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Preliminary Contaminated Land Assessment
Sydney Heritage Fleet
Pyrmont, NSW 2009

Report Number 610.10676-R4R0

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Preliminary Contaminated Land Assessment
Sydney Heritage Fleet
Pyrmont, NSW 2009

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EXECUTIVE SUMMARY

This report presents the results of the preliminary contaminated site investigation for the proposed development, and has been undertaken in accordance with SLR's Offer of Services, Sydney Heritage Fleet Bank Street, Pyrmont; Specialist Building / Environmental Technology Services (Ref. 610.10676 SHF P1 20110823, dated 23 August 2011).

This assessment is a requirement of the Director General's Requirements issued 14 February 2011, and thus the objectives of this preliminary contamination assessment are to:

- Meet the following Director General's Requirement:
    - Demonstrate compliance with the requirements of SEPP 55 (State Environmental Policy No.55).
- Assess the likelihood of ground and/or groundwater contamination at the site as a result of previous usages of the site and adjacent land .
- Provide an assessment in accordance with the preliminary contamination assessment methodology outlined in Guidelines for Consultants Reporting on Contaminated Site, Chapter 2.1 (NSW Office of Environment and Heritage 2011).

The site was considered to contain a number of Areas of Environmental Concern (AEC) which have been split into two categories for the purpose of this assessment: Site Derived Sources; and, External Sources. The potential sources of contamination or impacts associated with these AECs are listed below.

<u>Site Derived Sources</u>

- Reclaimed land and associated fill materials of unknown quantity and composition.
- Fill of unknown quantity and composition used to create the variations in working ground level during site history.
- The various floor levels associated with the above variations in working ground levels
- Although not actually a source of contamination, it was noted in our site visit that the RTA compound works involved removing fill material from an excavation in the vicinity of the Bridge Pier on Lot 20 and relocating it beneath proposed hard standing areas on the upper area. It should be assumed that any contamination that may have been present in the cut area is now distributed at shallow depth over some areas of the upper part of the site.
- Previous known occupiers undertaking **unknown** activities (among others).
- Previous known occupiers undertaking **known** activities.
    - Colonial Sugar Refinery: Gypsum and possibly building materials were stored on site potentially along with sugar refining raw materials
    - Cam and Sons Limited: it is likely, due to the trawling activities of this company that fish and fish products would have been stored and moved across the site. Coal was also stored and used as fuel within the vessels, which may have been transferred onto the site.
    - Timber Merchants (including Allen Taylor and Company Limited): it is possible that timber (treated/untreated) was stored or moved across the site. Potentially site usage may also have involved the treatment of timber or the storage of timber treatment chemicals.
- The demolition of the 'L' shaped building. There is potential for hazardous building materials to have existed within the building fabric such as Asbestos Containing Materials (ACM's), lead paint or old light fittings which may contain PCB's and the like.

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Potential External Sources

- The CSR industrial site operations up gradient from the subject site
- The operations of proximal businesses on the Pyrmont Peninsula, particularly those adjacent or up gradient, given the industrial nature of the area
- The Pyrmont Incinerator which is known to be active north of the site between 1937 and 1971

The following conclusions and recommendations have been developed as part of this assessment:

It is a requirement of the Director General that an assessment of the potential impacts of contaminated land on the development is made, in accordance with the requirements of SEPP 55. The objective of this Stage 1 Preliminary Investigation was to identify any past or present contaminating activity, which may have impacted soils or groundwater on the site, as required in Section 3.4 of SEPP 55.

The work performed included a site history study and walkover inspection only and did not include any sampling or testing of soils. Without conducting a soil sampling and analysis program on the site it is not possible to verify the presence or absence of soil contamination.

The historical study carried out demonstrates that the site has potentially been impacted as a result of its own industrial legacy and as a function of its proximity to an area, which in past times, was heavily industrialised.

From the investigation information available it is understood that fill materials may extend up to 4m beneath the site. It is possible, given the potential sources, that contamination impacts could be present throughout the fill material, from the earliest material deposited during reclamation, through to the various levels of the site introduced as ground levels were manipulated during usage.

The proposed construction works are anticipated to involve disturbance of the soils, particularly during excavation to foundation level for the waterside structures. From the appraisal conducted there is a potential for contamination to have occurred in these soils.

Section 3.5.2 of SEPP 55 requires that where contaminating activities are suspected to have had an impact on the land, sampling and analysis will be required to confirm or support any conclusion reached from the site history appraisal. This would allow an initial assessment of any contamination to be established.

Contamination testing has already been carried out on site but at shallow depth in a few locations only. The level of soil investigation and testing noted to date would be insufficient to allow a full assessment of potential contamination, particularly at depth, in the areas to be developed. The investigations did however indicate that contamination (in the form of polycyclic aromatic and petroleum hydrocarbons) was present at elevated levels within shallow fill materials.

Consequently, in line with Section 3.5.2 of SEPP 55, it is recommended that a limited soil investigation is carried out in land areas which are likely to be disturbed by the proposed development. Such an investigation would establish the likelihood of encountering contaminated soil and groundwater during the construction works and the nature of any such impacts.

Should these investigative works indicate that that development area has not been significantly impacted by the potentially contaminating activities, this should provide sufficient information to satisfy the planning authority that the site is suitable for the proposed use.

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Should elevated contaminant levels be encountered, which exceed the Health Investigation Levels prescribed for this development type, then a Stage 2 – Detailed Investigation will be required in accordance with Section 3.5.3 of SEPP 55. This investigation would seek to provide information on the extent and degree of contamination and an assessment of the risks posed by the contaminants to health and the environment.

It is understood that construction of the overwater elements of the proposed scheme may result in the disturbance of marine sediments adjacent to the site. Such sediments are likely to be impacted by the industrial heritage of the Blackwattle Bay area. These soils may also be Potentially Acid Sulphate. Given the potential impact on the existing bay water quality and ecological environment such disturbance may cause, it would normally be recommended that further investigation be carried out to assess the nature of the near shore sediments. It is understood from the client that this may not be possible. Hence, it is recommended that a construction methodology is selected which minimises sediment disturbance, results in little spoil generation at surface, allows for the impacts of potential chemical attack and is accompanied by appropriate control measures to protect the marine environment during the works. Such a methodology should incorporate a management plan for dealing with any acid sulphate soils encountered.

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR Consulting) has been commissioned by Crawford Architects on behalf of Sydney Maritime Museum Ltd (Client) to provide environmental assessment reports to support a Development Application (DA) for the Sydney Heritage Fleet (SHF), Bank Street, Pyrmont.

This report presents results of the preliminary contaminated site investigation for the above proposed development.

This report has been undertaken in accordance with SLR's Offer of Services, Sydney Heritage Fleet Bank Street, Pyrmont; Specialist Building / Environmental Technology Services (Ref. 610.10676 SHF P1 20110823, dated 23 August 2011).

From the information provided by the Client, the following briefly describes the development:

- The development will comprise a non-profit making working museum and a home for the SHF.
- The site is located under the eastern pylon of the Anzac Bridge with a water frontage to Blackwattle Bay and a street frontage to Bank Street. Approximately half of the site adjacent to the bridge pylon will be occupied by the SHF and the other half to the east will become a community park. The land understood to be developed as a community park does not form part of this assessment.
- Located to the west of the bridge pylon is a freestanding Exhibition Pavilion with an attached refreshment kiosk and amenities also at sea wall/water level.
- The land based component of the project comprises two storage areas at sea wall/water level.
    - The first to store dragon boats operated by Dragon Boats NSW with direct access to a new boat ramp.
    - The second to store and operate small vessels owned by the SHF, which will also make use of the boat ramp.
- Directly above the boat storage areas are exhibition spaces, meeting rooms, amenities, and entry lobby and reception areas.
- Across from the entry courtyard fronting Bank Street is a single storey building with some mezzanine spaces over which are the SHF's maintenance workshops and storage areas which are required to service the SHF vessels. The roof of the maintenance areas will be "green", to provide sound insulation for the SHF's operations and a visually attractive landscape for the adjacent residential buildings.
- Where reference is made to the site being developed for commercial use, this terminology is used to differentiate from residential or industrial uses, and is not intended to construe a commercial (or business) venture.

