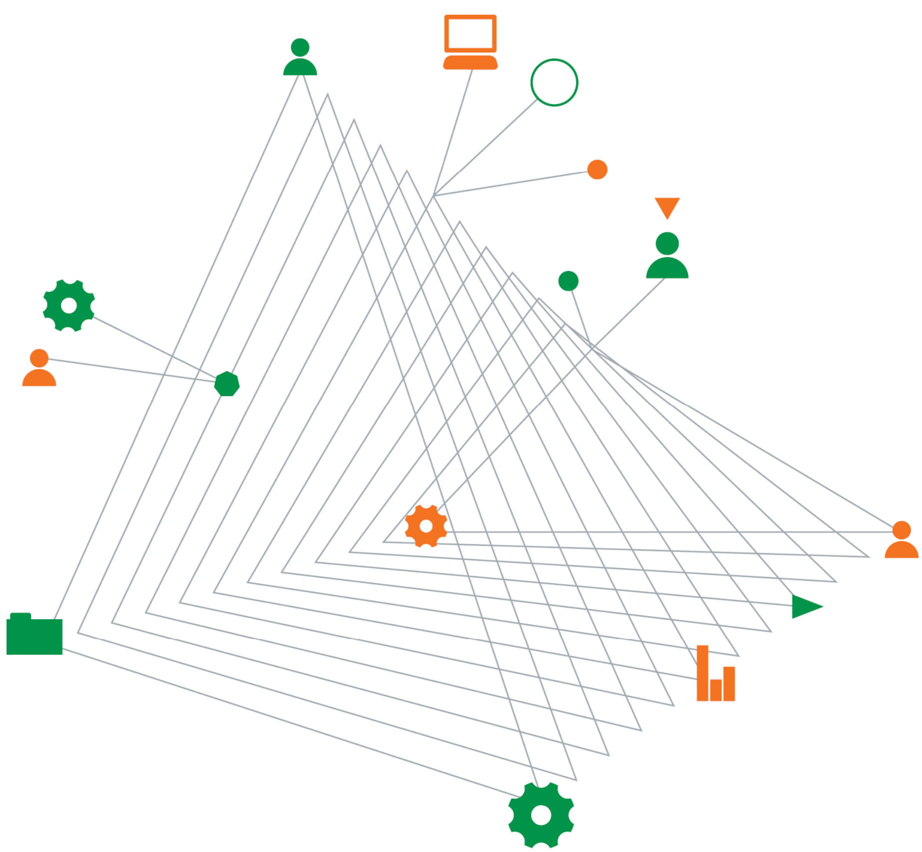
Art Gallery of NSW

Art Gallery of NSW Expansion Project – Sydney Modern

Stage 1 Preliminary Environmental Study

25 September 2017



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Art Gallery of NSW Expansion Project – Sydney Modern

Prepared for
Art Gallery of NSW

Prepared by
Coffey Geotechnics Pty Ltd
Level 19, Tower B, Citadel Towers, 799 Pacific Highway
Chatswood NSW 2067 Australia
t: +61 2 9406 1071 f: +61 2 9406 1002
ABN: 93 056 929 483

Project Director	Dr Michael Dunbavan (contamination) Senior Principal
Project Manager	Delfa Sarabia Senior Associate Engineer

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Quality information

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Revision	Description	Date	Author	Reviewer
Rev. 0	Remediation Action Plan	06/06/2016	Lewis Fogerty	Michael Dunbavan
Rev. 1	Revised RAP	1/08/2016	Damien Hendrickx	Michael Dunbavan
Rev. 2	Revised RAP	14/11/2016	Matthew Locke	Michael Dunbavan
Rev. 3	Revised RAP (update to certain design details)	25/09/2017	Matthew Locke	Michael Dunbavan

