P20-Ap20565	NCP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
Chromium Reducible Sulfur	P20-Ap20565	NCP	% S	0.020	0.020	3.0	30%	Pass	
Chromium Reducible Sulfur -acidity units	P20-Ap20565	NCP	mol H+/t	13	12	3.0	30%	Pass	
Sulfur - KCl Extractable	P20-Ap20565	NCP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	P20-Ap20565	NCP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	P20-Ap20565	NCP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	P20-Ap20565	NCP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P20-Ap20565	NCP	% CaCO3	25	26	5.0	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P20-Ap20565	NCP	% S	7.9	8.3	5.0	30%	Pass	
ANC Fineness Factor	P20-Ap20565	NCP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	P20-Ap20565	NCP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	P20-Ap20565	NCP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	P20-Ap20565	NCP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Ap17530	NCP	%	14	13	8.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

Authorised By

Andrew Black	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Alliance Geotechnical
10 Welder Road
Seven Hills
NSW 2147

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mehran Asadabadi**

Report **713557-L**
Project name ADDITIONAL OLD KINGS PARADE
Project ID 10673
Received Date Apr 14, 2020

Client Sample ID			**HA01 (0.0-0.2)**	**HA01 (0.4-0.6)**	**HA02 (0.4-0.6)**	**HA03 (0.4-0.6)**
Sample Matrix			**US Leachate**	**US Leachate**	**US Leachate**	**US Leachate**
Eurofins Sample No.			**S20-Ap18998**	**S20-Ap18999**	**S20-Ap19000**	**S20-Ap19001**
Date Sampled			**Mar 31, 2020**	**Mar 31, 2020**	**Mar 31, 2020**	**Mar 31, 2020**
Test/Reference	LOR	Unit				
Heavy Metals						
Lead	0.01	mg/L	0.02	0.05	0.37	0.10
USA Leaching Procedure						
Leachate Fluid[C01]		comment	1.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	6.5	6.5	6.9	5.6
pH (off)	0.1	pH Units	5.4	5.1	6.2	5.1
pH (USA HCl addition)	0.1	pH Units	1.6	1.6	1.6	1.6

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Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Sydney	Apr 21, 2020	180 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
USA Leaching Procedure	Sydney	Apr 16, 2020	14 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			

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NATA # 1261
Site # 1254 & 14271

Sydney
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Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
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Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

New Zealand

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Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: ADDITIONAL OLD KINGS PARADE
Project ID: 10673

Order No.:
Report #: 713557
Phone: 1800 288 188
Fax: 02 9675 1888

Received: Apr 14, 2020 3:32 PM
Due: Apr 21, 2020
Priority: 5 Day
Contact Name: Mehran Asadabadi

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	USA Leaching Procedure	Chromium Reducible Sulfur Suite	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217						X	X		
Brisbane Laboratory - NATA Site # 20794								X	X
Perth Laboratory - NATA Site # 23736									
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	HA01 (0.0-0.2)	Mar 31, 2020		US Leachate	S20-Ap18998	X	X		
2	HA01 (0.4-0.6)	Mar 31, 2020		US Leachate	S20-Ap18999	X	X		
3	HA02 (0.4-0.6)	Mar 31, 2020		US Leachate	S20-Ap19000	X	X		
4	HA03 (0.4-0.6)	Mar 31, 2020		US Leachate	S20-Ap19001	X	X		
5	HA01 (0-0.2)	Mar 31, 2020		Soil	S20-Ap19002			X	X
6	HA03 (0-0.2)	Mar 31, 2020		Soil	S20-Ap19003			X	X
7	HA03 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap19004			X	X
Test Counts						4	4	3	3

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/L	< 0.01			0.01	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	95			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S20-Ap19001	CP	%	85			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S20-Ap24898	NCP	mg/L	0.03	0.02	47	30%	Fail	Q15

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Andrew Black	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal (NSW)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

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43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: ADDITIONAL OLD KINGS PARADE
Project ID: 10673

Order No.:
Report #: 713557
Phone: 1800 288 188
Fax: 02 9675 1888

Received: Apr 14, 2020 3:32 PM
Due: Apr 21, 2020
Priority: 5 Day
Contact Name: Mehran Asadabadi

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Lead	USA Leaching Procedure	Chromium Reducible Sulfur Suite	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217						X	X		
Brisbane Laboratory - NATA Site # 20794								X	X
Perth Laboratory - NATA Site # 23736									
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	HA01 (0.0-0.2)	Mar 31, 2020		US Leachate	S20-Ap18998	X	X		
2	HA01 (0.4-0.6)	Mar 31, 2020		US Leachate	S20-Ap18999	X	X		
3	HA02 (0.4-0.6)	Mar 31, 2020		US Leachate	S20-Ap19000	X	X		
4	HA03 (0.4-0.6)	Mar 31, 2020		US Leachate	S20-Ap19001	X	X		
5	HA01 (0-0.2)	Mar 31, 2020		Soil	S20-Ap19002			X	X
6	HA03 (0-0.2)	Mar 31, 2020		Soil	S20-Ap19003			X	X
7	HA03 (0.4-0.6)	Mar 31, 2020		Soil	S20-Ap19004			X	X
Test Counts						4	4	3	3

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Site # 1254 & 14271

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NATA # 1261 Site # 20794

Perth
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Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**Alliance Geotechnical**
Contact name:	Mehran Asadabadi
Project name:	ADDITIONAL OLD KINGS PARADE
Project ID:	10673
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Apr 14, 2020 3:32 PM
Eurofins reference:	**713557**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☒ Split sample sent to requested external lab.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Andrew Black on Phone : (+61) 2 9900 8490 or by e.mail: AndrewBlack@eurofins.com

Results will be delivered electronically via e.mail to Mehran Asadabadi - mehran@allgeo.com.au.

Note: A copy of these results will also be delivered to the general Alliance Geotechnical email address.

#AU04_Enviro_Sample_NSW

Subject: FW: 5 DAY TAT ADDITIONAL ANALYSIS: FW: Report 711476: Additional Analysis Required

From: Samuel Inameti [mailto:Samuel@allgeo.com.au]
Sent: Tuesday, 14 April 2020 3:32 PM
To: Andrew Black; Asim Khan
Cc: Mehran Asadabadi
Subject: Report 711476: Additional Analysis Required

Hi,

Please can we get a TCLP on lead for the following samples in the subject report (**711476**):

- HA01 (0.0-0.2);
- HA01 (0.4-0.6);
- HA02 (0.4-0.6); and
- HA03 (0.4-0.6).

Also can we get the following samples tested for Chromium Reducible Sulfur (CRS):

- HA01 (0-0.2);
- HA03 (0-0.2); and
- HA03 (0.4-0.6).

All on a standard TAT. Thanks.

Regards,

Samuel Inameti
Environmental Consultant
Mobile: 0451 747 200 | **Email:** samuel@allgeo.com.au

Alliance Geotechnical
ENGINEERING | ENVIRONMENTAL | TESTING
Your On-Site Geotechnical & Environmental Specialists

OHSAS18001 ISO9001 ISO14001 AS/NZS4801
OH&S QUALITY ENVIRONMENT OH&S

Email: admin@allgeo.com.au - **Website:** allgeo.com.au - **Office Phone:** 1800 288 188
PO Box 275, Seven Hills NSW 1730 / Address: 10 Welder Road, Seven Hills NSW 2147

ATTACHMENT 5
BOREHOLE LOGS

Alliance Geotechnical
Manage the earth, eliminate the risk

Alliance Geotechnical Pty Ltd
T: 1800 288 188
E: office@allgeo.com.au
W: www.allgeo.com.au

BH No: HA01
Sheet: 1 of 1
Job No: 10673

Borehole Log

Client: City of Parramatta Council
Project: Old Kings Parade Ground Foreshore Lighting
Location: 24A O'Connell St, Parramatta NSW 2150

Started: 31/3/20
Finished: 31/3/20
Borehole Size 100 mm

Rig Type: Hand Auger
Hole Location: Refer to drawing 10673-GR-1-A
Driller: EW
Logged: EW

RL Surface:
Contractor: Alliance Geotecnical
Bearing: ---
Checked: TM

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
HA					-	TOPSOIL/FILL: Silty CLAY, low to medium plasticity, brown.		M	F	TOPSOIL/FILL
						0.45m: As above, but becoming soft.			S	
	Minor Seepage Observed		0.5							
						Test Pit HA01 terminated at 0.65m.				
			1.0							

2. NON CORED BOREHOLE (NO COORD/RL) GINT LOGS.GPJ GINT STD AUSTRALIA.GDT 1/4/20

Alliance Geotechnical
Manage the earth, eliminate the risk

Alliance Geotechnical Pty Ltd
T: 1800 288 188
E: office@allgeo.com.au
W: www.allgeo.com.au

BH No: HA02
Sheet: 1 of 1
Job No: 10673

Borehole Log

Client: City of Parramatta Council
Project: Old Kings Parade Ground Foreshore Lighting
Location: 24A O'Connell St, Parramatta NSW 2150

Started: 31/3/20
Finished: 31/3/20
Borehole Size 100 mm

Rig Type: Hand Auger
Hole Location: Refer to drawing 10673-GR-1-A
Driller: EW
Logged: EW

RL Surface:
Contractor: Alliance Geotecnical
Bearing: ---
Checked: TM

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
HA	None Observed				-	TOPSOIL/FILL: Silty SAND, fine to medium grained, dark brown, with medium to coarse grained sub-angular gravels.		M	L - MD	TOPSOIL/FILL
			0.5		-	FILL: Gravelly SAND, fine to medium grained, yellow-brown; medium to coarse grained sub-angular gravels.		M	MD	FILL
			1.0			Test Pit HA02 terminated at 0.6m.				