1.1 Objectives

This assessment is a requirement of the Director General's Requirements issued 14 February 2011, and thus the objectives of this preliminary contamination assessment are to:

- Meet the following Director General's Requirement:
    - Demonstrate compliance with the requirements of SEPP 55 (State Environmental Policy No.55)
- Assess the likelihood of ground and/or groundwater contamination at the site as a result of previous usages of the site and adjacent land
- Provide an assessment in accordance with the preliminary contamination assessment methodology outlined in Guidelines for Consultants Reporting on Contaminated Site, Chapter 2.1 (NSW Office of Environment and Heritage 2011)

1.2 Scope of Work

To achieve the above objective, the following scope of works was implemented:

- Site history material review (further detail regarding this stage is provided below)
- Site inspection
- Review of previous SI and/or environmental assessment reports
- Appraisal of Potential Acid Sulphate Soils

1.2.1 Site History Material Review

The site history material review was conducted to check details of past actual/potential contaminating activities that may have occurred at the site or in areas adjacent to the site. The following site history materials were reviewed

- Historical land title search – NSW Land Titles
- NSW Heritage Register
- Environment Protection records including the Register of Contaminated Sites – Environment Protection Authority
- NSW WorkCover Application for Records Search – Dangerous Substances, Dangerous Goods, Underground Storage Tanks and Licence History
- Aerial photographs and historical maps
- Details of previous site usage will be evaluated for potential contaminant impact using the guidance document ANZECC & NHMRC 1992 The Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites

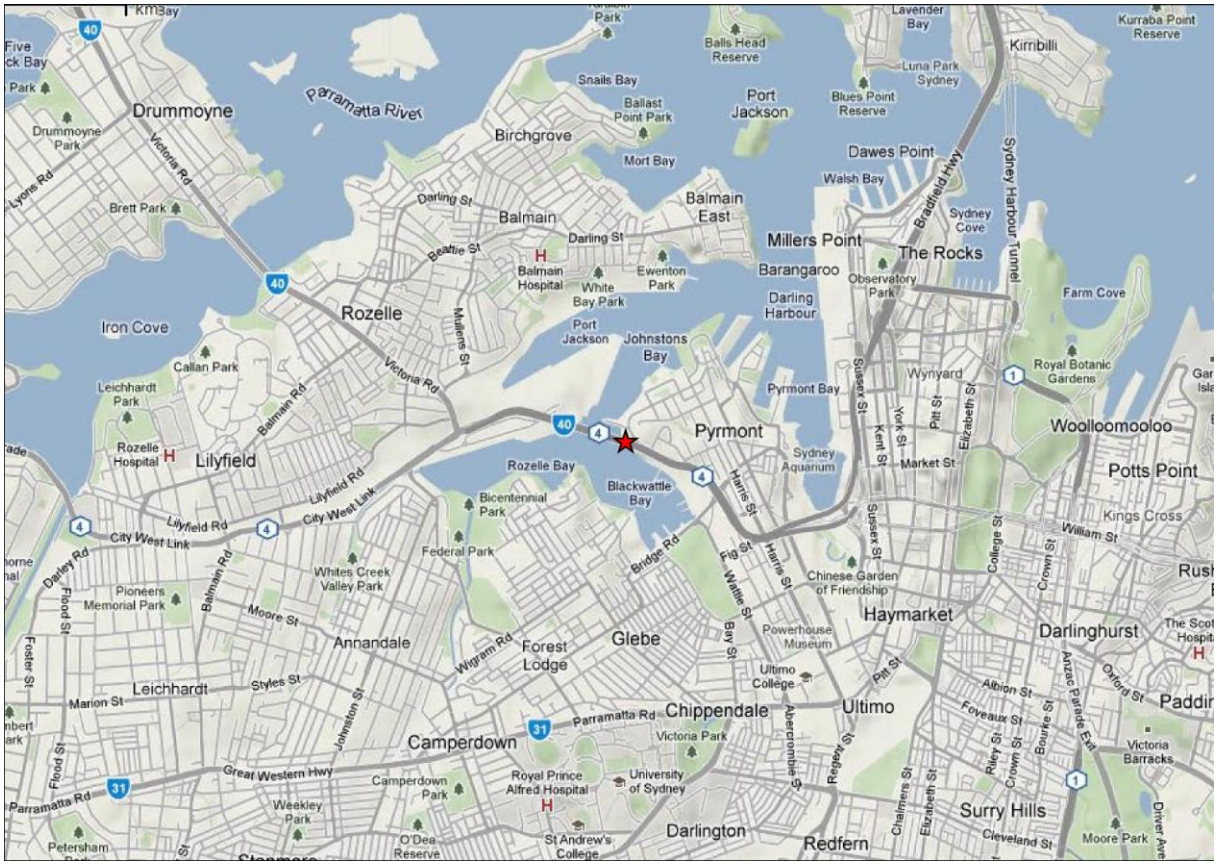
2 SITE DESCRIPTION

2.1 Site Location and Description

The Project Site is located off Bank Street, Pyrmont, NSW 2009, approximately 1.3 kilometres (km) west of Sydney Central Business District (CBD).

A Locality Map is provided below in **Figure 1**.

Figure 1 Locality Map



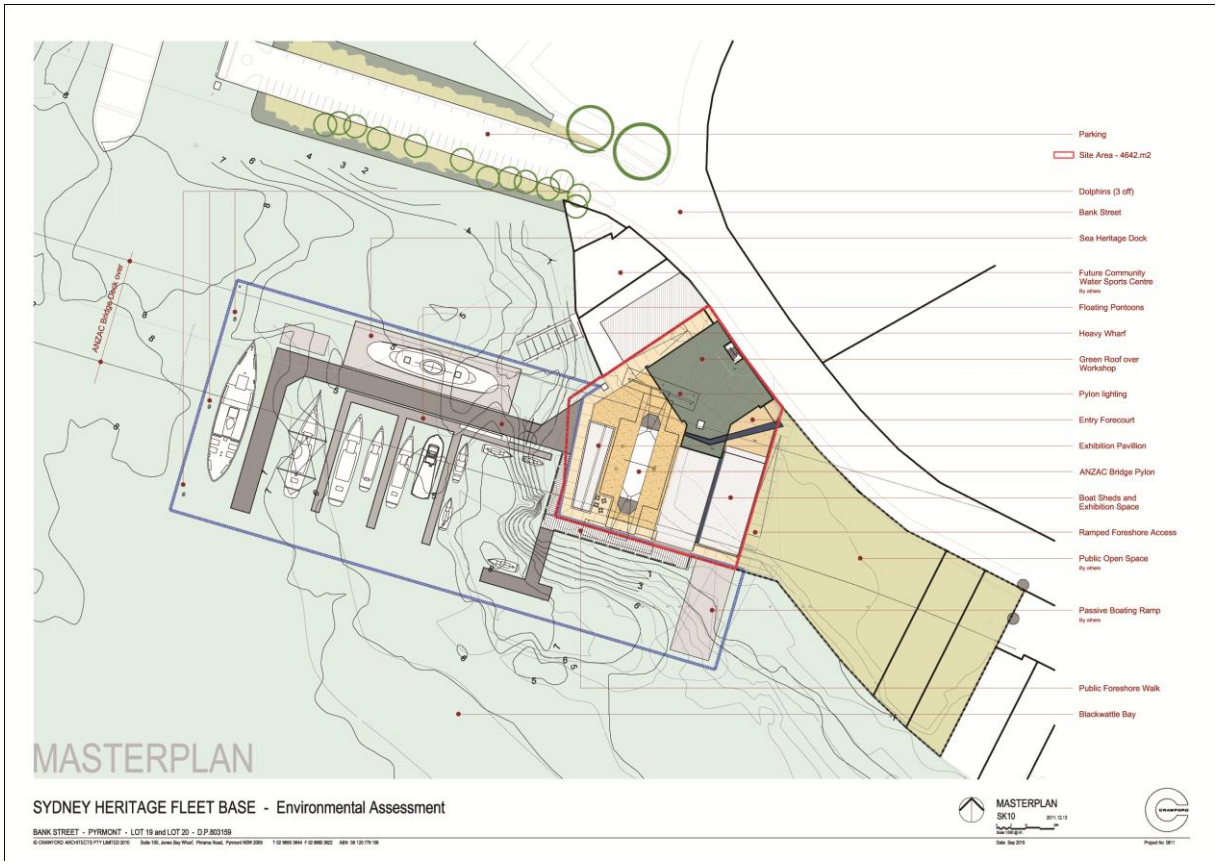
Source: SLR Consulting

The Project Site is a combination of two lots located beneath the eastern pylon of the Anzac Bridge, comprising Lot 19 and Lot 20 of Deposit Plan 803159. The area included within this DA is shown in **Figure 2** and is approximately 4,642 m^2 in area.

For clarity, throughout this report when both lots are being referred to, the term 'Project Site' will be used. If they need to be discussed individually the lots will be referred to by their associated lot and Deposit Plan number.

Two leases exist on the site, a land lease (identified in **Figure 2** by a red boundary) and a water lease (identified by a blue boundary). The public open space (shaded in green in **Figure 2**) is shown, although this is not included within this DA and does not form part of this assessment.

Figure 2 Site Plan



Source: Crawford Architects

The Project Site is bordered to the south and west by Blackwattle Bay, to the north by Bank Street. The surrounding land uses include:

- North and Northwest: On the other side of Bank Street is Jackson's Landing residential and community estate.
- South and West: Blackwattle Bay borders the Project Site.
- Northeast: There is a small cluster of commercial buildings located on the opposing side of Bank Street.
- Southeast: A series of buildings operated by Poulos Bros Seafoods Pty Ltd, Bidvest Australia Pty Ltd, Hymix Australia Pty Ltd and the Sydney Fish Markets.

2.2 Project Description

The proposed development works shall incorporate the following:

- A two storey building with some mezzanine spaces.
- Located west of the bridge pylon is a freestanding Exhibition Pavilion with an attached kiosk and amenities.
- Boat sheds and vessel storage for dragon boating.
- Shipwrights and boat storage area which includes a machine shop, workshop, timber store, lunch room and amenities.