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Abbreviations

ACM	Asbestos Containing Material
AEC	Area of Environmental Concern
AGNSW	Art Gallery of New South Wales
AHD	Australian Height Datum
B(a)P	Benzo(a)pyrene
bgs	below ground surface
BH	Borehole
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
C6-C36	Hydrocarbon chain length fraction
COC	Chain of Custody
COPC	Chemical of potential concern
EIS	Environmental Impact Statement
Eurofins	Eurofins Environment Testing Australia Pty Ltd, trading as Eurofins MGT
HA	Hand Auger
IP	Interface Probe
LOR	Limit of Reporting
µg/L	micrograms per litre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
MW	Monitoring Well
NATA	National Association of Testing Authorities
NEPM	National Environment Protection (Assessment of Site Contamination) Measure
OCP	Organochlorine Pesticide
OPP	Organophosphorus Pesticide
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PES	Preliminary Environmental Study
PID	Photoionisation Detector
ppm	parts per million

QA	Quality Assurance
QC	Quality Control
RPD	Relative Percent Difference
SIL	Soil Investigation Level
SGS	SGS testing laboratories trading as SGS Australia Pty Limited
SOP	Standard Operating Procedures
TRH	Total Recoverable Hydrocarbons
UFP	Unexpected Finds Protocol

Executive summary

In 2014, Coffey Geotechnics Pty Ltd (Coffey) was commissioned by the Art Gallery of New South Wales (AGNSW) to undertake a Stage 1 Preliminary Environmental Study (PES) to support a preliminary design for the Art Gallery of New South Wales Expansion Project – Sydney Modern (the project). The project was subject to an international design competition so the design was unknown at that time. The proposed Expansion Area (the site) extends to the northeast from the current Art Gallery location, towards Lincoln Crescent, Woolloomooloo.

The preliminary design for the project was subsequently completed and in March 2016, AGNSW commissioned Coffey to undertake additional delineation assessment works in the vicinity of the previously identified contamination and revise the existing PES to support the Environmental Impact Statement (EIS). The requirement for a Remedial Action Plan (RAP) to remediate the previously identified contamination and demonstrate that the site can be made suitable for the proposed use, updated groundwater monitoring information and vapour assessment within fuel bunker forming part of the project, was also identified.

The former fuel bunker in the northeastern portion of the site (adjacent to Lincoln Crescent) was remediated in the late 1990s and a Site Audit was undertaken by AGC Woodward-Clyde (Woodward-Clyde, 1999). The Auditor indicated that the site (understood to be the former fuel bunker) was suitable for commercial / industrial use, subject to ongoing monitoring of groundwater to confirm that the source of oil had been substantially removed and subject to consideration of potential odours within the fuel bunker. The previous audit did not apply to the wider Expansion Area.

The Art Gallery of NSW proposes to undertake a major expansion of the existing art gallery adjacent to the Phillip Precinct of the Domain. The expansion, proposed as a separate, stand-alone building, is located north of the existing gallery, partly extending over the Eastern Distributor land bridge and includes a disused Navy fuel bunker located to the north east of this land bridge.

The new building comprises a new entry plaza, new exhibition spaces, shop, food and beverage facilities, visitor amenities, art research and education spaces, new roof terraces and landscaping and associated site works and infrastructure, including loading and service areas, services infrastructure and an ancillary seawater heat exchange system.

The proposed Expansion Area covers an area of approximately 3.9 hectares (Ha). Architectural drawings illustrating the proposed development are presented in Appendix A. Infrastructure associated with an underground / underwater seawater heat exchange system is also proposed to be constructed between the Expansion Area and Woolloomooloo Bay via Lincoln Crescent and land to the north.

As part of this Revised PES, Coffey undertook a desktop assessment, site walkover and limited soil sampling at six locations within the proposed Expansion Area (BH1, BH2 and BH4 to BH7). Soil sampling was undertaken in conjunction with a geotechnical investigation undertaken by Coffey (Coffey, 2017a) and selected soil samples were submitted for total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes (BTEX), polycyclic aromatic hydrocarbons (PAH), heavy metals (arsenic, cadmium, chromium, copper, lead, nickel, mercury and zinc), asbestos, organochlorine pesticides (OCP) and organophosphorus pesticides (OPP). Elevated concentrations of PAHs were recorded at two locations (BH2 and BH5) along with strong hydrocarbon odours. A concrete obstruction was also recorded in BH2.

A further six hand auger bores were excavated in 2016 (HA01 to HA05 and BH02) to delineate the previously identified contamination and to further assess the possible presence of a concrete slab previously recorded in BH2.