Alliance Geotechnical
Manage the earth, eliminate the risk

Alliance Geotechnical Pty Ltd
T: 1800 288 188
E: office@allgeo.com.au
W: www.allgeo.com.au

BH No: HA03
Sheet: 1 of 1
Job No: 10673

Borehole Log

Client: City of Parramatta Council
Project: Old Kings Parade Ground Foreshore Lighting
Location: 24A O'Connell St, Parramatta NSW 2150

Started: 31/3/20
Finished: 31/3/20
Borehole Size 100 mm

Rig Type: Hand Auger
Hole Location: Refer to drawing 10673-GR-1-A
Driller: EW
Logged: EW

RL Surface:
Contractor: Alliance Geotecnical
Bearing: ---
Checked: TM

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
HA	None Observed				-	TOPSOIL/FILL: Silty SAND, fine to medium grained, dark brown.		M	L - MD	TOPSOIL/FILL
						0.3m: As above, but becoming brown-red.				
			0.5		CL	Sandy CLAY, low plasticity, fine grained sand, brown-red, with trace ironstone fragments.		M	F	ALLUVIUM
						Test Pit HA03 terminated at 0.6m.				
			1.0							

Alliance Geotechnical
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Alliance Geotechnical Pty Ltd
T: 1800 288 188
E: office@allgeo.com.au
W: www.allgeo.com.au

BH No: HA04
Sheet: 1 of 1
Job No: 10673

Borehole Log

Client: City of Parramatta Council
Project: Old Kings Parade Ground Foreshore Lighting
Location: 24A O'Connell St, Parramatta NSW 2150

Started: 31/3/20
Finished: 31/3/20
Borehole Size 100 mm

Rig Type: Hand Auger
Hole Location: Refer to drawing 10673-GR-1-A
Driller: EW
Logged: EW

RL Surface:
Contractor: Alliance Geotecnical
Bearing: ---
Checked: TM

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
					-	TOPSOIL/FILL: Silty SAND, fine to medium grained, dark brown.		M	L - MD	TOPSOIL/FILL
HA	None Observed				CL	Sandy CLAY, low plasticity, fine grained sand, light brown, with trace ironstone fragments.		M	F - St	ALLUVIUM
			0.5			0.45m: As above, but becoming stiff and red-brown.			St	
			1.0			Test Pit HA04 terminated at 0.65m.				

Appendix F

Geotechnical Investigation Report – Alliance Geotechnical Pty Ltd

Alliance Geotechnical
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T: 1800 288 188
E: office@allgeo.com.au
W: www.allgeo.com.au
P: PO Box 275
Seven Hills NSW, 1730

26 April 2020

City of Parramatta Council
126 Church Street
Parramatta NSW 2150

Project: Old Kings School Foreshore Lighting
Project Location: 24A O'Connell St, Parramatta NSW 2150
Report Number: 10673-GR-1-1
Report Type: Geotechnical Investigation Report

1. INTRODUCTION

Alliance Geotechnical Pty Ltd (AG) have been commissioned by the City of Parramatta Council (the Client) to prepare this Geotechnical Investigation Report on the foundation conditions for the proposed installation of light poles along the foreshore of the Old Kings School (the site).

AG was supplied with the following documents:

- 3 sheets of drawings prepared by Lighting, Art & Science, dated 03/2020 (ref: L162R) showing the lighting and wiring layout, typical pole elevations and footing details
- Site utility survey prepared by ALS, dated 12/03/2020 (ref: 203250-3853).

According to the provided information, it is understood that the proposed works will involve the installation of 12 light poles adjacent to the footpath. AG understands that the light poles are to be supported by a 1 m square by 0.5m deep shallow pad footing on a foundation with a required minimum allowable bearing capacity of 100 kPa. An archaeologically sensitive sand layer is known to exist at the site at an approximate depth of 0.6m.

AG's scope of services at this site include:

- Assess existing geotechnical conditions and soil profile.
- Confirm allowable bearing pressure of subgrade.
- Environmental waste classification of material to be removed (report number 10673-ER-1-1).

The purpose of this report is to:

- Describe the proposed development and geotechnical site model.
- Set out AG's geotechnical recommendations for the engineering design and geotechnical construction review of the proposed alterations and additions.

Given the constraints of the archaeologically sensitive sand layer, the scope of work comprised:

- Hand auger holes at four nominated locations to a maximum depth of 0.6m to collect samples for waste classification and produce a shallow geotechnical borehole log.

- Carry out dynamic cone penetrometer (DCP) testing to a maximum depth of 2.0m at each of the four locations to gain an appreciation of the soil consistency in order to carry out bearing capacity calculations.

Borehole locations and logs are in Attachment 1 and DCP results are in Attachment 2.

2. SITE CONDITIONS

2.1. Site Locality, Surrounding Properties, and Geology

The site is located on the northern bank of the Parramatta River, between O'Connell Street and Marsden Street. Bayanami Public School is to the north of the site. To the south lies the Parramatta River, with the Marsden Street Weir located adjacent to the south-east corner of the site. The site features a footpath which runs east-west along the bank of the river and dense vegetation between the footpath and the river.

The 1:250,000 NSW Department of Mineral Resources Geological Map of the Sydney Region indicates the soils within the site to be underlain by the Triassic age Wianamatta Group which is described as *black to dark-grey shale and sandstone beds.*

The site and surrounding properties are shown in Figure 1.

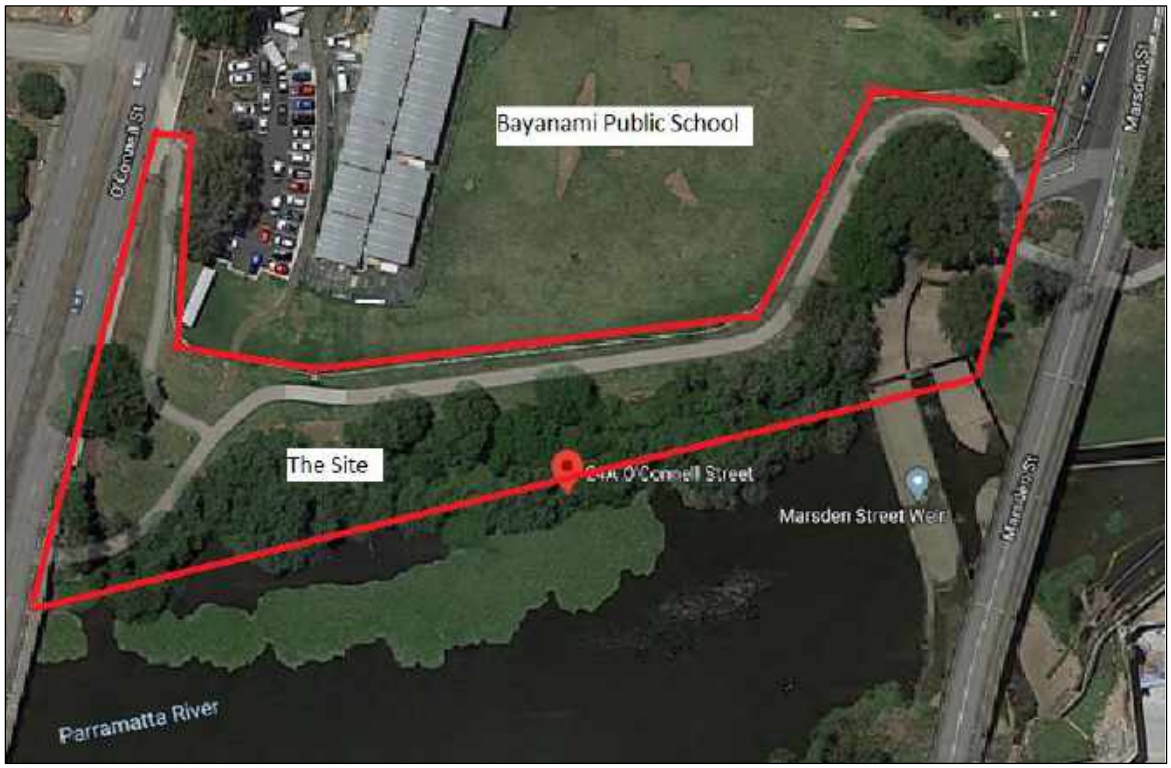


Figure 1: General overview of the site (highlighted in red) and surrounds.

2.2. Fieldwork and Subsurface Conditions

The field investigation was undertaken on 31 March 2020 and comprised drilling of four (4) boreholes using hand held tools and four (4) dynamic cone penetrometer (DCP) tests.

AG's geotechnical engineer undertook the drilling, visual-tactile assessment and logging of the subsurface strata profile. The auger holes were drilled in locations selected by the engineer along the length of the footpath where the proposed light poles are to be installed and DCP tests were undertaken at the same locations. The depth of each borehole was limited to 0.6m due to concerns of penetrating an archaeologically sensitive layer.

DCP testing was undertaken to a depth of 2.0m, as there was minimal risk of damaging any potential archaeological artefacts with DCP rods.

The fieldwork included sampling for waste classification. Two separate soil samples were taken from each hand auger borehole at 0-0.2m depth and 0.4-0.6m depth. The results of the waste classification can be found in AG's environmental report (ref. 10673-ER-1-1).

The following are attached to the end of the report:

- Select site photographs taken during the fieldwork.
- The approximate borehole and DCP tests locations shown on the Drawing 10673-GR-1-A.
- Detailed borehole logs (HA01-HA04) and DCP test results.

The inferred subsurface soil profile at the borehole locations are summarised in Table 1 below.

Table 1 - Summary of Subsurface Conditions

Geotechnical Unit	Depth to Top of Layer (m)			
	HA01	HA02	HA03	HA04
Topsoil/Fill: Silty SAND, loose to medium dense, fine to medium grained, dark brown, with medium to coarse grained sub-angular gravel	-	0.0	0.0	0.0
Topsoil/Fill: Silty CLAY, soft to firm, low to medium plasticity	0.0	-	-	-
Fill: Gravelly SAND, medium dense, fine to medium grained, yellow-brown, medium to coarse grained sub-angular gravel	-	0.25	-	-
Alluvium: Sandy CLAY, firm to stiff, low plasticity, fine grained sand, brown-red, with trace ironstone fragments	-	-	0.35	0.25
Termination depth	0.65	0.6	0.6	0.65

Minor groundwater seepage was encountered at one of the boreholes, borehole HA01, during the site investigation. It is inferred that this is due to the proximity of the borehole to the riverbank. It should be noted that groundwater seepage depth is subject to fluctuate following prolonged or heavy rainfall season.