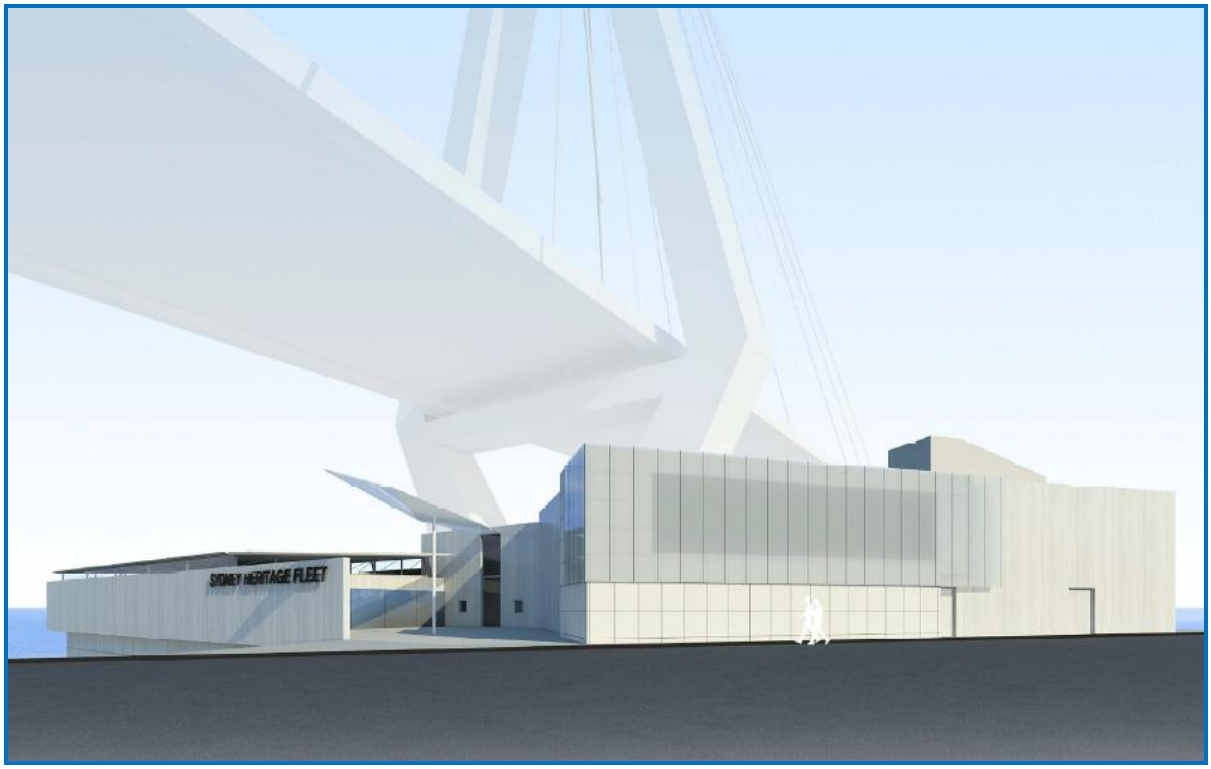
- Directly above the storage areas are exhibition spaces, meeting rooms, amenities and entry, lobby and reception areas.
- Restoration and maintenance workshop, including a metal fabrication workshop, coal stores, garbage and recycling stores, paint and flammable goods store.
- Working living museum.
- Lay apart stores and electrical workshop.
- The mezzanine which incorporates amenities.
- Heavy wharf.
- Floating pontoons.

Figure 3 and **Figure 4** below show design perspectives for the proposed development from the proposed public open space and from Bank Street, respectively.

Figure 3 View of Proposed Development from Public open space

Source: Crawford Architects

Figure 4 View of Proposed Development from Bank Street



Source: Crawford Architects

3 LEGISLATION AND GUIDANCE

This preliminary site investigation has been conducted in general accordance with the requirements of Section 105 of the *Contaminated Land Management Act 1997* and in line with the policies and guidance detailed below

3.1 State Environmental Planning Policy No. 55 (SEPP 55)

When a new development is proposed, SEPP 55 *Remediation of Contaminated Land*, requires that a determination is made as to whether the land associated is contaminated and, if so, whether it is suitable for the proposed development in its current state or will require some form of the remedial treatment. The process of determination involves four stages:

- Stage 1: Preliminary Investigation.
- Stage 2: Detailed Investigation.
- Stage 3: Remediation Action Plan.
- Stage 4: Validation and Monitoring.

Any development may require one or more phases to be carried out, as the findings of the first two determine whether the remaining phases are required.

This assessment deals only with Stage 1.

3.2 Guidelines for Consultants Reporting on Contaminated Sites (EPA 2000)

This report has been prepared in accordance with the Guidelines for Consultants Reporting on Contaminated Sites (EPA 2000);

> *The purpose of these guidelines is to ensure that reports prepared by consultants on the investigation and remediation of contaminated land contain sufficient and appropriate information to enable efficient review by regulators, the Site Auditor and other interested parties*

4 THE EXISTING ENVIRONMENT

4.1 Subject Site and Surrounding Areas

The following description of the Subject Site and Environs is compiled from the site inspection observations and a review of publically available documentation (site photographs are attached in **Appendix A**).

For clarity, throughout this report when both lots are being referred to, the term 'the site' or the 'subject site' will be used. Should there be a need to discuss lots individually they will be referred to by their associated lot and Deposited Plan number.

The site is bordered to the south by Blackwattle Bay, to the north by Bank Street, to the east by the various commercial premises and to the west by Blackwattle Bay.

Table 1

The surrounding sites include;

- North and Northwest: On the other side of Bank Street is a new residential/community estate called Jacksons Landing. There are additional apartments located between Bank Street and Quarry Master Drive.
- West and South: Blackwattle Bay borders the site in these directions. Anzac Bridge also spans over the site crossing the Bay to the west
- Northeast: There is a set of commercial buildings located to the northeast on the other side of Bank Street.
- East: Directly East of the site is a building operated by Poulos Bros Seafoods Pty Ltd, on the eastern side of this is Bidvest Australia Pty Ltd, Hymix Australia Pty Ltd and further East the Sydney Fish Markets

The site's topography comprises an upper and lower level with the upper portion adjacent to Bank Street forming the majority of Lot 20. The lower part of the site is largely Lot 19 which is approximately 2m lower than the adjacent lot and primarily forms the area around the bridge pylon. Both areas are relatively level in nature with access to the lower level achieved via three earth/stone ramps located on each side of the pylon (see Photo 6) and one adjacent to the new boat ramp (See Photo 14).

Figure 5 below shows the topography of the subject site overlayed on the proposed development information. The pink area represents the higher elevations and the blue area being the lower elevation.

The western boundary of the site, where it abuts Blackwattle Bay, is marked by two distinct wharf walls. In the southern half of Lot 20 an old sandstone block wharf wall can be seen extending south-eastwards from the southernmost point where the two lots join (See Photos 13, 17 and 18). A newer concrete wall extends west from this point (See Photos 11 and 14) before turning north beneath the bridge. It is understood that this newer wall was constructed to retain and protect the area reclaimed for the bridge construction. During the site inspection the older wall was observed extending into the fill materials behind the new wall (See Photos 15 and 16); presumably following the line of the old wharf side. Consequently, remnants of sandstone block work may well be buried beneath the main site or could have been removed during previous site development works.

The newer concrete wharf wall was emplaced at a level coincident with the lower level of the site. By contrast the older wall, is slightly higher in construction topped by a steeply sloping, grassed earth bank extending to the upper level of the south part of the site. The newer wall is topped by concrete pavement which forms a convenient access from the new boat ramp to Lot 19.

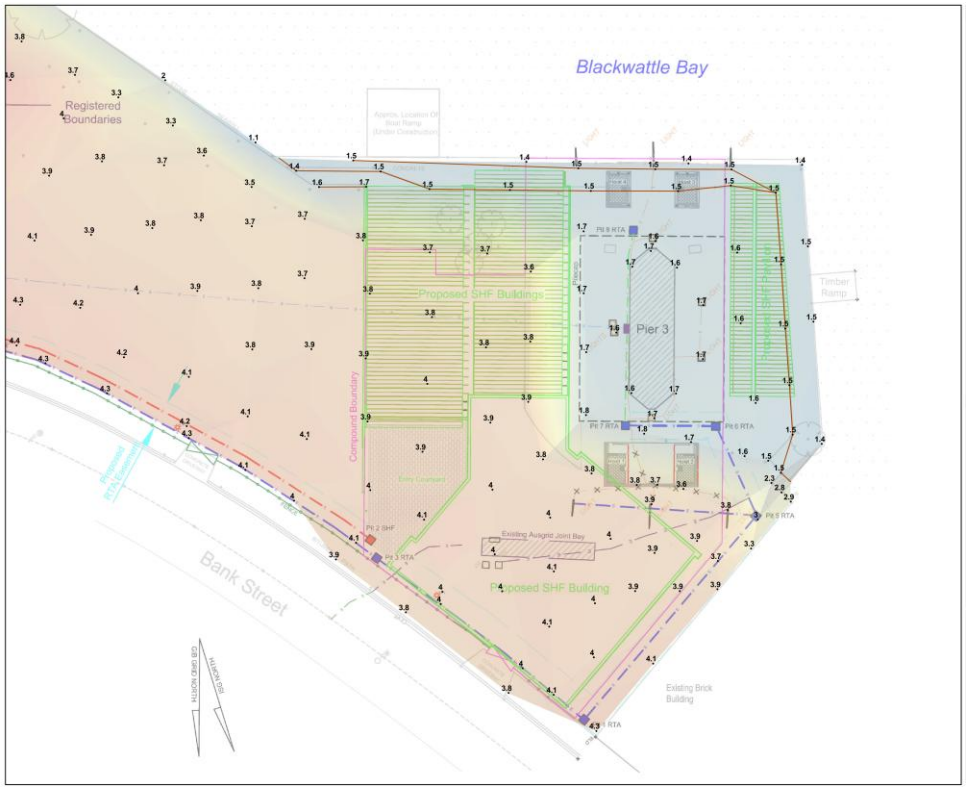
The site is bound to the north by Bank Street which is located at the base of a steep rise into Pyrmont. The height of the retaining wall on the northern side of Bank Street is estimated to be about 3-4 metres. Ground elevations within Lot 20 range between 4.8m AHD in the north-eastern corner to 3.6mAHD in the south-western corner. Ground elevations within Lot 19 range between 1.8m AHD (adjacent to Lot 20) and 1.4m AHD at the water front. A chain link fence separates the site from Bank Street and access is via two metal gates located midway along, and at the northern end, of the site's eastern boundary.