The results of the Revised Stage 1 PES identified the following potential sources of contamination at the site:

- Limited use of pesticides – low likelihood;
- Weathering of hazardous materials from current structures and uncontrolled demolition of site structures either currently or historically located on-site – low to moderate likelihood close to the

Art Gallery building and the former fuel bunker. If hazardous materials are identified by the hazardous materials surveys on the exterior of existing site building or structures then assessment of the likelihood of contamination of surrounding soils should be undertaken;

- Fill materials of unknown origin – moderate likelihood in localised areas which could be associated with construction of older roads such as Art Gallery Road and Art Gallery expansions.
- Former fuel bunker – whilst the Site Audit report undertaken by Woodward-Clyde (1999) confirmed the fuel bunker site is suitable for commercial/industrial use, the Audit was subject to conditions such as:

  - The requirement for ongoing groundwater monitoring, of which Coffey could find no information. Coffey has undertaken two groundwater monitoring events, one in 2014 and one in 2016 (refer to Appendix G). Although residual oil droplets / oil smearing was noted in one well (MW2) during both events, the concentrations were not indicative of the presence of separate phase hydrocarbons (oil) which may be migrating from the site.
  - Consideration of minor oil seeps that may occur from joints and bolt holes and potential odours from residual oil impregnated within the fuel bunker structure. Assessment of odours was undertaken by Hibbs (2016) and risks associated with odours within the fuel bunker from residual oil is considered to be low. Air conditioning and ventilation of the proposed Sydney Modern buildings would further reduce the likelihood of odour issues. Assessment of potential minor oil seeps will be assessed further once access to the interior of the fuel bunker is available. The assessment is discussed in the RAP (Coffey, 2017c) and the presence of minor oil seeps within the fuel bunker is unlikely to change the conclusions of this report.

  The potential for residual petroleum hydrocarbon vapours within the fuel bunker was also identified and has been assessed by Coffey.
- Former naval electrical substation to the north of the pump room – low likelihood of TRH and / or PCB contamination. Further assessment is proposed and is discussed further in the RAP (Coffey, 2017c).
- Soil sampling and laboratory analysis indicated an area of fill to the east of the Domain Tunnel and adjacent to Art gallery Road (in the vicinity of BH2 and BH4 on Figure 2) containing elevated concentrations of PAHs which are likely associated with coal or bitumen in the fill and strong hydrocarbon odours. Based on additional assessment and delineation works undertaken, the area containing elevated concentrations of PAHs and strong hydrocarbon odours appears to be localised. Based on the results and subject to leachate testing as part of future waste classification works, the majority of soils in this area would likely classify as General Solid Waste.

Evidence of other potential sources of contamination has not been identified.

With the exception of the potential sources of contamination noted above, the desktop study did not identify significant AECs or sources of contamination that would present a significant constraint to the proposed works, with respect to contamination. However, additional assessment and validation sampling is proposed, as outlined in the RAP, to confirm the absence of elevated concentrations of contamination in other areas of the site. It is noted that the majority of fill beneath the proposed locations of new buildings will be removed and disposed offsite as part of the construction works.

Avoidance, mitigation and management measures proposed to address potential issues and impacts are outlined in Section 11 of this report and include:

- Remediation of contaminated soils in the vicinity of BH2 and BH4 in accordance with an Auditor-endorsed RAP;
- Further assessment in areas of the site not previously investigated if those soils are to remain, are to be reused in other areas of the site or where subsurface excavation is required. This includes assessment of soils adjacent to existing building or structures if the hazardous materials surveys indicate the presence of hazardous materials on the exterior. Further assessment and validation requirements are outlined in the RAP (Coffey, 2017c);