The light pole footings will be founded on either soft to firm silty clay fill, medium dense sandy gravel, or firm to stiff sandy clay.

3. INFERRED FOUNDATION BEARING CAPACITY AND FOOTING SETTLEMENT

Bearing capacity is influenced by the density/consistency of the material to approximately two footing widths (material dependent) beneath which the footing is founded. Referring to the attached DCP testing results, the allowable bearing pressure and estimated settlement with at the tested locations is as summarised in Table 2.

Table 2 Allowable Bearing Pressure at Tested Locations

Hand Auger Number	Foundation Soil Description	No of Blows per 150 mm Averaged Over 1 m	Allowable Bearing Pressure (kPa)	Estimated Settlement (mm)
HA01	Silty clay	2.5	75	10
HA02	Gravelly sand	2.5	75	6
HA03	Sandy clay	5.0	125	4
HA04	Sandy clay	5.3	125	4

The above results suggest that larger (or deeper) footings are required where HA01 and HA02 were carried out. Although design loads have not been provided, a 1.2 m x 1.2 m x 0.5 m footing is expected to be suitable. It is recommended that design loads and the allowable bearing pressures in Table 2 be used to calculate the required footing dimensions. It may be prudent to adopt a larger spread footing at all locations since ground conditions are unknown at the other light pole footing locations. Alternatively, the Client may wish to confirm ground conditions by carrying out DCPs at all footing locations.

A settlement of up to approximately 1-2% of the footing width can be expected, and is expected to be less than 25 mm.

4. LIMITATIONS

This report has been prepared for the client (City of Parramatta Council), based on a desktop review of the supplied drawings, and a limited ground investigation.

This report provides an assessment of the foundation bearing capacity at the tested locations and recommendations where the ground cannot provide the resistance required by the proposed design. The construction recommendation provided in this report should be confirmed and verified following a geotechnical engineer supervision during the construction. Any proposed change to the construction methodology or construction equipment should be reviewed by AG prior to implementation.

Should you need any further information or to discuss this report, please contact the undersigned.

Eric Wu

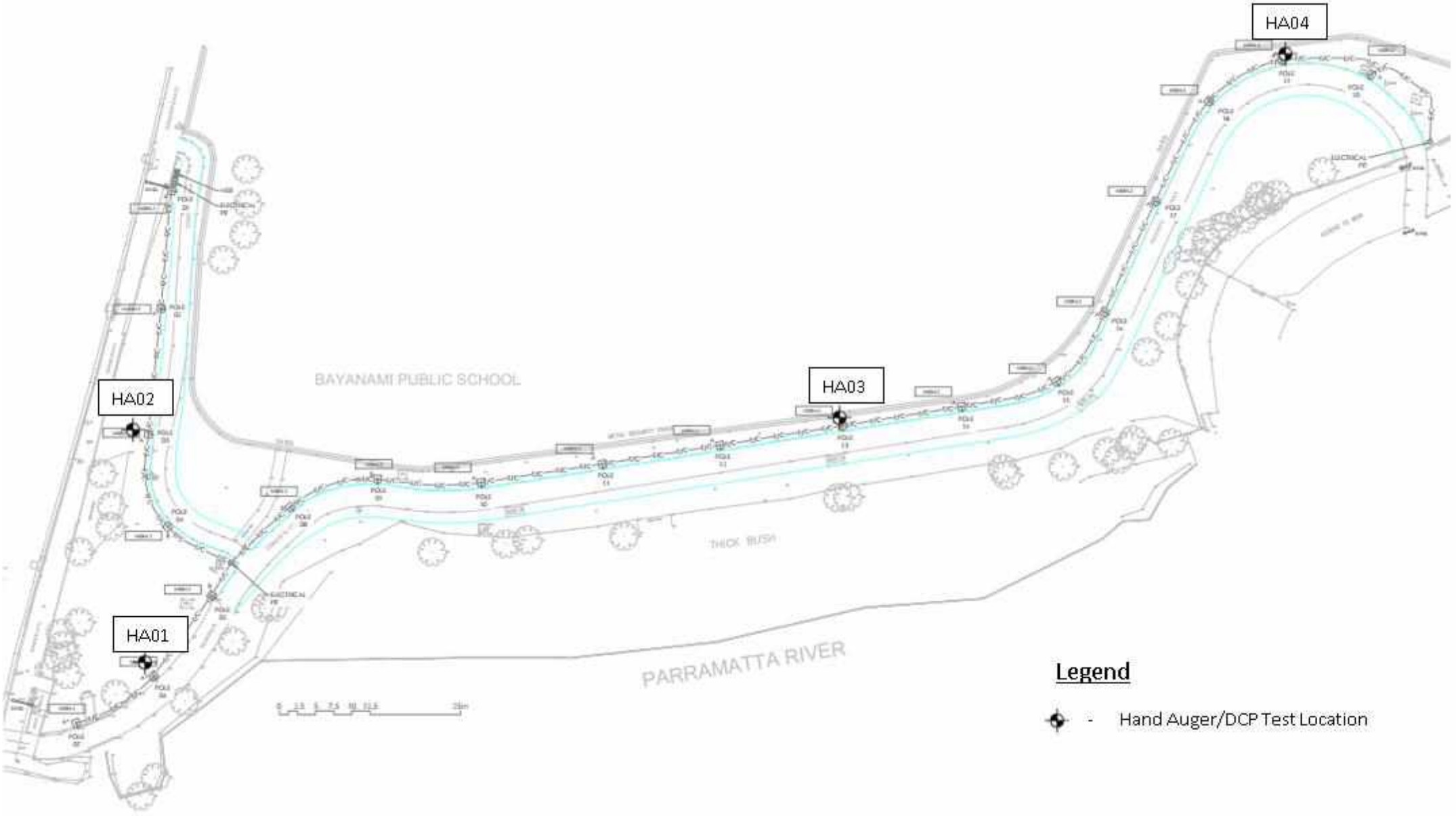
Graduate Geotechnical Engineer
BE (Civil)

Reviewer

Tony Matacin

Principal Geotechnical Engineer
BE (Civil) BE (Mining) MEngSc CPEng NER

Attachment 1: Borehole Locations and Borehole Logs



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Geotechnical Investigation Plan

Client Name:	City of Parramatta Council	Figure / Drawing Number:	10673-GR-1-A
Project Name:	Old Kings Parade Ground Foreshore Lighting	Figure / Drawing Date:	02/04/2020
Project Location:	24A O'Connell St, Parramatta NSW 2150	Report Number:	10673-GR-1-1

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BH No: HA01
Sheet: 1 of 1
Job No: 10673

Borehole Log

Client: City of Parramatta Council
Project: Old Kings Parade Ground Foreshore Lighting
Location: 24A O'Connell St, Parramatta NSW 2150

Started: 31/3/20
Finished: 31/3/20
Borehole Size 100 mm

Rig Type: Hand Auger
Hole Location: Refer to drawing 10673-GR-1-A
Driller: EW
Logged: EW

RL Surface:
Contractor: Alliance Geotecnical
Bearing: ---
Checked: TM

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
HA					-	TOPSOIL/FILL: Silty CLAY, low to medium plasticity, brown.		M	F	TOPSOIL/FILL
						0.45m: As above, but becoming soft.			S	
	Minor Seepage Observed		0.5							
						Test Pit HA01 terminated at 0.65m.				
			1.0							

2. NON CORED BOREHOLE (NO COORD/RL) GINT LOGS.GPJ GINT STD AUSTRALIA.GDT 1/4/20

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BH No: HA02
Sheet: 1 of 1
Job No: 10673

Borehole Log

Client: City of Parramatta Council
Project: Old Kings Parade Ground Foreshore Lighting
Location: 24A O'Connell St, Parramatta NSW 2150

Started: 31/3/20
Finished: 31/3/20
Borehole Size 100 mm

Rig Type: Hand Auger
Hole Location: Refer to drawing 10673-GR-1-A
Driller: EW
Logged: EW

RL Surface:
Contractor: Alliance Geotecnical
Bearing: ---
Checked: TM

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
HA	None Observed				-	TOPSOIL/FILL: Silty SAND, fine to medium grained, dark brown, with medium to coarse grained sub-angular gravels.		M	L - MD	TOPSOIL/FILL
			0.5		-	FILL: Gravelly SAND, fine to medium grained, yellow-brown; medium to coarse grained sub-angular gravels.		M	MD	FILL
			1.0			Test Pit HA02 terminated at 0.6m.				

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BH No: HA03
Sheet: 1 of 1
Job No: 10673

Borehole Log

Client: City of Parramatta Council
Project: Old Kings Parade Ground Foreshore Lighting
Location: 24A O'Connell St, Parramatta NSW 2150

Started: 31/3/20
Finished: 31/3/20
Borehole Size 100 mm

Rig Type: Hand Auger
Hole Location: Refer to drawing 10673-GR-1-A
Driller: EW
Logged: EW

RL Surface:
Contractor: Alliance Geotecnical
Bearing: ---
Checked: TM

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
HA	None Observed				-	TOPSOIL/FILL: Silty SAND, fine to medium grained, dark brown.		M	L - MD	TOPSOIL/FILL
						0.3m: As above, but becoming brown-red.				
			0.5		CL	Sandy CLAY, low plasticity, fine grained sand, brown-red, with trace ironstone fragments.		M	F	ALLUVIUM
						Test Pit HA03 terminated at 0.6m.				
			1.0							

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BH No: HA04
Sheet: 1 of 1
Job No: 10673

Borehole Log

Client: City of Parramatta Council
Project: Old Kings Parade Ground Foreshore Lighting
Location: 24A O'Connell St, Parramatta NSW 2150

Started: 31/3/20
Finished: 31/3/20
Borehole Size 100 mm

Rig Type: Hand Auger
Hole Location: Refer to drawing 10673-GR-1-A
Driller: EW
Logged: EW

RL Surface:
Contractor: Alliance Geotecnical
Bearing: ---
Checked: TM

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
					-	TOPSOIL/FILL: Silty SAND, fine to medium grained, dark brown.		M	L - MD	TOPSOIL/FILL
HA	None Observed				CL	Sandy CLAY, low plasticity, fine grained sand, light brown, with trace ironstone fragments.		M	F - St	ALLUVIUM
			0.5			0.45m: As above, but becoming stiff and red-brown.			St	
			1.0			Test Pit HA04 terminated at 0.65m.				