The southern part of the site is currently occupied by several steel site stores and racks of long rowing boats as this area is utilised by a Dragon Boat racing club.

During the site inspection (mid-September 2011) a large portion of the site was subject to earthworks, which it is understood preceded construction of access facilities by the RTA for maintenance of the Anzac Bridge (See Photos 1 -10). The earthworks involved excavation adjacent to the bridge pylon (See Photos 6 and 10) to house a lift structure. The removed fill (after removal of the concrete and metal debris – See Photos 21 and 22) would appear to have been deposited on the upper site surface (See Photo 2). The upper site area had been levelled and was in the process of receiving hardcore gravel for compaction prior to asphalting as part of a car park formation. The lower level of the site also appeared to have undergone some surface preparation and it was understood that at least one of the earth/stone ramps constructed would form permanent access to this area.

In the area of the site not disturbed by ongoing earthworks, the ground surfacing was seen to comprise sandy gravel. Inspection of the exposed soil materials in the new cut for the boat ramp, suggested that the fill in this area extended about 2m above the level of the new concrete wall. The fill exposed mainly comprised sandy gravel of sandstone, concrete and some brick with some cobbles of similar composition and was consistent with reprocessed demolition materials.

Figure 5 Site Topography



Source: SLR Consulting

Table 1 Summary of Site Identification Information

Site Location	Bank St, Pyrmont NSW 2009	
	Lot 19 DP 803159	**Lot 20 DP803159**
Land Use	Public Recreation	Public Recreation
Local Government Area	City of Sydney	City of Sydney
Approximate Area Coordinate at the Centre of the Site (Deg, Min, Sec)	33°52'11"S, 151°11'15"E	33°52'12"S, 151°11'18"E
Current Owner	Waterways Authority	Waterways Authority

4.2 Soil Landscape

Soil landscape information has been obtained from 'Soil Landscapes of the Sydney 1:100,000 sheet' 1989 (Soil Conservation Service of NSW, Sydney).

Across the site the map indicates there is a combination of 'Gymea' and 'disturbed terrain' soil landscapes. It is difficult to assess exactly where the soil landscape changes from Disturbed Terrain to Gymea, however it seems the western end of the site (lot 19 and some of Lot 20) is shown as mostly Disturbed Terrain whilst the eastern end of the site is shown as Gymea. From the site inspection it would appear the entire site has a coverage of fill materials, indicative of Disturbed Terrain.

It is likely that during the sites history the various occupier activities have taken place on a number of topographic levels. It is not possible, without further intrusive investigation, to identify the nature of these previous surface levels, their relative depth and the fill material used to create them.

As is described by 'The State of the Environment Report' commissioned for Landcom, Gymea soil landscapes are generally found on Hawkesbury Sandstone, which occurs extensively along the foreshore of Sydney Harbour. The soils are yellow earths and earthy sands, with siliceous sands on the leading edges of benches, localised gleyed podzolic soils and yellow podzolic soils on shale lenses and siliceous sands and leached sands along drainage lines.

The NRAtlas (SPADE) program, provided by the Office of Environment and Heritage, showed the closest soil test pits were between 1 and 2 km away from the subject site across different parts of the harbour, and as such, no soil information could be accurately inferred for the site from this data set.

4.3 Acid Sulphate Soils

As is indicated by the Acid Sulphate Soil Risk Maps – Edition Two, provided by the Department of Land and Water Conservation (the site forms part of the *Prospect/Parramatta River* area map), the subject site is classified as Disturbed Terrain and has not been given an Acid Sulphate Soil probability. It states on the map that site investigations are required to assess this area for acid sulphate potential.

The maps also indicate that the bottom sediments within the adjacent Blackwattle Bay have a high probability of containing Acid Sulphate Soils.

4.4 Hydrology / Hydrogeology

No detailed information is currently available regarding groundwater flow or depth beneath the site. It is likely that groundwater would flow southwards across the site towards Blackwattle Bay from the higher ground North of Bank Street.

No obvious site drainage system was noted during the inspection. Given the granular nature of the site surface observed, it is anticipated that rainfall would seep directly into exposed soils and migrate with gradient towards the bay. A low point on Bank Street, close to the northern end of the site, could potentially result in any rainwater not intercepted by road drainage systems flowing overland, down gradient onto the site. It is however anticipated that site drainage will be significantly impacted by the RTA works which will introduce a sizeable coverage of hard standing and presumably an associated drainage system.

Although parts of the site are relatively low lying, and those areas were no doubt more extensive in area during the early site development, no records of any significant flooding events were noted during the research of site history.

4.5 Potential Receptors

Based on the site material review and site visit, potential receptors for contamination, should it be present on site, include;

- Site owners and occupiers.
- Site visitors
- RTA workers within the enclosed compound area
- Construction workers should development take place which involves earth disturbance.
- Neighbouring site owners and occupiers if contamination is migrating offsite through dust or surface water.
- Potential groundwater users at the site, if groundwater is impacted by contaminants.
- Blackwattle Bay and potentially the wider Sydney Harbour body.

4.6 Previous Site investigations

Details of only two intrusive site investigations directly related to the site could be obtained. The first report is a geotechnical report carried out as part of the preliminary assessment works for the construction of the Anzac Bridge. The second and more recent report from June 2010 relates to a shallow soil contamination assessment prior to the construction of a new access boat ramp. A third report, carried out for the Hymix Plant to the south-east, investigated the nature of sediments in Blackwattle Bay and given the nature of the proposed site works a review of this report is also included. Summaries of these reports are provided below.

4.6.1 Limited Phase 2 Environmental Site Investigation: RCA Australia (June 2011)

This investigation was carried out for Aurecon as part of the Environmental Factors Report prepared for the RTA prior to the construction of their improved access infrastructure for the Anzac Bridge.

A total of nine (9) test pits were excavated across the site to a maximum depth of 0.9m.

Soil samples were collected from 0-0.3m at all locations, with TP12, TP14, TP16 and TP17 each having an additional sample taken from 0.6-0.9m, as deeper excavations were proposed in these areas. TP12 was in the vicinity of a proposed Dragon Boat ramp, TP14 and TP16 were in the vicinity of the bridge pier where ramps and associated elevator shafts were proposed. All samples were analysed for total recoverable hydrocarbons (TRH); benzene, toluene, ethylbenzene and xylenes (BTEX); polycyclic aromatic hydrocarbons (PAH); and metals (As, Cd, Cr, Cu, Ni, Pb, Zn, Hg). Samples TP12b, TP14b and TP15a had the additional analysis of tributyltin (TBT).

Significant PAH contamination was identified in samples TP10a, TP14a and TP12b.

Samples TP10a, TP14a and TP12b were from a fill layer that includes construction materials within a clayey sand matrix. Results of other samples in this material, by RCA and by Noel Arnold (Ref [1]), indicate a wide range of contaminant concentrations. It was therefore considered that contamination is randomly distributed throughout fill material and that there are possibly higher concentrations that have not been identified.

The identified contamination was semi-volatile and biodegradable, however PAH were noted to be less amenable to these processes. It was not anticipated that a significant decrease of the identified concentrations would occur without active intervention and augmentation. RCA concluded that for the site condition at the time, there was unlikely to be any significant exposure to human health as there was no active usage. The proposed increased use of the site was considered to increase the possible exposure to human health from soils contact, but it was understood that much of the area would be sealed with bitumen as part of the works and as such would restrict exposure.

4.6.2 Soil Contamination Investigation: Noel Arnold & Associates Pty Ltd (June 2010)

Noel Arnold & Associates Pty Ltd (NAA) previously completed a Soil Contamination Investigation at the site in June 2011 to provide information about potential soil contamination at the site, prior to planned development works. The work performed included a site history study, walkover inspection and limited soil sampling.

The soil sampling program undertaken at the site comprised the excavation of eight (8) test pits to a maximum depth of 1.3m below ground level (bgl). A total of eight (8) soil samples were collected from various depths in the soil profile and analysed for targeted analytes including TPH, BTEX, Heavy Metals, VOC's, PAHs and asbestos. Soil Investigation Levels (SILs) were used to assess the significance of the concentrations of contaminants in the soil. The investigation levels adopted by NAA for the purposes of this investigation were the HILs, *Column 3- Parks recreation open space, playing fields including secondary schools*.