- Review of GHDs previous assessment reports (as referenced in Woodward-Clyde (1999)), if available, to assess whether soils beneath and in the vicinity of the former Naval electrical substation (adjacent to the north of the pump room) were adequately assessed, and to confirm the absence of elevated concentrations of contamination;
- Construction works should be undertaken in accordance with a Construction Environmental Management Plan (CEMP) which includes requirements for dealing with unexpected finds;
- Soils should be segregated (to the extent practicable) based on their waste classification to minimise cross contamination or missing of soils;
- Soils to be imported to site must be suitable for use from a contamination perspective. Further information on requirements for imported soils are outlined in the RAP;
- Soils requiring disposal offsite must be disposed or recycled at an appropriately licensed waste facility;
- If localised seepages containing oily water are observed within or in the immediate vicinity of the fuel bunker during soil disturbance works then these will need to be managed and contained and either appropriately disposed at a liquid waste treatment facility or to Sydney Water sewer under a Trade Waste Consent. Odour impacts in the vicinity of seepages (if they occur) will also need to be managed so there is no noticeable odour at the boundary of the development site.
- Groundwater to be removed from excavations downgradient of the former fuel bunker must be assessed for the presence of contamination. Contaminated water must be appropriately managed to prevent discharge to stormwater and surface water receptors and disposal to a licenced liquid waste treatment facility;
- Works involving excavation of soils / sediments and / or dewatering of soils / sediments within Woolloomooloo Bay or Class 2 land (as marked on Sydney Local Environmental Plan 2012 map sheet ASS_021) must be undertaken in accordance with an Acid Sulfate Soil management Plan (ASSMP). Class 2 land is located beneath Lincoln Crescent and to the north, in the vicinity of the proposed seawater heat exchange infrastructure; and
- Visual assessment of the interior of the tank to confirm the absence of minor oil seeps from joints and bolt holes within the fuel bunker which may present a minor aesthetic issue.

Based on the information obtained as part of this Revised PES and in accordance with Clause 7 of SEPP55, Coffey consider that the site can be made suitable for the proposed art gallery development through remediation and validation in accordance with the RAP (Coffey, 2017c).

This report should be read in conjunction with the attached “Important Information about your Coffey Environmental Report”.

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Appendices

1. Introduction and background

Coffey Geotechnics Pty Ltd (Coffey) was commissioned in 2014 by the Art Gallery of New South Wales (AGNSW) to undertake a contamination assessment to support a preliminary design for the Art Gallery of New South Wales Expansion Project – Sydney Modern (the project). The Stage 1 Preliminary Environmental Study (PES) contamination assessment was undertaken prior to an international design competition associated with the new development. The proposed Expansion Area (the site) extends to the north and northeast from the current Art Gallery location, towards Lincoln Crescent in Woolloomooloo.

The PES identified concentrations of contamination in two locations to the north / northwest of the existing art gallery building (BH2 and BH4) that may present an unacceptable human health or ecological risk during future construction or for public open space or commercial use.

The preliminary design for the project was subsequently completed and in March 2016, AGNSW commissioned Coffey to undertake additional delineation assessment works in the vicinity of the previously identified contamination and revise the existing PES to support the Environmental Impact Statement (EIS). The requirement for a Remedial Action Plan (RAP) to remediate the previously identified contamination, updated groundwater monitoring information and vapour assessment within fuel bunker forming part of the project was also identified.

The proposed Expansion Area covers an area of approximately 3.9 hectares (Ha). Proposed development drawings are presented in Appendix A. Infrastructure associated with an underground / underwater seawater heat exchange system is also proposed to be constructed between the Expansion Area and Woolloomooloo Bay via Lincoln crescent and land to the north.

Coffey undertook this assessment in general accordance with the relevant sections of our proposal dated 14 April 2016 and revised this report in September 2017 at the request of AGNSW to include certain changes to detail of the proposed development.

The site location and site layout are shown in Figure 1 and Figure 2 respectively.

1.1. Proposed development

The Art Gallery of NSW proposes to undertake a major expansion of the existing art gallery adjacent to the Phillip Precinct of the Domain. The expansion, proposed as a separate, stand-alone building, is located north of the existing gallery, partly extending over the Eastern Distributor land bridge and includes a disused Navy fuel bunker located to the north east of this land bridge.

The new building comprises a new entry plaza, new exhibition spaces, shop, food and beverage facilities, visitor amenities, art research and education spaces, new roof terraces and landscaping and associated site works and infrastructure, including loading and service areas, services infrastructure and an ancillary seawater heat exchange system.