Attachment 2: DCP Test Results

Dynamic Cone Penetrometer (DCP) Test Report

Client:	City of Parramatta Council	Report Number:	10673-GR-1-1
Project Name:	Old Kings Parade Ground Foreshore Lighting	Project Number:	10673
Project Location:	24A O'Connell St, Parramatta NSW 2150	Date Tested:	31/03/2020
Test Method:	AS 1289.6.3.2		

Test Number	HA01	HA02	HA03	HA04
Test Locations	Refer to Drawing No. 10673-GR-1-A	Refer to Drawing No. 10114-GR-1-A	Refer to Drawing No. 10114-GR-1-A	Refer to Drawing No. 10114-GR-1-A
Surface Material	TOPSOIL/FILL: Silty CLAY	TOPSOIL/FILL: Silty Sand	TOPSOIL/FILL: Silty Sand	TOPSOIL/FILL: Silty Sand
Surface Condition	Moist	Moist	Moist	Moist
Depth (metres)				
0.00 – 0.15	3	4	2	5
0.15 – 0.30	2	3	4	6
0.30 – 0.45	4	3	4	7
0.45 – 0.60	3	13	5	7
0.60 – 0.75	4	7	4	6
0.75 – 0.90	5	7	3	7
0.90 – 1.05	4	11	2	8
1.05 – 1.20	4	6	3	9
1.20 – 1.35	3	5	4	8
1.35 – 1.50	3	7	5	11
1.50 – 1.65	3	11	5	18
1.65 – 1.80	3	7	6	15
1.80 – 1.95	3	9	5	16
1.95 – 2.10	4	14	7	14
2.10 – 2.25				
2.25 – 2.40				
2.40 – 2.55				
2.55 – 2.70				

Notes:

1. This penetrometer test report is intended to be read in conjunction with the geotechnical report by Alliance Geotechnical (ref: 10673-GR-1-1).

Appendix G

Review of Environmental Factors Management, Old Kings Parade Ground Foreshore Lighting Upgrade – Bushland Management Solutions Pty Ltd T/A Hills Bushcare

Review of Environmental Factors

Old Kings Parade Ground Foreshore Lighting Upgrade

Prepared by Bushland Management Solutions Pty Ltd
Trading as Hills Bushcare

Hills Bushcare

Document Control

Document No: DWS Doc No 189245611

Version	Date	Changes to Previous Version	Pages
Draft 2	3/04/2020	Minor formatting	N/A
Final	5/5/20	Typo and formatting	N/A

Hills Bushcare

Contents

1. Introduction

This Review of Environmental Factors (REF) was prepared by Bushland Management Solutions Pty Ltd for Parramatta City Council to assess the environmental impacts for the proposed lighting improvement works on established footpaths along the foreshore of the old Kings Parade, involving the installation of (21) new lighting poles and associated light fittings.

1.1. Permissibility

This REF has been prepared in accordance with the requirements of Part 5 of the *Environmental Planning and Assessment Act 1979* (the EP&A Act).

The Review includes an analysis of the project site and the proposed activity in the context of the relevant State and local planning policy and instruments. Potential environmental impacts associated with construction and operation of upgraded light systems along the Old Kings Parade Foreshore are assessed, with suggested mitigation measures for any likely direct or indirect environmental impacts arising from the proposal.

The review does not find any significant impacts that would prevent the proposal from occurring.

2. Proposed Activity along Kings Foreshore

Installation of public lighting improvement works along the existing pathway of the Old Kings Parade Foreshore.

1.2. Project Scope and Objectives

The lighting installation along the Old Kings Parade Foreshore involves:

- Project Establishment including WHS legislative requirements, refer City of Parramatta Standard Terms and Conditions
- Inception Meeting
- Stakeholder Consultation
- Desktop study including existing data review and preliminary report, including Aboriginal site register, flora, fauna, water, soil, waste & contamination issues
- Field investigation flora and fauna (legislative) THSC records indicate potential impact on Flying Fox Colony known to occur.
- Draft report at 80%
- Final report including GIS mapping
- Lighting installation

3. Location of Activity

Improvements to public lighting will be carried out along an established pathway on the foreshore of Parramatta River between O'Connell Street on the western side and Marsden Street on the eastern side of the site. Bankwest stadium and Parramatta Park are situated on the western side of O'Connell Street.

Figure 1 – Site location for the proposed light improvement works between O'Connell Street and Marsden Street (Source – Google Earth).

Figure 2 – The Old Kings Parade Foreshore currently lacks lighting infrastructure (Source – Parramatta City Council)

4. Description of Activity

The installation of new lighting systems includes 20 new light poles and light fittings to select areas along the foreshore pathway between Marsden and O'Connell Street (See figure 4).

The purpose of the proposed installation of new lighting systems in this area is to improve public safety within the section of the Parramatta River foreshore.

Lighting installation to include:

> *Category P Lighting: Lighting which is applicable to roads on which the visual requirements of pedestrians are dominant e.g. local roads or outdoor public areas, other than roads, where the visual requirements of pedestrians are dominant e.g. parks and plazas.*

5. Justification and Alternatives and Project Need

As part of the revamping of the Parramatta River foreshore to improve safety and public connections. Currently only temporary lighting exists in this area.

Alternatives

Do Nothing

The option of a do nothing approach would result in the continuation of public safety concerns for those who access this section of the Parramatta River foreshore during night time operational hours. The proposed public lighting improvement works is likely to improve accessibility at night to the Parramatta River Foreshore while providing safer access.

Install fewer lights than the number proposed

Councils engineers view the number of lights proposed as the minimum necessary for achieving the safety and access objectives of the lighting project.