The conclusions of the SCI indicated that parts of the site were previously a bitumen car park. The results of the soil sampling indicated that targeted areas exceeded the adopted SILs (for PAH and TPH) for the proposed future use of the site as a public boat ramp. NAA recommended that measures to manage the impacted soils be undertaken as part of the redevelopment of the site.

4.6.3 Marine Sediment Contamination Assessment: Douglas Partners Pty Ltd (June 2008)

Douglas Partners Pty Ltd conducted a Marine Sediment Contamination Assessment at the Hymix wharf, located on Blackwattle Bay NSW. The NSW Maritime Authority required the owner (Hymix) to remove the wharf structure and address the environmental requirements associated with the management of sediments during the removal. The scope of the work for this assessment included a review of the site history and the collection of 10 sediment samples.

The soil sampling undertaken at the Site comprised collection of surface sediments from five on-site (i.e. within the footprint of the wharf) and five off-site locations. Off-site samples were collected by SCUBA divers and comprised surface sediments (i.e. 0 – 0.3m interval). Sediments were analyzed for heavy metals, cyanide, PAHs, TRHs, BTEX, MAHs, PCBs, OCPs, Phenols, TBT and VCHs.

The Sediment Quality Guidelines specified in Table 3.5.1 of the ANZECC Guidelines for Fresh and Marine Water Quality (2000) was adopted by Douglas Partners as the Site Assessment Criteria for the investigation.

Concentrations of Cyanide, TRHs, BTEX, Phenols, PCBs and VHCs were below laboratory detection limits in all samples. Concentration of total PAHs in all samples exceeded the ISQG-Low criteria. Total PAHs was measured in one sample (onsite sample S3) at a significantly elevated level (71.29 mg/kg) compared with concentrations in other samples.

Among the heavy metals:

- cadmium and chromium were within the ISQG-Low levels for all samples;
- arsenic and nickel both recorded one exceedance of the ISQG-Low levels but were below the ISQG-high levels;
- copper exceeded the ISQG-Low level in all samples; with three off-site samples (S8, S9 & S10) exceeding the ISQG-High level;
- All samples recorded lead (Pb) and mercury (Hg) concentrations exceeding the ISQG-Low levels (with the exception of on-site sample S2, in which Hg was not detected), with some sample locations exceeding ISQG-High levels. No apparent differences were reported for Pb concentrations between on-site and off-site locations, although concentrations of Hg appeared to be greater in off-site samples.

Douglas Partners noted that detected concentrations of heavy metals were within background levels for Parramatta Estuary sediments.

Acid sulfate soils were considered likely to be present at the Site, although laboratory testing (e.g. SPOCAS) was not undertaken.

The conclusions of the assessment indicated that contamination present at the site was not necessarily caused by the wharf and associated activities and more likely due to discharge of contaminant-loaded effluent from various sources (e.g. storm water runoff) into Blackwattle Bay. Due to elevated concentrations of PAHs relative to background levels, however, Douglas Partners advised care be taken during removal of the wharf to ensure minimal disturbance of sediments.

4.6.4 Geotechnical Investigation: RTA (pre-2003)

The investigation involved the formation of a number of rotary drilled boreholes in the area now occupied by the eastern pier (No. 3) of the Anzac Bridge (then referred to as the new Glebe Bridge) The general geology of the Pier 3 area comprises fill material (gravelly sand) overlying sandstone bedrock. Fill material varies in depth from 0.5m bgl to 4.0m bgl, with the deeper fill found close to the waterline. Below the waterline, sandstone bedrock is overlain directly with marine sediments. A schematic cross section of the site geology was presented as part of the report and it was noted that the sandstone bedrock profile seemingly dips steeply towards the Bay and a significant thickness of marine sediments are postulated immediately off shore. Such observations are supported by our understanding that this bridge pier was founded on short piles to transfer loads to the underlying sandstone.

No contamination testing was carried out as part of these works.

5 SITE HISTORY MATERIAL REVIEW

5.1 Planning Certificate Section 149 (2) and (5)

It is understood that the Planning Certificate Section 149 (2) and (5) for the site was not issued at the time of this assessment.

5.2 Council Property Files

There are no council records for this site which indicate any significant environmental issues

5.3 Aerial Photographs

A total of six (6) aerial photographs provided by the Land and Property Management Authority of NSW have been reviewed along with the current Google Earth Image. These photographs were taken in 1930, 1951, 1962, 1972, 1982 and 1991 (see **Appendix B**). A review summary is presented in **Table 2**

Note that the aerial photograph depicting the site during 1991 is the only image which shows Lot 19 (reclaimed during the late 1980s). Therefore all photographs apart from 1991 described below refer only to Lot 20.

Table 2 Aerial Photograph Summary

Year	Observations	Interpretation
1930	**The Site**	No detailed interpretation of the subject site is possible from this photograph due to the quality. It can be seen however that the approximate line of the Pyrmont peninsula is similar to that seen in current images. Given the established development shown it is evident that the land reclamation had occurred some year previously. It is also observed that the reclaimed area of land is reasonably well developed at this time with a number of large and smaller wharves and associated buildings and infrastructure.
	Pyrmont	There are a high number of buildings already present in the Pyrmont area. The harbour and wharfed areas indicate a high amount of maritime traffic and materials/goods for transport are noted lining the shore. The buildings present in Pyrmont appear to be of a small scale.
1951	**The Site**	The north-western end of the site shows an 'L' shaped building present. The south-eastern end of the site shows a large wharf attached and potentially a small white building at the rear of the site. It is difficult to tell if this is a permanent structure upon the site, or if it is storage structure of some kind. In comparison to the 'L' shaped building it is much smaller. There is nothing else of note observable on the site.
	Pyrmont	The Pyrmont peninsula has been highly built up since the last photograph with many factories and large buildings present. Notably this photo shows what we know to be the Colonial Sugar Refining (CSR) Factory/establishment north –east of the site. The south-east side of the main CSR site is not as developed at this time, as it is noted to be in the later images
1961	**The Site**	The north-western end of the site is still occupied by the aforementioned 'L' shaped building It can be seen that the large timber wharf has been removed and the south-west end of the site possibly contains boxes/pallets of what is likely to be raw materials or finished goods. These lines of square objects can be seen across the whole end of the site
	Pyrmont	There is minimal change to the Pyrmont built environment since the 1951 photograph. There is some visible construction occurring proximal to the south-east end of the main CSR site.

Year	Observations	Interpretation
		There is a large amount of maritime activity on the north side of the Pyrmont Peninsula, moving into Port Jackson Bay
1972	**The Site**	The above mentioned 'L' shape building has been removed from the north-west end of the site and there is now a smaller rectangular building located at the rear of the site with what appears to be cars occupying the front (water side) of the site. The south-eastern end of the site is noticeably less occupied by the square objects seen in the last image; however, they are still present
	Pyrmont	The south-eastern end of the main CSR site has been further and substantially developed. At this time the reclaimed area of Pyrmont Peninsula is significantly less developed
1982	**The Site**	The site is now completely vacant. Exposed dirt and concrete can be seen
	Pyrmont	Changes are again seen on the main CSR site. There are minimal changes to the surrounding industrial areas
1991	**The Site**	The site is still vacant in this photograph, Lot 19 has been added to the site (the footing for the eastern pylon of the Anzac Bridge is clearly visible in this photo).
	Pyrmont	There are no significant changes to note from the previous image
Current Image (2009)	**The Site**	The current image shows that the eastern pylon of the Anzac Bridge dominates Lot 19 of the current site and the bridge spans over most of the remaining Lot 20. It is difficult to see what is present on Lot 20 from this photo as the bridge obscures most of the view. In terms of site usage, it would appear there are possibly some trucks or containers present on site.
	Pyrmont	The current image shows that most of the industry previously noted has been removed and replaced by residential developments.

5.4 Historical Maps

A total of four (4) historical maps were identified for the Pyrmont area from a search completed of the Historical Atlas of Sydney (attached **Appendix C**)

Table 3 Historical Map Summary

Map Title	Interpretation
1865: Section Y of Plan, Trigonometrical Survey, City of Sydney	• Shows the Pyrmont coastline • No detail regarding the city or developments are shown
1903: Map of the City of Sydney	• Shows the Glebe Island Bridge • Shows major roads around the site • Does not show any detail regarding the subject site • Does not show any detail regarding the areas immediately around the subject site
1938-1950: City of Sydney Civic Survey, Pyrmont	• Shows lot details throughout Pyrmont, including the CSR factory • Includes the large timber wharf, as mentioned in the previous section • Does not show much detail regarding the subject site
1956: The Council of the City of Sydney, City building Surveyors Department, Building Regulation Branch	• Detailed representation of the lots and uses of the Pyrmont area • It is in a similar format to the last map, but is much more

Map Title	Interpretation
	detailed • Lot 19 is not present • Lot 20 is shown in two parts. The western half is occupied by the Potato Marketing Board of Tasmania • The eastern half is shown to be vacant with the large timber wharf attached, plus a smaller wharf towards the edge of the site.