Development consent is sought for:

- Site preparation works, including:
  - Site clearing, including demolition of former substation, part of road surfaces, kerbs and traffic islands, pedestrian crossings, foot paths, retaining walls, stairs, and part of disused underground former Navy fuel bunker;
  - Tree removal;
  - Excavation and site earthworks;
  - Remediation works;

- Construction of the new building comprising:
  - Covered public entry plaza;
  - Five building levels, including entry pavilion following the site topography down to Lincoln Crescent;
  - Retention of part of existing former underground Navy fuel bunker for use as gallery space and support spaces;
  - Art exhibition spaces;
  - Outdoor publicly accessible terraces;
  - Shop and cafe;
  - Multipurpose space;
  - Education spaces;
  - Ground level loading dock (accessed via Lincoln Crescent) with associated art handling facilities, workshops, service parking, plant, and storage areas.
- Landscaping and public domain improvements including:
  - Continuation of the east-west pedestrian link over the land bridge between the Domain and Woolloomooloo Bay, including dedicated lift structure for universal access;
  - Improved public access of the north south pedestrian link
  - Enhancement of the public open space on the land bridge to create a landscape and art connection between the two buildings
  - Hard and soft landscaping to roofs and terraces;
  - Plantings and new pathways;
  - Increased landscaped area to forecourt of existing Art Gallery building and removal of car parking
  - Relocation of selected trees to the south-eastern corner of the site;
  - Sound barrier to edge of land bridge;
- Upgrade works to part of Art Gallery Road, Cowper Wharf Road, Mrs Macquaries Road, and Lincoln Crescent, including new pedestrian crossings;
- Provision of vehicle drop off points including a taxi stand, private vehicle drop off and bus/coach drop off, at Art Gallery Road;
- Installation of an ancillary seawater heat exchange system to act as the new building's cooling system, adjacent to and within Woolloomooloo Bay;
- Diversion, extension and augmentation of physical infrastructure and utilities as required.

Architectural drawings illustrating the above features are presented in Appendix A.

1.2. Planning requirements

Condition 8 of the Secretary's Environmental Assessment Requirements (SEARs) for the proposed development indicates that the Environmental Impact Statement (EIS) must address the following specific matters in relation to contamination:

- Demonstrate compliance with the requirements of SEPP 55.
- If remediation works are required, the EIS must include a Remedial Action Plan (RAP). The RAP must be prepared in accordance with the contaminated land planning guidelines under section 145C of the *Environmental Planning and Assessment Act 1979* and relevant guidelines produced or approved under section 105 of the *Contaminated Land Management Act 1997.*
- The RAP must be accompanied by a Site Audit Statement prepared by a NSW EPA accredited site auditor certifying that the site can be made suitable for the proposed use(s).

- Comply with relevant policies and guidelines including *Managing Land Contamination, Planning* Guidelines, *SEPP 55 - Remediation of Land 1998* and guidelines produced or approved under section 105 of the *Contaminated Land Management Act 1997*.

Condition 11 of the SEARs also indicates that potential odour impacts must be addressed (as wells as potential noise and air quality impacts), in particular during the construction and operation of the development, and appropriate mitigation measures must be addressed.

1.3. Objective

The objectives of the original PES were to:

- Undertake a preliminary assessment of potential site contamination and consider the likelihood of any unacceptable risk to human health or the environment for current and future site users; and
- Undertake a preliminary waste classification for soil disposal purposes from future sub-surface works.

The objectives of the additional works undertaken as part of this revised PES are to:

- Delineate the previously identified contamination in the vicinity of BH2 and BH4 to enable preparation of a RAP for the site (reported separately);
- Assess the presence of contamination in ambient air within the former fuel bunker that is included in the proposed development; and
- Assess potential issues, impacts and avoidance, mitigation and management measures associated with contamination and / or odours during the construction and operational stages of the development. This includes additional areas added to the extent of works (e.g. seawater heat exchange) which were not part of the proposed development at the time of the original PES.

The above information is required to support the EIS regarding contaminated land and SEPP 55.

1.4. Scope of works

To address the project objectives Coffey undertook a Stage 1 Preliminary Environmental Study (PES). The PES was carried out generally in accordance with the processes provided in the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (ASC NEPM, NEPC 1999, amended 2013), and included limited soil sampling and analysis across the site.