6. Project Maps and Specifications

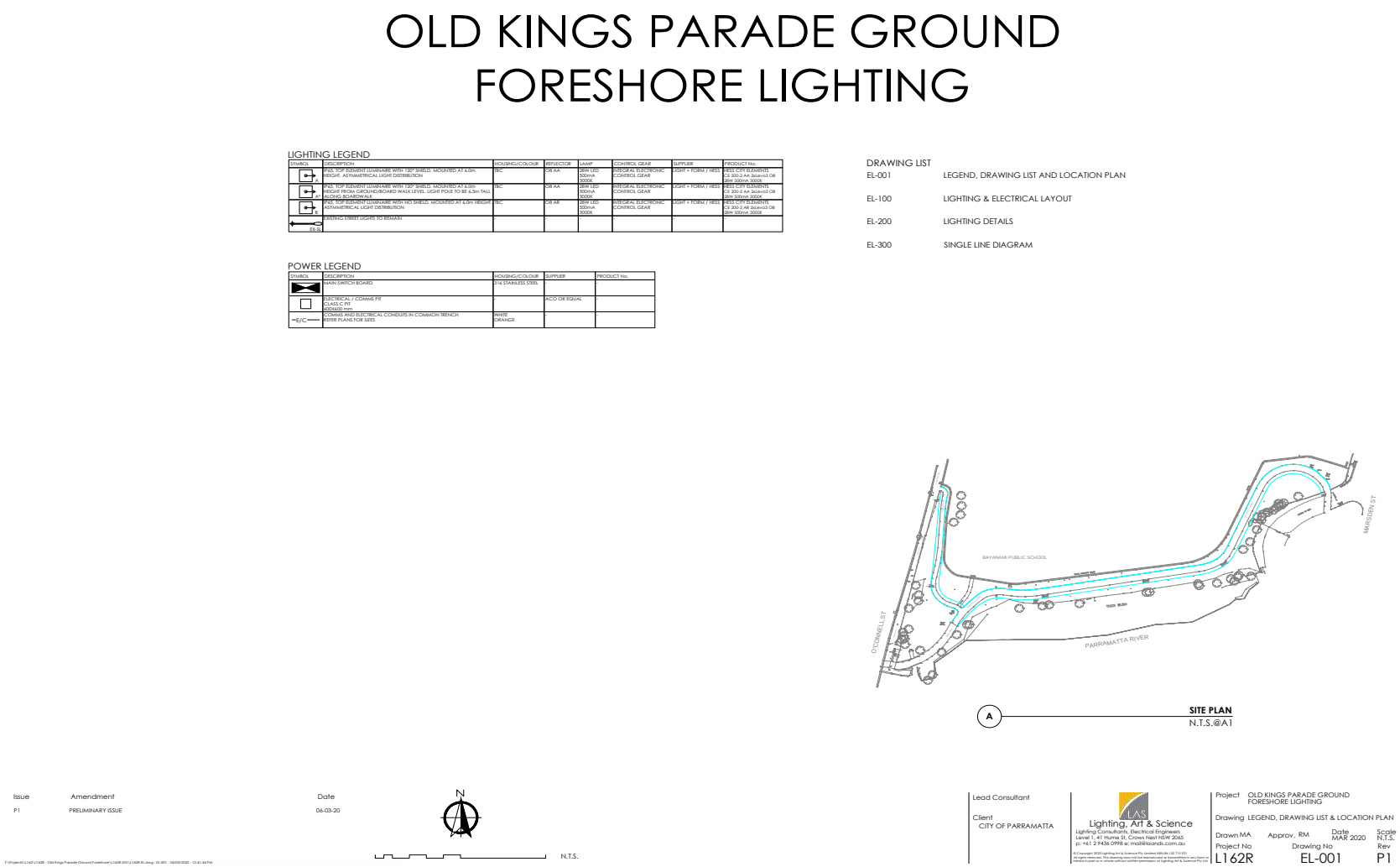

Figure 3 – Project Specifications

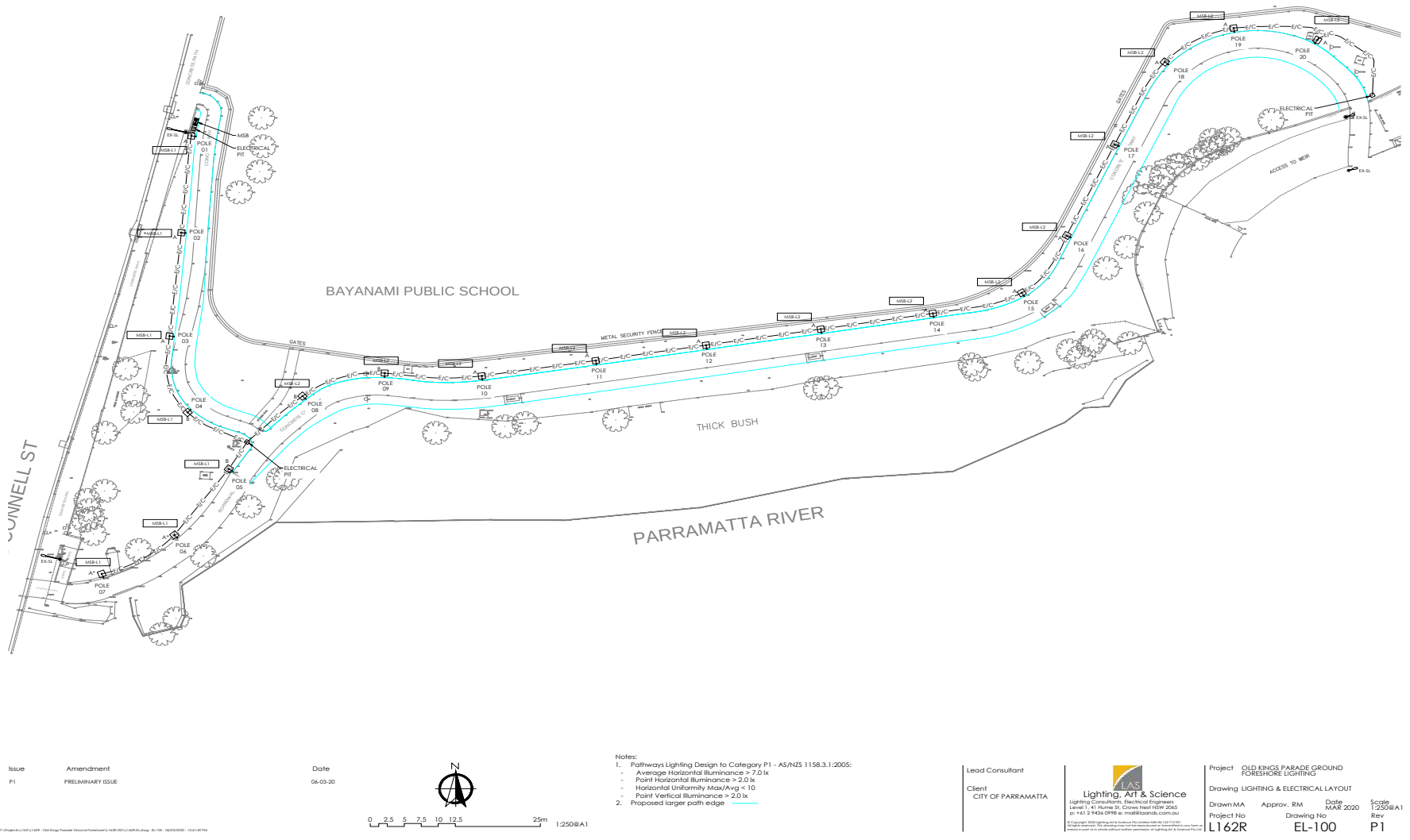

Figure 4 – Proposed locations of light poles.

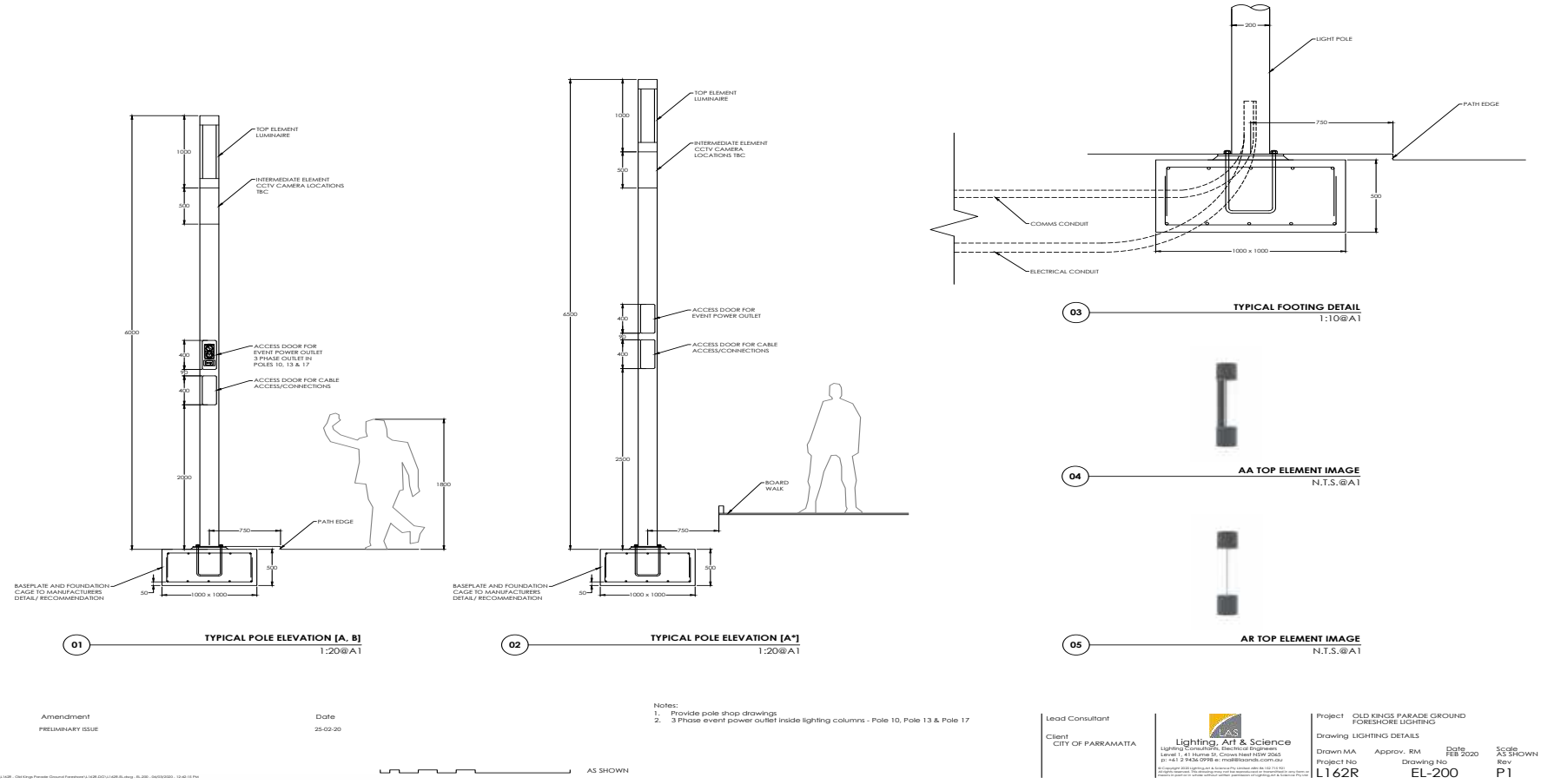

Figure 5 – Light pole and element specifications

7. Overview of Legislation

A Review of Environmental Factors (REF) is required by Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act) when consent authorities propose works on their own land that may have an impact on the environment. This REF is undertaken in accordance with the requirements of Part 5 of the EP&A Act. This REF was conducted with the consideration of other relevant legislation and policies applying to the subject land and proposed development or activity as well as an assessment of the potential impacts of the development or activity on the natural and built environments.

7.1. Environmental Planning & Assessment Act 1979 (EP&A Act)

Planning and development within NSW is regulated by the Environmental Planning & Assessment Act 1979 (EP&A Act). The EP&A Act requires development consent to be obtained for all development unless there are specific provisions in a planning instrument which override this requirement. Under Part 5 of the act (Infrastructure and environmental impact assessment), the EP&A Act defines activity as:

a. the use of land, and
b. the subdivision of land, and
c. the erection of a building, and
d. the carrying out of a work, and
e. the demolition of a building or work, and
f. any other act, matter or thing referred to in section 26 that is controlled by an environmental planning instrument.

7.2. Duty to consider environmental impact

For the purpose of attaining the objects of this Act relating to the protection and enhancement of the environment, a determining authority in its consideration of an activity shall, notwithstanding any other provisions of this Act or the provisions of any other Act or of any instrument made under this or any other Act, examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.

The Old Kings Parade Foreshore light infrastructure upgrade is located on a council managed reserve and development by or on behalf of a Council is permitted without development consent under *State Environmental Planning Policy* (SEPP) *(Infrastructure)* subject to the preparation of a Review of Environmental Factors (REF).

An REF is to meet the requirements of Part 5 of EP&A Act, Section 111 of the *EP&A Act* and Clause 228(2) of the *Environmental Planning and Assessment Regulation 2000*.