5.5 Historical Land Titles

Historical land titles were obtained from Service First Registrations (**Appendix D**). The site is identified as two lot numbers on the same Deposited Plan:

- Lot 19 in Deposited Plan 803159
- Lot 20 in Deposited Plan 803159

It is understood that Lot 20 has records dating back in two parts. This is shown in **Appendix D** as the highlighted areas on the Deposited Plan**.** These parts are split into east and west sections.

Land Titles for both lots are summarised in **Table 4** and **Table 6**

Table 4 Summary of Proprietors – Lot 20 in Deposited Plan 803159 (part 1)

Year	Proprietor
2003 to date	Waterways Authority
1989-2003	Roads and Traffic Authority of New South Wales
1957-1989	Colonial Sugar Refining Company Limited
1955-1957	Potato Marketing Board of Tasmania
1937-1955	Cam and Sons Limited
1932-1937	Charles Caminiti
1913-1932	Albert Octavius Harris (Grazier)
1899-1913	Sir Matthew Harris (Knight)

Table 5 Summary of Proprietors – Lot 20 in Deposited Plan 803159 (part 2)

Year	Proprietor
2003 to date	Waterways Authority
1989-2003	Roads and Traffic Authority of New South Wales
1948-1989	Colonial Sugar Refining Company Limited
1938-1948	Cam and Sons Limited
1913-1938	Albert Octavius Harris (Grazier)
1899-1913	Sir Matthew Harris (Knight)

Table 6 Summary of Proprietors – Lot 19 in Deposited Plan 803159

Year	Proprietor
2003 to date	Waterways Authority
1989-2003	Roads and Traffic Authority of New South Wales
To 1989	Maritime Services Board

Leases identified for Lot 20 Part 1 are;

- 03.10.1899 (297541). To Gustav Augenson & Otto Romcke. Surrendered 09.05.1901 *(Part Marked (A) on D.P. 803159)*
- 09.05.1901 (322728). To Gustav Augenson & Otto Romcke. Expired 17.12.1929 *(Parts Marked (A & B) on D.P. 803159)*
- 08.08.1903 (369297) To Gustav Augenson & Otto Romcke. Surrendered 14.07.1927 *(Parts Marked (A & B) on D.P. 803159)*
- 14.07.1927. (B 541388). To Reginald George Todman & Dudley Edward Smith (Timber Merchants) Expired 04.08.1932 *(Parts Marked (A & B) on D.P. 803159)*

Leases identified for Lot 20 Part 2 are;

- 11.07.1901 (326175). To Allen Taylor & Robert Murray McCheyne Anderson. Expired 17.12.1929 *(Part Marked (F) on D.P. 803159)*
- 11.07.1901 (326177). To Allen Taylor & Robert Murray McCheyne Anderson. Expired 17.12.1929 *(Parts Marked (C, D & E) on D.P. 803159)*
- 14.11.1902. (353460). To Allen Taylor & Robert Murray McCheyne Anderson. Expired 18.10.1932 *(Parts Marked (C, D & E) on D.P. 803159)*
- 22.08.1932. (C 137518). To Allen Taylor and Company Limited. Excpired 13.06.1935 *(Parts Marked (C, D & part E) on D.P. 803159)*
- 22.08.1932. (C 137519). To Wallis Bros Limited. Expired 06.12.1938 *(Parts Marked (F & part E) on D.P. 803159)*
- 20.04.1935 (C 334806). To Wallis Bros Limited. Expired 06.12.1938 *(Parts Marked (F & part E) on D.P. 803159*
- 20.04.1935 (C 344807). To Allen Taylor and Company Limited. Expired 12.11.1937 *(Parts Marked (C, D & part E) on D.P. 803159)*
- 27.04.1936. (C 436016). To Wallis Bros Limited. Expired 06.12.1938 *(Parts Marked (F & part E) on D.P. 803159*
- 14.07.1937 (C 574001). To Allen Taylor and Company Limited. Expired prior to 27.06.1949 *(? Parts Marked (C, D & part E) on D.P. 803159)*

There were no leases identified from 08/07/1990 to date for Lot 19

Three easements are identified for both Lots 19 and 20 in March 2003;

- Easement for Electricity Purposes - 3 and 4.625m wide
- Easement for Drain Water - 3m wide
- Easement for Maintenance - variable width

During the 1970s to 1980s the previous elongated lots which fronted Blackwattle Bay were amalgamated to provide the current larger blocks/lots which are now present. This may explain the history of Lot 20 being in two parts.

5.6 Material Assessment Summary

A number of reference documents were identified which provide details on the subject site and regarding the history and background information of the Pyrmont Area and businesses surrounding Bank Street. See **Section 10** for a complete list of references used throughout this report.

5.6.1 The Subject Site

Reclamation

It is understood that Lots 19 and 20 both comprise reclaimed land. A report published by the City of Sydney Council, *Ecology of Pyrmont Peninsula*, stated that the area comprising Lot 20 was reclaimed during the mid 1870s-early 1890s.

No exact details of the early reclamation works at the site could be located. It was however common practice at the time to utilise dredged estuarine sediments and excess fill from industrial and residential development sites.

A paper published by the Sydney University Press (Birch 2006) describes the following reclamation practices for most of Port Jackson:

> *"The most common method used to undertake this reclamation was to construct a sea wall and infill behind the barrier using garbage waste, industrial waste and sediments removed from the floor of the adjacent estuary"*

This document also states that the composition of fill material varied by location and date of reclamation. It can be assumed that the environmental controls, if any, in place at this time would have provided little in the way of constraints with respect to the use of contaminated fill.

Lot 19 was reclaimed between 1989 and 1991 (as indicated by aerial photographs and title details) in order to facilitate the construction of the eastern support pylon for the Anzac Bridge. At this time it is unlikely that strict environmental controls as we know them today, with respect to the reuse of fill materials, were in place for the reclamation. It is however anticipated that the nature of the works would have required the imported fill to meet certain geotechnical parameters to allow placement to the required engineering specification. Consequently, it is unlikely that grossly contaminated material would have been used on site in this area and it is possible that clean, natural materials were imported. However, documents relating to the reclamation of this lot could not be identified and therefore, it is unknown whether there is a potential for contaminated fill to have been used to complete this work.

It has also been noted that the site has probably received further imported fill material between the time of the initial reclamation and present day, due to the postulated changes in operational ground level which are indicated from site observation and the aerial photographic record.

Ownership

It is understood that in the late 1800s the Pyrmont area was a thriving industrial suburb with a number of different industries supporting the growing population. The Colonial Sugar Refinery (CSR), who refined and manufactured sugar and sugar by-products, dominated the northern tip of the peninsula from 1875. CSR manufactured a long list of by-products, some of which included; caneite (1936), activated carbon, molasses and alcohol (industrial and domestic). The Sugar Cane used to make these products was shipped in from Queensland and deposited on the docks of Pyrmont.

The Historical Title data shows that CSR Ltd owned Lot 20 of DP 803159; part 1 from 1957-1989 and Part 2 from 1948-1989. The aerial imagery shows that during the time CSR owned the site there were lines of square objects present on the site. It is noted that the number of objects peaked during 1961 and steadily decreased until 1982 when the site location stood empty. It is probable that this area of land was used for storage and shipment of CSR products amd/or imported raw materials. It is noted that the large timber wharf which was attached to the site was removed some time between 1951 and 1961 which might indicate that requirement for shipping of material from/to this site had ceased. It has been stated within the 'Bank Street Master Plan' (2006 Maunsell/Aecom) that CSR, at one time, used the subject site to store Gypsum. Gypsum is a mineral used largely within building materials (plaster and 'Drywall') and the manufacture of plaster and cement. Perhaps less well known is the historic use of gypsum as a water conditioner within the brewing and sugar refining industries. Given that during the period of their occupation CSR, as well as refining sugar, was also involved in the processing and selling of building materials, there is clearly a potential for the material to have been stored at the site.

The Potato Marketing Board of Tasmania owned Part 1 or Lot 20 between 1955 and 1957. A search of the Archives Office of Tasmania states that this company was established in 1927 to promote the orderly and effective marketing of potatoes and performed the following two functions:

1 Primary industries: "supports the development, management and sustainability or agriculture, food and marine industries through research, testing, advice and marketing. Includes the management of quality assurance programs, regulation and licensing of products and producers and monitoring the use of chemicals, pesticides and veterinary medicines. Also includes quarantine services"

2 Trade: "Exports and imports of resources and manufactured goods. Regulation of industry protection and control of imports through customs services. Includes patenting of products and use of trademarks"

Cam and Sons Limited owned Lot 20 of Deposited Plan 803159, Part 1 between 1937 and 1955, and Part 2 between 1938 and 1948. It has been identified through internet sources that Cam and Sons Limited operated a successful trawling business along the NSW east coast, which included their site at Bank St, Pyrmont. It is likely at this time that the "L" shaped building present on Part 1 of the site was used as an office or as a storage facility and was demolished close to the time when Cam and Sons relinquished their ownership. It is also noted that Cam and Sons Limited's fleet all maintained coal powered engines, which lead to the company in 1936 (when their fleet totalled 5 ships) to obtain a coal mine at Aberfield. This coal was transported and stored for use on the ships.

It is understood from the listing of easements associated with Part 1 (A and B) of Lot 20 that during periods between 1927 and 1932, timber merchants (Allen Taylor and Company Limited) occupied this site. The aerial photographs do not indicate that a building was present for their use during occupation. It is probable that the occupation was associated with the export and import of timber and/or timber products. This may also include timber treatment (pesticides) on site or the storage of timber treatment chemicals.