The assessment included:

- Review of the previous investigations undertaken within the former fuel bunker area to assess validity of conclusions given the elapsed time since those investigations and recent changes in contaminated sites guidelines. This included:
  - An assessment of whether the conduct of previous investigations are in general accordance with current guidelines made or endorsed under the NSW Contaminated Land Management Act 1997 (CLM Act) including, but not limited to, the:
    - Guidelines for Consultants Reporting on Contaminated Sites (NSW OEH, 2011)
    - Contaminated Sites Sampling Design Guidelines (NSW EPA, 1995)
    - National Environmental Protection (Assessment of Site Contamination) Measure (NEPC 1999, amended 2013)
    - Guidelines for the Assessment and Management of Groundwater Contamination (NSW DEC, 2007)
  - Identifying potential data gaps relevant to the current objective.

  - Undertaking a qualitative assessment of the implications of any data gaps and the contamination risks associated with data gaps

- A review, if practicable, of the previous subsurface investigations within the site, including the Gallery 1970 expansion and Eastern Distributor site investigations.
- Reference to relevant readily available information, including:
  - Local geology, hydrogeology and topography maps.
  - A selection of historical aerial photographs for the project area.
  - Dangerous goods records for the site held by SafeWork NSW.
  - Contaminated land declarations and notifications and environmental protection licence information in public registers held by the NSW Environment Protection Authority.
  - Reference to design drawings held by Roads and Maritime Services (RMS) relating to the design of the Eastern Distributor and any associated surrounding roads (where available).
- A site walkover, noting the environmental context, site features and other evidence that may indicate the potential for site contamination.
- Preliminary soil investigations which included:
  - Collection of soil samples from the 2014 geotechnical sample locations BH1, BH2 and BH4 to BH7.
  - Boring of six hand auger bores (HA01 to HA05 and BH02) and collection of soils samples in 2016 for delineation and further assessment purposes in the vicinity of BH2 and BH4.
  - Submission of representative soil samples for laboratory analysis of total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes (BTEX), polycyclic aromatic hydrocarbons (PAH), heavy metals (arsenic, cadmium, chromium, copper, lead, nickel, mercury and zinc), asbestos and / or organochlorine pesticides (OCP) and organophosphorus pesticides (OPP).
- Assessment of concentrations of volatile petroleum hydrocarbon contaminant vapours within the former fuel bunker using Radiello passive diffusive samplers.
- Preparation of this Stage 1 PES report, with reference to the architectural drawings provided and in general accordance with the relevant sections of NSW OEH 2011, 'Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites'.

2. Site identification and description

Site identification details are summarised below:

Table 2.1: Site Identification Details

Site Address	**Art Gallery Road, Sydney NSW 2000**
Total Site Area	Approximately 3.9 Ha as per the area presented in Appendix A, excluding the existing art gallery and the seawater heat exchange area in the vicinity of Lincoln Crescent and land to the north.
Title Identification Details	***Expansion Area:*** Part of Lot 34 of DP 39586 comprising Royal Botanic Garden and Domain Trust land to the north of Cahill Expressway, including the former fuel bunker.