7.3. State Environmental Planning Policy (SEPP) (Infrastructure) 2007

SEPP Infrastructure provides for the efficient provision of public infrastructure in NSW. The aim of this Policy is to facilitate the effective delivery of infrastructure across the State by:

- improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services, and
- providing greater flexibility in the location of infrastructure and service facilities, and
- allowing for the efficient development, redevelopment or disposal of surplus government owned land, and
- identifying the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development), and
- identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development, and
- providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing.

Division 17 of SEPP Infrastructure permits development by or on behalf of a Council on any land.

Division 12 (3) of SEPP Infrastructure also permits development by or on behalf of a Council on parks and other public reserves without consent. In accordance with the requirements of Clause 65(3)(a) of the Infrastructure SEPP, any impacts of light spill and artificial sky glow are to be minimised in accordance with the Lighting for Roads and Public Spaces Standard.

Parramatta City Council Environmental Plan 2012 **(Updated Feb 2019)**

The Parramatta *Local Environmental Plan 2011* (LEP) came into effect on 7th October 2011. The LEP is supported by the Parramatta Development Control Plan 2011 (DCP) which came into effect on 12th of October 2011.

The proposed works is located on Council public reserve zoned RE1 Public Recreation (Appendix 1).

The objectives of the RE1 zone are:

- To enable land to be used for public open space or recreational purposes
- To provide a range of recreational settings and activities and compatible and uses, and;
- To protect and enhance the natural environment for recreational purposes.

7.4. Biodiversity Conservation Act (2016)

The Biodiversity Conservation Act 2016 (BC Act) establishes a framework to protect threatened species, populations and ecological communities in NSW. Schedules 1 and 2 of the BC Act list terrestrial species, populations and ecological communities threatened in NSW.
Impacts to listed items are required to be assessed in accordance with Section 7.3 of the Act, known as the 'assessment(s) of significance'.

The purpose of this Act in relation to this activity is:

- To establish a framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity, and
- To establish a scientific method for assessing the likely impacts on biodiversity values of proposed development and land use change, for calculating measures to offset those impacts and for assessing improvements in biodiversity values

No significant impact has been found on any listed Threatened Species, Populations or communities as defined by the BC Act. As such, a Species Impact Statement and/or approval will not be required under the *Biodiversity and Conservation Act 2016*.

7.5. National Parks and Wildlife Act (1974)

The Office of the Environment (OEH) administers the National Parks and Wildlife Act 1974 (NPW Act). Under section 86 of the NPW Act it is an offence to harm Aboriginal objects or places.

All works will be done on existing disturbed sites along established pathways and previously cleared land. Therefore, from the information available, the proposed works will not directly or indirectly impact any known archaeological sites, Aboriginal objects or places.

7.6. The Protection of the Environment Operations Act, 1997 (PoEO Act)

The *Protection of the Environment Operations Act, 1997* (PoEO Act) is the primary piece of legislation regulating pollution control and waste disposal in NSW and is administered by the Environment Protection Authority (EPA).

Council sediment and erosion control policies address the potential impact for sediment affected runoff to pollute waterways and will be applied as part of the works instruction.

7.7. Commonwealth Environment Protection and Biodiversity Conservation Act (1999)

Under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Commonwealth approval is required for certain actions. Actions which have, may have or are likely to have a significant impact on a matter of National Environmental Significance (NES). Matters of NES include nationally threatened species or endangered ecological communities. Under the EPBC Act an assessment of the impact of a proposal on a NES must be undertaken to determine whether there is likely to be a significant impact.

The objectives of the EPBC Act are to:

- Provide for the protection of the environment, especially matters of national environmental significance
- Conserve Australian biodiversity
- provide a streamlined national environmental assessment and approvals process
- Enhance the protection and management of important natural and cultural places
- Control the international movement of plants and animals (wildlife), wildlife specimens and products made or derived from wildlife
- Promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources
- Recognise the role of Indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity
- Promote the use of Indigenous peoples' knowledge of biodiversity with the involvement of, and in cooperation with, the owners of the knowledge.

Based on the assessment of this REF, the project will not have a significant impact on listed species or communities.

Accordingly, a referral of the project to the Commonwealth under the EPBC Act is not required.

Hills Bushcare

8. Project Site

The Existing Environment

The site is situated east of Parramatta Park and Bankwest Stadium. The key feature of this area is Parramatta River with surrounding land uses predominantly comprised of mixed-use zones and public recreation (See appendix 1).

The site is predominantly an open space mown area which features an existing pathway and public benches along the Old Kings Parade foreshore. Vegetation along the Parramatta River within the site is highly disturbed and dominated by exotic species with the exception of a large *Ficus spp.* A desktop study for threatened fauna species within a 5km radius was conducted using databases from the Living Atlas of Australia (See Appendix 1). No threatened fauna species listed in Appendix 1 had been recorded within the Old Kings Parade foreshore, however, could potentially be present within Parramatta Park located on the western side of O'Connell street.

A permanent Grey Headed Flying Fox (*Pteropus poliocephalus*) camp is located on the banks of the Parramatta River, on the northern side on Bankwest Stadium. This species is listed as vulnerable under the *Biodiversity and Conservation Act (2016*) and the *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999.*

9. Site Photos

Existing pathway leading to Rings Bridge. Dense vegetation along the riverbank predominantly exotic species.

Existing pathway leading to O'Connell Street and Bankwest Stadium.

A Fig Tree (*Ficus spp.)* on the Marsden Street side of site.

Dense vegetation along the Parramatta River foreshore within this site consist of predominately exotic species.

The existing pathway along the Old King's Parade Foreshore with temporary light fixtures. Vegetation along the riverside of the path is dominated by exotic species.

10. Environmental Impact Assessment

Table 1 – Potential Environmental Impacts Associated with the Kings Foreshore Street Light Upgrade			
Key Issues	**Level of Concern**	**Potential Impact**	**Considerations**
Bushland clearing for light installation	Low	Removal of habitat values for local fauna, displacement of native flora and native seed bank. Opportunity for weed species to colonise disturbed soil.	Where major tree roots are to be impacted, the contractor will be asked to hand excavate (where feasible only) for small sections of identified boring underneath root zones, hand excavation or using non-destructive excavation techniques as options in these locations to reduce impacts to trees. The initial site inspection did not indicate the presence of threatened flora species in locations as identified in planning documents. Vegetation present on site is dominated by exotic species. It is unlikely that native flora will be impacted by light installation works.

Canopy or limb removal of native trees	Medium	- Damage to native canopy trees. - Damage to surrounding native vegetation during pruning works. - Adversely impacting on arboreal fauna within hollow-bearing trees.	- Where possible, final pole locations should be selected for areas where there is currently minimal canopy. If tree branches must be pruned for light installation, ensure all pruning works are carried out to ensure tree health and appropriate collar pruning techniques are used. - Inspect trees for significant hollows prior to pruning works. If hollows are present, consideration should be made for an alternative location for installation of the light pole where this is feasible.
Introduction or spread of soil and water-borne diseases *Uredo rangelii* (Myrtle Rust) and Phytophthora dieback.	High	- Infection and eventual death of a wide range of native species including canopy, shrubs and ground covers from Eucalyptus, Callistemon and Leptospermum genus. - It can devastate bushland areas by removing particular plants and changing the nature of the landscape, possibly driving rare species toward extinction. Changes in the composition of bushland also represent habitat change to animal communities with flow-on effects to their survival potential.	- The fungus is spread through the movement of soil and mud, especially by vehicles and footwear. It also moves in free water and via root-to root contact between plants. All objects that will come into contact with soil (including vehicle tyres and work boots) should be cleaned/washed down prior to entering the site and after leaving the site with a solution of 70% methylated spirits or disinfectant and 30% water. - Installation of cleaning stations to avoid transport of contaminated soil. - Use of dieback free construction materials

Potential direct and indirect impacts of obtrusive light spill on fauna and flora.	High	- Potential of light filtering through to surrounding bushland and disrupting circadian rhythm/foraging times of fauna. This may lead to a decreased activity of native fauna from around the local area. - Changes to the structure of food availability to the local fauna. Drawing food sources such as insects away from bushland areas to artificial light sources. - Potential disruption to migratory fauna such as the Bogong Moth (Agrotis infusa). - Disruption to nearby roosting or nesting areas and thoroughfare corridors of nocturnal species. Most nocturnal fauna species prefer to roost in sheltered, dark areas (such as powerful owls, micro and macro bats, sugar gliders, bandicoots and Antechinus). - Potential disruption to the flight path of the *Pteropus poliocephalus* camp at Parramatta Park.	- Plan for use of all (or majority of) identified National Light Pollution Guidelines. Particularly the use of focused/block out lighting away from bushland interface as well as the use of timers to limit light duration. - Use of fully shielded lights where safety goals can still be achieved - Walkway lights should be mounted as low as possible to reduce reflectivity into bushland - Use of focused/blockout lighting directed away from the bushland interface where possible. - - Lighting would be designed in accordance with the requirements of standards relevant to *AS 1158 Road Lighting and AS 4282 Controlling the Obtrusive Effects of Outdoor Lighting*, and as such operational lighting impacts (such as light spill) are expected to be negligible.