5.6.2 Surrounding Areas

Colonial Sugar Refinery (CSR)

As previously mentioned, CSR owned most of the northern tip of the Pyrmont peninsula for much of the 20th Century. They manufactured a variety of products including sugar and sugarcane based products, building materials, carbon char and other carbon based products, alcohol and chemicals. The remaining areas of Pyrmont Peninsula were part of a growing industrial area. Development in this area was rapid and aggressive and, in its early years, focused on the movement of less desirable industries away from the growing city centre.

The Pyrmont Incinerator

The Pyrmont incinerator, which is located in the area directly east and above Lot 20 (Part 2) as shown, was built in 1936 and commissioned in 1937. The primary use for this site was as a garbage incinerator for commercial and residential waste. The incinerator was in use until 1971, when the site was left abandoned until it was demolished in 1992.

Incineration plants are known to be significant sources of historical contamination. It is well documented that the impacts of early incinerator plants extend beyond the boundaries of the sites they occupy. Contaminant transport is typically associated with ash and chemical emission deposition on adjacent land or migration of impacted groundwater down gradient from the site.

Table 7 shows a summary of risks associated with waste incineration.

Table 7 Summary of Contamination Risks associated with Waste Incineration

Practice	Definition / Possible Pollutants	Risk
Storage area for waste/garbage		If the waste was stored on site there is a risk that leachate could enter the groundwater or soil
Bottom ash	Post-combustion waste residues and non-combusted materials, including heavy metals.	The risk associated with both types of ash is due to their storage and disposal. There is risk when the ash is being moved that contaminants may be released (either in gas or solid form) into the surrounding environment. It is estimated that approximately 97% of total dioxin emissions from an incinerator would be present in the ash
Fly ash	Particles captured in air filters (dioxins and heavy metals)	
Chemical emissions	Chemicals and pollutants emitted as waste from the incinerator stack after waste has been burned (PM10 particulate matter, volatile and semi-volatile organic compounds such as dioxins and PCBs)	Pollutants that are emitted into the atmosphere from an incinerator stack, as well as fugitive emissions, may be deposited on the ground near to the incinerator and so contaminate the local environment
Facility operational years	1937-1971	It is assumed that during the time when this facility was operational the environmental controls for waste facilities would not have been as strict as they are today. This would lead to unregulated emissions and fewer control measures on waste accepted. The risk of contamination is therefore increased.

Blackwattle Bay

As discussed through previous sections of this report, land surrounding Blackwattle Bay has seen a considerable degree of industrial impact since the area was first developed. In its earlier years a number of less desirable industries, such as abattoirs, were relocated to the area to lessen their impact on the growing population of Sydney itself to the east. During this period the Bay would have presented an obvious receptacle for waste water, garbage, sewage and general industrial waste. Historical references including the Sydney City Council Records, have documented significant pollution issues associated with the Bay.

Consequently, it is anticipated that the sediments of Blackwattle Bay have been significantly impacted by contaminants associated with the industrial past of the Pyrmont Peninsula.

5.7 WorkCover NSW Stores Chemical Information Database (SCID)

To complete a search of the Stored Chemical Information Database (SCID) and microfiche records by WorkCover NSW permission from the land owner is required.

As of 08 December 2011 this permission was not received, thus this search has not been completed in preparation of this report.

5.8 OEH Notices

A search of the Office of Environment and Heritage Contaminated Land Record website on 7 October 2011 indicated that there were no notices issued for the subject site under the *Contaminated Land Management Act 1997.* However, 7 prior notices were identified to have been issued for the Pyrmont Power Station (See **Appendix E**), located on Pyrmont St. The most recent of these notices was issued in May, 1994. It is stated within the notice that:

> *"The EPA is satisfied that Pacific Power has carried out the studies, remedial action and validation work in relation to the Premises in accordance with all the requirements of the EPA in relation to proposal and documents submitted to the EPA by Pacific Power."*

It is also noted that the EPA revoked Notices 1 through 6 on the grounds that the contaminant was to be removed from the site.

A search of the EPA Licences, applications and notices register for the Pyrmont area under the *Protection of the Environment Operations Act 1997* on the 07 October 2011 indicated that there were no active licences pertaining to the site or the surrounding areas (See **Appendix E**).

Three previous licences were identified as being held in surrounding locations:

- Bovis Lend Lease Pty Ltd, Bowman St: Surrendered
- Hymix Australia Pty Ltd, Bank St: No longer in force
- Sydney Harbour Casino Properties Pty Ltd, Pyrmont St: Surrendered

6 AREAS OF ENVIRONMENTAL CONCERN / POTENTIAL CONTAMINANTS OF CONCERN

The site was considered to contain a number of potential Areas of Environmental Concern (AEC) which have been split into two categories for the purpose of this assessment; Site Derived Sources and External Sources. The potential sources of contamination or impacts associated with these AECs are listed below:

Site Derived Sources

- Reclaimed land and associated fill materials of unknown quantity and composition:
  - Original reclaimed land used for Lot 20 Parts 1 and 2
  - The land associated with the Anzac Bridge Works (Lot 19)
- Fill of unknown quantity and composition used to create the variations in working ground level during site history.
- Impacts from the site usage on the various floor levels associated with the above variations in working ground levels
- Although not actually a source of contamination, it was noted in our site visit that the RTA compound works involved removing fill material from an excavation in the vicinity of the Bridge Pier on Lot 20 and relocating it beneath proposed hard standing areas on the upper area. (See Photos 2, 6 and 10) This excavation was noted to be largely in fill materials which may have been impacted by previous site usage. During the site meeting the supervising engineer was questioned with respect to whether a contamination assessment had been carried out and SLR was assured that it had been. Subsequent research has established that two reports were referenced in Aurecon's Review of Environmental Factors for the RTA works. These reports were the June 2010 Noel Arnold Report and the RCA Australia Report from June 2011. The first report only sampled at shallow depth and not in the vicinity of the RTA excavation. The second report had some limited deeper sampling which was supposed to target areas of proposed deeper excavation. It was noted that the northernmost access ramp and the some of the elevator pit materials were not investigated. Both reports indicated the presence of PAH contamination in the fill materials. Although not deemed to be a significant health risk for a site which was to receive a bituminous capping layer, it should be assumed that any contamination that may have been present in the cut area is now distributed at shallow depth over some areas of the upper part of the site.
- Previous known occupiers undertaking **unknown** activities primarily Wallis Bros Limited

In the context of the area and the location of the site it is likely that the above mentioned companies may have been involved in industry and/or the import/export of goods. However, this cannot be confirmed without further information.

- Previous known occupiers undertaking **known** activities;
  - Colonial Sugar Refinery: Gypsum and possibly building materials were stored on site potentially along with sugar refining raw materials
  - Cam and Sons Limited: it is likely, due to the trawling activities of this company that fish and fish products would have been stored and moved across the site. It is also possible that boat maintenance was carried out on site. Coal was also possibly loaded onto the site for use as fuel for the vessels, which may have been transferred onto the site.
  - Timber Merchants (including Allen Taylor and Company Limited): it is possible that timber (treated/untreated) was stored or moved across the site. Potentially site usage may also have involved the treatment of timber or the storage of timber treatment chemicals
- The demolition of the 'L' shaped building which was removed from the site at some point between 1961 and 1971. Given the age of the building there is potential for hazardous building materials to have existed within the building fabric such as Asbestos Containing Materials (ACM's) or lead paint as is frequently found in the Sydney area.

Potential External Sources

- The CSR industrial site operations up gradient from the subject site
- The operations of proximal businesses on the Pyrmont Peninsula, particularly those adjacent or up gradient, given the industrial nature of the area
- The Pyrmont Incinerator which is known to be active north of the site between 1937 and 1971

Table 8 below shows a summary of potentially contaminating activities identified on site.