	Lot 113, 115 of DP 1105308 and Part of Lot 107 and Lot 108 of DP 1105308, comprising part of Art Gallery Road on the land bridge and road reserve owned / managed by Roads and Maritime Services. Part of Lot 101 of DP 854472 comprising Royal Botanic Garden and Domain Trust land to the west and south of the existing gallery building. The development also includes Lot 102 of DP 854472 comprising the existing art gallery building to the south and southwest of Expansion Area. This area is excluded from this study because development works associated with the existing art gallery building comprise general upgrade works and do not include subsurface excavation or soil disturbance works. ***Seawater heat exchange site:*** Northern portion of Lincoln Crescent (no Lot / DP). SP57623 and SP57624 comprising the residential apartment building and between Lincoln Crescent and Woolloomooloo Bay and a small portion of Woolloomooloo Bay adjacent to the western wharves. Lot 51 of DP47732, Lot 35 of DP 39586, former Lot 7007 of DP 93650 to the north and northeast of Lincoln Crescent and part of Lot 9 of DP 1007565 comprising the eastern part of Woolloomooloo Bay.
Current Zoning	***Existing Art Gallery and Expansion Area:*** The existing art gallery and is zoned “B8 - Metropolitan Centre” while the proposed Expansion Area is zoned “RE1 – Public Recreation” and “SP2 – Classified Road” under the City of Sydney’s Sydney Local Environmental Plan 2012. ***Seawater heat exchange area:*** B4 - Mixed Use and RE1 – Public Recreation under the City of Sydney’s Sydney Local Environmental Plan 2012 and W6 - Scenic Waters Active Use (SREP (Sydney Harbour Catchment) 2005).
Current Site Use	***Existing Art Gallery and Expansion Area:*** Public art gallery and parkland ***Seawater heat exchange area:*** Road (Lincoln Crescent), public open space and marine (Woolloomooloo Bay).
Proposed Site Use	***Existing Art Gallery and Expansion Area:*** Public art gallery and parkland ***Seawater heat exchange area:*** Road (Lincoln Crescent), public open space and marine (Woolloomooloo Bay).
Adjoining Site Uses	North west: Art Gallery Road and Royal Botanic Garden beyond.

	North: Mrs Macquaries Road and Ausgrid substation. South west: Current Art Gallery and public parkland beyond. East: Lincoln Crescent, beyond which lie residential properties and commercial premises. South east: Cahill Expressway and Woolloomooloo) beyond.

The location and layout of the site is show in Figures 1 and 2 respectively.

2.1. Site features

A site walkover was conducted on 10 April 2014 and again on 27 April 2016 by an experienced Coffey environmental scientist. The site occupies the grassed area directly north/north-east of the gallery (above the Domain Tunnel section of the Eastern Distributor / Cahill Expressway), the landscaped area directly to the northeast to east of this and beyond this the grassed area above a former fuel bunker as well as Lincoln Crescent which bounds the bunker at the base.

A former bunker fuel tank site is located in the northeastern section of the proposed Expansion Area. The former fuel bunker site, which houses two bunker fuel tanks with an approximate combined capacity of 14,200 tonnes of fuel oil, is covered with grass apart from access hatches and ports within the grassed area. The northeastern side of the bunker fuel tank site consists of concrete steps down to Lincoln Crescent and an exposed sandstone cutting indicating the sandstone has been excavated to accommodate the bunker fuel tanks (this has also been confirmed through review of historical photos). Outcropping sandstone is also present at the southern end of the fuel bunker. No hydrocarbon staining was found on the steps and no oily sheen was apparent on seepage water that ran down from the side of the covered bunker or outcropping sandstone adjacent to Lincoln Crescent.

The site walkovers indicated no evidence of potentially contaminating activities having taken place in the area, nor were any signs of impact apparent (no staining, odour etc.). The vegetation appeared healthy in these areas, and no bare patches of soil were identified. Land use around the Art Gallery consists of roads and parkland.

Site photographs are presented in Appendix B.

3. Site setting

3.1. Topography and hydrology

The surface of the site and surrounding area slopes down towards Woolloomooloo Bay to the northeast of the site. Site survey information indicates that the site lies at an elevation of approximately 25m Australian Height Datum (AHD) in the southwest (west of existing art gallery) and approximately 2.5m AHD in the northeast (Lincoln Crescent).

The site generally slopes to the southeast from Art Gallery Road.

No surface water features are present at the site. The closest waterway to the site is Woolloomooloo Bay which is located approximately 80m to the northeast of the fuel bunker at its closest point. Woolloomooloo Bay is a part of Sydney Harbour.

3.2. Regional geology and soils

Review of the 1:100,000 Sydney Geological map indicates that the site is underlain by Hawkesbury Sandstone of the Wainamatta Group. Hawkesbury Sandstone is described as medium to coarse grained quartz sandstone with very minor shale and laminate lenses.

The Sydney 1:100,000 Soil Landscape Series Sheet 9130 (Soil Conservation Service of NSW, 1989) indicates that the site is in an area underlain by 'Gymea' soils which are typically associated with the rolling and low hills of Hawkesbury Sandstone. This is consistent with the findings of the geotechnical investigation (Coffey, 2017a).