		- Increased risk of predation to native fauna under or around lights for insects (such as moths attracted to night lights) may increase ease of predation on native fauna by cats and foxes, as well as possible fatality from collision with vehicles. - Potential disruption to pollination processes due to displacement of pollinators in the area i.e. insects or macro pollinators. - Increased light impacting on day- length for particular plant species may alter plant growth and reproductive timing. This could reduce growth and seed output of these plants and reduce their genetic contribution to the species	
Acid Sulphate Soils	High	- Major environmental impacts include fish and oyster kills, fish disease, destruction of fish nursery habitat, and loss of aquatic biodiversity.	- The Parramatta River and foreshore soils, next to site of proposed works, is classified as Class 3, where Acid sulfate soils are likely to be found below 1m of the natural surface. Sediments within Parramatta River are also classified as having a high probability of acid sulfate soil occurrence (See Appendix 3). - Site Specific ASSMP addressing treatment and disposal of acid sulphate soils is to be prepared prior to excavation or construction works commencing. If acid sulfate soils are encountered, they should be managed in accordance with the Acid Sulfate Soil Manu (Acid Sulfate Soil Management Advisory Committee, 1998

Energy Use	Medium	- Increased use of energy/fossil fuels for operation.	- Use quality solar lighting, the lowest intensity light possible and utilise a timing function to limit unnecessary use.
Generation of Waste	Medium	- Soil and other general waste that may be generated during construction including excess concrete and building materials may result in contamination and pollution of surrounding bushland areas and waterways.	- Dispose of any waste generated to an approved waste disposal facility and in accordance with the relevant statutory provisions. - Waste bins should be established on-site.
Sediment and Erosion Control	Medium	- Sediment and erosion movement could impact on Parramatta River and its aquatic species..	- Council standard sediment and erosion control requirements should be strictly enforced due to the sensitivity of the construction environment. - If necessary, major excavations should consider sediment fences in line with "Blue Book" requirements

11. Recommended Mitigation Measures

11.1. Methodology to Categorise Impact

(See Table 1)

The construction site was inspected by staff of Hills Bushcare. Lists of threatened fauna occurring within a 5km radius of proposed construction site were collected from the Living Atlas of Australia database. A number of publications were used to identify other fauna and flora occurring on site for consideration of potential environmental impacts.

11.2. Minimising Potential Impacts on Threatened Fauna and Flora Species, Population, Habitat and Ecological Community.

It is recommended, where possible, that steps should be taken to minimise the impacts of obtuse light spill on the ecological communities potentially found around the Parramatta River Foreshore. The following Best Practice Lighting Design should be used as a guide **(**National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds, Commonwealth of Australia 2019**):**

1. Start with natural darkness and only add light for specific purposes.
2. Use adaptive light controls to manage light timing, intensity and colour.
3. Light only the object or area intended – keep lights close to the ground, directed and shielded to avoid light spill.
4. Use the lowest intensity lighting appropriate for the task.
5. Use non-reflective, dark-coloured surfaces.
6. Use lights with reduced or filtered blue, violet and ultra-violet wavelengths.

11.3.Community Impacts

Light improvement works within the Old Kings Parade Foreshore on Parramatta River is likely to significantly enhance public safety and provide longer periods of safe use of the area. The proposed works will likely have a positive impact on the community by increasing the availability of safe usage along the Parramatta River foreshore within the hours between dusk and dawn. It will enable increased access to Bankwest Stadium and for recreational activity and the associated health benefits.

12. Conclusion

This REF concludes that:

1. The proposed light improvement works for the Old Kings Parade Foreshore can be undertaken without resulting in significant adverse environmental impacts as defined by the *Biodiversity Conservation Act (2016).*

2. Minor light impacts are an unavoidable part of increasing public safety along the Parramatta River foreshore and will not cause unacceptable environmental impacts.

3. Future fauna studies may indicate localised impacts requiring local modifications to timing and direction of lights; however, this should be a subject of monitoring and not restrict the proposal as outlined.

4. Given the site's proximity to Bankwest stadium, it is unlikely that proposed lighting improvement works for the Old Kings Parade Foreshore will further impact on fauna species that utilise this area of Parramatta River.

5. Subject to the recommendations of this report. In the absence of any significant environmental impacts as a result of the proposed activity and considering the broader social benefits in improving public safety, it is considered a satisfactory proposal.

13. References

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1. Appendix 1 Threatened Fauna Species Recorded within a 5km Radius of Project Site.

Mammals					
Scientific Name	**Common Name**	**Conservation and Bio Act Status**	**EPBC Act Status**	**Habits**	**Likelihood of Occurrence**
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Found in well-timbered areas containing gullies.	Unlikely. None have been recorded on site.
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites.	Unlikely. None have been recorded on site.
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	Not Listed	Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	Unlikely. None have been recorded on site.
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E	E	Largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils.	Unlikely. None have been recorded on site.
Miniopterus australis	Little Bent wing bat	V	Not Listed	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas.	Unlikely. None have been recorded on site.

Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	Not Listed	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Hunt in forested areas, catching moths and other flying insects above the tree tops.	Unlikely. None have been recorded on site
Mormopterus norfolkensis	Eastern Freetail-bat	V	Not Listed	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures.	Have not been recorded on the site.
Myotis macropus	Southern Myotis	V	Not Listed	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.	Possible – Has not been recorded on site.
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night when foraging. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.	Unlikely. Lack of suitable habitat.
Pseudomys novaehollandiae	New Holland Mouse	V	Not Listed	Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes It is a social animal, living predominantly in burrows shared with other individuals	
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	A known camp is located on the north east corner of

				Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young.	Parramatta Park. Next to Bankwest Stadium.
Scoteanax rueppellii	Greater Broadnosed Bat	V	Not Listed	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m.	Potentially present in surrounding areas.
Saccolaimus flaviventris	Yellow-Bellied Sheathtail-Bat	V	Not listed	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	Unlikely. None have been recorded on site.
Amphibians					
Heleioporus australiacus	Giant Burrowing Frog	V	V	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. The home ranges of both sexes appear to be non-overlapping suggesting exclusivity of non-breeding habitat. Home ranges are approximately 0.04 ha in size.	Unlikely. None have been recorded on site.
Litoria raniformis	Southern Bell Frog	E	V	Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat.	Unlikely. None have been recorded on site.

Litoria aurea	Green and Golden Bell Frog	E	V	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas.	Unlikely. None have been recorded on site
Birds					
Anthochaera phrygia	Regent Honeyeater	CE	CE	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	Has not been recorded on site. Potential suitable habitat may occur in surrounding sites such as Parramatta Park.
Botaurus poiciloptilus	Australasian Bittern	E	E	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains.	Unlikely. None have been recorded on site
Calidris ferruginea	Curlew Sandpiper	E	CE	It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	Unlikely. None have been recorded on site

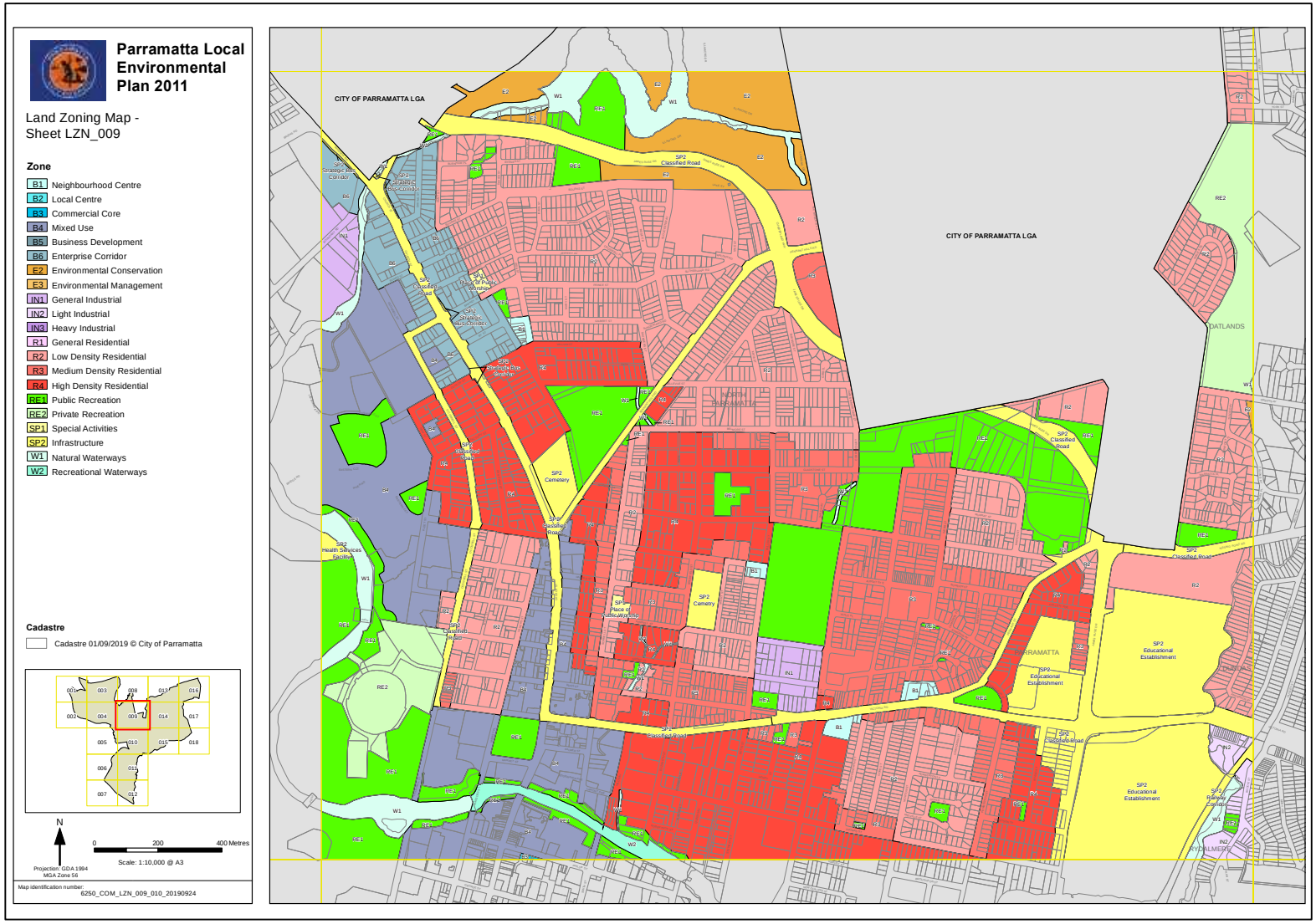
				It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed.	
Daphoenositta chrysoptera	Varied Sittella	V	Not Listed	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.	Unlikely. None have been recorded on site
Dasyornis brachypterus	Eastern Bristlebird	E	E	Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. Age of habitat since fires (fire-age) is of paramount importance to this species.	Unlikely. None have been recorded on site
Epthianura albifrons	White-fronted Chat	V	Not Listed	Gregarious species usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	Unlikely. None have been recorded on site.
Grantiella picta	Painted Honeyeater	V	V	Inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema*. Insects and nectar from mistletoe or eucalypts are occasionally eaten. Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.	Unlikely. None have been recorded on site.