Table 8 Summary of Potentially Contaminating Activities

Potentially contaminating Activity	Sub Component / Description	Likelihood of Contamination	Potential Chemicals of Concern
Reclamation of land and the use of fill of unknown quantities and composition	Potential contamination of soils and possibly ground water	Moderate to high likelihood of contamination	TPH, PAH, Phenolic Compounds and Heavy Metals, and asbestos
Fill of unknown quantities and composition used to create the various working ground levels during the sites history	Potential contamination of soils and possibly ground water	Moderate likelihood of contamination	TPH, PAH, Phenolic Compounds and Heavy Metals, pesticides and herbicides, PCBs and asbestos
Recent RTA activities where it was noted that soil/fill was being removed from excavations adjacent to bridge pier and being re-deposited on the site	Potential contaminants described above may have been redeposited	Moderate likelihood of contamination	TPH and PAH
Previous known site occupiers undertaking known activities and the potential impact on	Colonial Sugar Refinery	Low to moderate likelihood of contamination	Gypsum, PAH, phenolic compounds, pesticides and herbicides
	Cam and Sons Limited	Low to Moderate likelihood of contamination	TPH, PAH, pesticides and herbicides, phenolic compounds, biological and other chemicals associated with cleaning
	Timber Merchants	Low to moderate likelihood of contamination	pesticides and herbicides, biological, heavy metals, borax, creosols
The potential impact of the removal of the 'L' shaped building on Lot 20	The potential contamination which may have occurred during the demolition of the building	Moderate likelihood of contamination	Asbestos, heavy metals, PCB,
The adjacent CSR industrial site operations and other Pyrmont peninsula industrial operations up gradient from the site			BTEX, PAH, Phenolic Compounds and Heavy Metals, pesticides and herbicides TPH, Biological, Ethanol, and other chemicals associated with cleaning
Historical peninsula and Glebe area industrial operations			TPH, PAH, Phenolic Compounds, Heavy metals and biological/organic detritus
The Pyrmont Incinerator which was known to operate north of the site between 1937 and	The potential residual impacts from airborne and groundwater borne	Moderate likelihood of contamination	PAH, Heavy Metals, Asbestos, TPHs, Dioxins

Potentially contaminating Activity	Sub Component / Description	Likelihood of Contamination	Potential Chemicals of Concern
1971.	contaminants		

It should be emphasised that **Table 8** does not indicate or imply financial risks associated with AEC's in the event contamination is actually or potentially present. **Table 8** is intended to present qualitative information of the probability of such contamination at the PAEC based on the findings gathered from the investigation

Table 9 Potential Contaminant Description

TPHs	Total Petroleum Hydrocarbons	**Heavy Metals**	Generally inclusive of arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes	**OCPs**	Organochlorine Pesticides
PAH	Polycyclic Aromatic Hydrocarbons	**PCB**	Polychlorinated Biphenyls
Asbestos	Generally inclusive of Amosite, Chrysotile and/or Crocidolite	**DDT**	Dichlorodiphenyldichloroethylene
Chemicals/ pesticides	Chloropyrifos Endosulfan etc.	**Fertilisers**	

With reference to the *Contaminated Sites Guidelines for the NSW Site Auditor Scheme* (DEC, 2006), the presence of the below contaminants of concern, at elevated levels, would be considered a requirement for assessment

- Heavy metals (total concentrations), inclusive of arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc.
- Total petroleum hydrocarbons (TPH).
- Benzene, toluene, ethylbenzene and xylenes (BTEX).
- Polycyclic aromatic hydrocarbons (total concentrations) (PAH).
- Organochlorine pesticides (OCP).
- Polychlorinated biphenyls (PCB).
- Asbestos.
- Dioxins and furans (PCDD/PCDF).

7 CONCLUSIONS AND RECOMMENDATIONS

It is a requirement of the Director General that an assessment of the potential impacts of contaminated land on the development is made, in accordance with the requirements of SEPP 55. The objective of this Stage 1 Preliminary Investigation was to identify any past or present contaminating activity, which may have impacted soils or groundwater on the site, as required in Section 3.4 of SEPP 55.

The work performed included a site history study and walkover inspection only and did not include any sampling or testing of soils. Without conducting a soil sampling and analysis program on the site it is not possible to verify the presence or absence of soil contamination.

The historical study carried out demonstrates that the site has potentially been impacted as a result of its own industrial legacy and as a function of its proximity to an area, which in past times, was heavily industrialised.

From the investigation information available it is understood that fill materials may extend up to 4m beneath the site. It is possible, given the potential sources, that contamination impacts could be present throughout the fill material, from the earliest material deposited during reclamation, through to the various levels of the site introduced as ground levels were manipulated during usage.

The proposed construction works are anticipated to involve disturbance of the soils, particularly during excavation to foundation level for the waterside structures. From the appraisal conducted there is a potential for contamination to have occurred in these soils.

Section 3.5.2 of SEPP 55 requires that where contaminating activities are suspected to have had an impact on the land, sampling and analysis will be required to confirm or support any conclusion reached from the site history appraisal. This would allow an initial assessment of any contamination to be established.

Contamination testing has already been carried out on site but at shallow depth in a few locations only. The level of soil investigation and testing noted to date would be insufficient to allow a full assessment of potential contamination, particularly at depth, in the areas to be developed. The investigations did however indicate that contamination (in the form of polycyclic aromatic and petroleum hydrocarbons) was present at elevated levels within shallow fill materials.

Consequently, in line with Section 3.5.2 of SEPP 55, it is recommended that a limited soil investigation is carried out in land areas which are likely to be disturbed by the proposed development. Such an investigation would establish the likelihood of encountering contaminated soil and groundwater during the construction works and the nature of any such impacts.

Should these investigative works indicate that that development area has not been significantly impacted by the potentially contaminating activities, this should provide sufficient information to satisfy the planning authority that the site is suitable for the proposed use.

Should elevated contaminant levels be encountered, which exceed the Health Investigation Levels prescribed for this development type, then a Stage 2 – Detailed Investigation will be required in accordance with Section 3.5.3 of SEPP 55. This investigation would seek to provide information on the extent and degree of contamination and an assessment of the risks posed by the contaminants to health and the environment.

It is understood that construction of the overwater elements of the proposed scheme may result in the disturbance of marine sediments adjacent to the site. Such sediments are likely to be impacted by the industrial heritage of the Blackwattle Bay area. These soils may also be Potentially Acid Sulphate. Given the potential impact on the existing bay water quality and ecological environment such disturbance may cause, it would normally be recommended that further investigation be carried out to assess the nature of the near shore sediments. It is understood from the client that this may not be possible. Hence, it is recommended that a construction methodology is selected which minimises sediment disturbance, results in little spoil generation at surface, allows for the impacts of potential chemical attack and is accompanied by appropriate control measures to protect the marine environment during the works. Such a methodology should incorporate a management plan for dealing with any acid sulphate soils encountered.

8 LIMITATIONS

The following information will assist in understanding the uncertainties relating to the interpretation of the data obtained during this investigation and the recommendations presented in the report, and help with assessment and interpretation of the report.

The services undertaken consist of a site history materials review and a site inspection, with the intention of providing a preliminary indication of likely contamination issues at the site.

SLR Consulting is not a professional quantity surveyor (QS) organisation. As such, any areas, volumes and tonnages or any other quantities noted in this report are only indicative estimates. The services of a professional QS organisation should be required if quantities are to be relied upon.

SLR Consulting assumes no responsibility for the quality or accuracy of data obtained from external sources, or for occurrences outside the scope of works defined in this report.

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Investigations are conducted in a conscientious and professional manner. The nature of the task, however, and the likely disproportion between any damage or loss which might arise from the work and any report prepared as a result and the cost of our services is such that SLR Consulting cannot guarantee that all issues of concern/contamination have been identified.

Thus while SLR Consulting carries out the work to the best of our ability, SLR Consulting totally excludes any loss or damages which may arise from services provided to the client or any other parties.

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9 CLOSURE

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Sydney Maritime Museum Ltd. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR Consulting.

SLR Consulting disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

10 REFERENCES

Allsopp M, et al (2001) 'Incineration and human health: State of knowledge of the impacts of waste incinerators on human health' *University of Exeter, UK* ISBN: 90-73361-69-9

Archaeological and Heritage Management Solutions (2011) Appendix B. 'Bank Street, Pyrmont, Statement of Heritage Impact', in Roads and Traffic Authority New South Wales (2011) *Anzac Bridge Construction Compound: Review of Environmental Factors*

Archives Office of Tasmania (2006), *Function details* viewed September 2011 http://search.archives.tas.gov.au/default.aspx?detail=1&type=F&id=20

Birch, G. (2006) 'A Short Geological and Environmental History of the Sydney estuary, Australia' *Sydney University Press:* http://hdl.handle.net/2123/2102

Broadbent, J. (unknown) *Transformations: Ecology of Pyrmont Peninsula 1788-2008* City of Sydney

Bureau of Agricultural Economics, (1949). *Bulletin No.5.The Australian potato industry*, Department of Commerce and Agriculture

Carver. S (2005) *Bank Street, Pyrmont Master Plan, Volume 2*. Maunsell/Aecom

City of Sydney Archives (2006) *Pyrmont Incinerator* Viewed in October 2011

Connell Wagner (NSW) Pty Ltd (1993). *Glebe Island Bridge Feasibility Study* Department of Planning

Department of Land and Water Conservation, NSW (2007) *Prospect/Parramatta Area,* Acid Sulphate Soil Risk Maps – Edition 2

Douglas Partners Pty Ltd (2008) *Marine Sediment Contamination Assessment*

Environmental Planning Section, Consulting Services Bureau. Department of Main Roads, NSW (1988) *Glebe Island Bridge Environmental Impact Statement*, viewed from the NSW Department of Library: Urban Affairs and Planning

Fitzgerald, S. (1992) *Sydney 1842-1992* Hale and Iremonger

Historical Atlas of Sydney (2009) *City of Sydney Archives, Digital Information* viewed September 2011 http://www.photosau.com.au/CoSMaps/scripts/home.asp

Kogevinas, M. (2001) 'Human health effects of dioxins: cancer, reproductive and endocrine system effects' *Human Reproduction Update*. Vol.7, No.3 pp. 331-339

Noel Arnold & Associates Pty Ltd (2010) *Soil Contamination Investigation*

RCA Australia (2011) *Limited Phase 2 Environmental Site Investigation*

RTA (pre-2003*) Geotechnical Investigation*

The Powerhouse Museum (2005) *Paradise Purgatory and Hellhole: A history of Pyrmont and Ultimo* viewed September 2011