Lathamus discolour	Swift Parrot	E	CE	Migrates to the Australian south-east mainland between February and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Forest Red Gum *E. tereticornis*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana*, Blackbutt *E. pilularis*, and Yellow Box *E. melliodora*.	Unlikely. None have been recorded on site.
Ninox connivens	Barking Owl	V	Not Listed	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey found on these fertile riparian soils. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as *Acacia* and *Casuarina* species.	Unlikely. None have been recorded on site.
Ninox strenua	Powerful Owl	V	Not Listed	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina*	Unsuitable roosting habitat, possible foraging suitability, most likely in areas west of site.

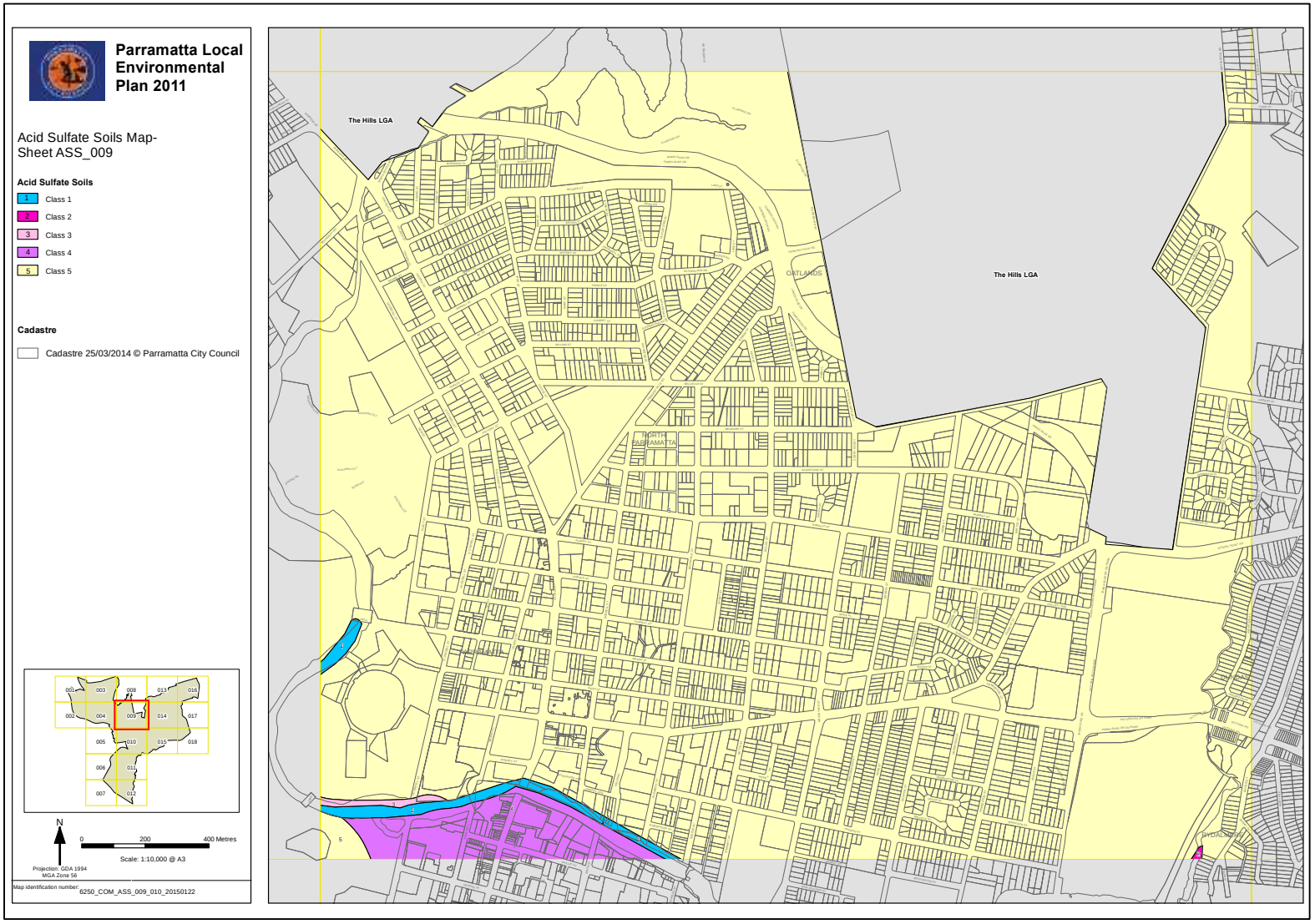
				littoralis, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species.	
Petroica boodang	Scarlet Robin	V	Not Listed	Lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat.	Unlikely. None have been recorded on site
Rostratula australis	Australian Painted Snipe	E	E	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.	

Hills Bushcare

Appendix 2 - Parramatta City Council Land Zoning Map



Appendix 3 – Parramatta City Council Acid Sulfate Soils Map



Appendix H

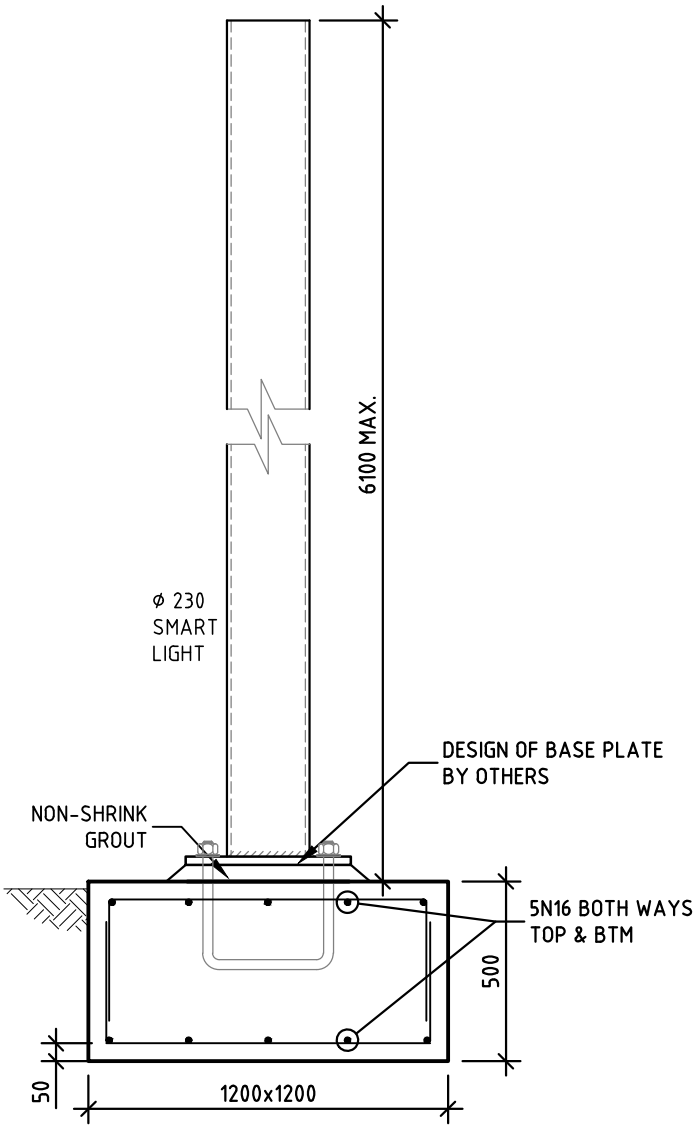
Footing Details for Light Poles – Civil & Structural Engineering Design Services Pty Ltd

CIVIL & STRUCTURAL ENGINEERING
DESIGN SERVICES PTY. LTD. ACN. 051 307 852

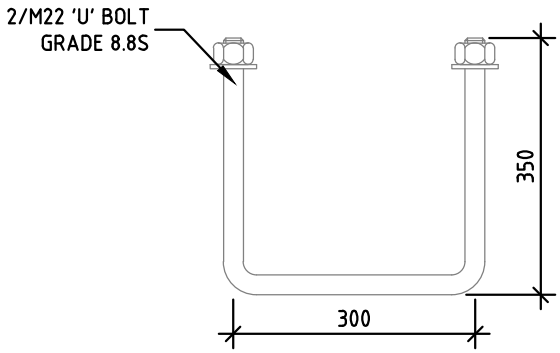
CONSULTING STRUCTURAL, CIVIL, GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

3 Wanniti Road BELROSE 2085

PHONE 61-02 9975 3899
FAX 61-02 9975 1943
MOBILE 0407 753 899
EMAIL hited@bigpond.net.au



FOOTING DETAILS
1:20



'U' BOLT DETAILS
1:10

NOTE:

FOOTINGS HAVE BEEN DESIGNED FOR MIN. 75 KPA SOIL BEARING CAPACITY.

DESIGN WIND SPEED:
45 M/S
TC: 2
REGION: A1-7

Registered Professional Engineer 198230
Mr Edward A. Bennett
MIEAust CPEng

Signature.....Date 05 / 12 / 2019

Register on the NPER in the Category of
Civil/Environmental/Structural/Geotechnical
National Professional Engineers Register

CLIENT: FORM AND LIGHT
PROJECT: FOOTING DETAILS FOR 6.1M LIGHT POLE TO BE INSTALLED IN PARRAMATTA

Drawn By: SD	Scale: AS SHOWN
Checked By: E. A. BENNETT M.I.E. Aust.	Drawing No.: F-11-267713B
Date: 05/12/2019	Amendment B-06/05/2020