3.3. Acid sulfate soils risk

A search for potential occurrence of Acid Sulfate Soils on the site was undertaken in April 2014 and May 2016 using the NSW Natural Resources Atlas (http://www.nratlas.nsw.gov.au), Acid Sulfate Soil Risk Map published by the Department of Land and Water Conservation (reference: Sheet 91 30N3, Prospect-Parramatta) and Acid Sulfate Soil Map published by City of Sydney Council as part of the Sydney Local Environmental Plan 2012 (reference: Sheet ASS_021).

The Acid Sulfate Soil Risk Map indicates that there is no known occurrence of acid sulfate soils (ASS) beneath the Expansion Area. The Expansion Area is marked as Class 5 land on the City of Sydney Acid Sulfate Soil Map. However, disturbed terrain at elevation 2-4m AHD (class X2) is located approximately 10m to the east of the Expansion Area (at its closest point; to the east of the fuel bunker) and within the proposed seawater heat exchange area. This land is marked Class 2 land on the Acid Sulfate Soil Map published by City of Sydney Council. The Acid Sulfate Soil Risk Map also indicates that there is a high likelihood of ASS being present within Woolloomooloo Bay to the east within sediments.

To assist AGNSW in project planning, Coffey has prepared a Preliminary Acid Sulfate Soil Management Plan (Ref. GEOTLCOV25037AC-R04 Rev2, dated 25 September 2017).

3.4. Regional hydrogeology

Based on the hydrology of the surrounding area, it is expected that regional groundwater would flow in a broadly northeasterly direction toward Woolloomooloo Bay.

A search of groundwater bore licences was undertaken in April 2014 using the NSW Natural Resources Atlas (http://www.nratlas.nsw.gov.au) and May 2016. The results of the search are presented in Appendix C and indicated that there are three registered groundwater bores within an approximately 1km radius of the site:

- GW112183 is located approximately 500m south (up gradient) of the site. This bore is licensed for monitoring purposes. The standing water level (SWL) and bore depth are unknown.
- GW107418 is located approximately 800m to the south-east of the site. This bore is licensed for domestic purposes and was installed in 2005. The SWL was recorded as 3.5 metres below ground surface (m bgs) and the bore depth is 11.5 m bgs.
- GW106471 is located approximately 600m to the east of the site. This bore is licensed for domestic purposes and was installed in 2004. The SWL is unknown however the bore depth is 2 m bgs.

4. Site history

The Art Gallery of NSW website (http://www.artgallery.nsw.gov.au/about-us/history/history-of-the-building/) states that the façade and old wing of the Gallery were originally built between 1896 and 1909.

Additional site history information is summarised in the following sections.

4.1. Aerial photographs

Selected current and historical aerial photographs of the site were obtained from the Land and Property Information Division of the NSW Department of Finance and Services for review and are summarised in Table 4.1. Additional historical images were also sourced from SIX Viewer (http://maps.six.nsw.gov.au) and Google Earth.

Table 4.1: Summary of Observations from Aerial Photographs

Year	Observations
1930	Art Gallery building is surrounded by trees and parkland. Woolloomooloo wharves are located to the east along with residential and commercial properties. The bunker fuel tank site is parkland.
1943 (SIX Viewer)	Art Gallery building has expanded to the east. An industrial complex seems to be located in the northern portion of the site and is associated with the wharves at Woolloomooloo. The detail on the bunker fuel tank site is of poor quality however the top of the bunker fuel tank site appears bare, and some possible buildings appear to be located around that area. The photo also indicates the possibility of operations associated with the bunker fuel tank extending towards Art Gallery Road.
1951	Art Gallery building appears to be similar. Land in the northern portion of the site has been cleared. Land in the surrounding areas including the bunker fuel tank site appears unchanged.
1961	The Cahill Expressway is under construction to the north and east of the Art Gallery building. Land has been cleared to the south for the construction of the Domain. The surrounding lands appear unchanged with the exception of the bunker fuel tank site which now appears to be grassed.
1978	A road has been constructed into the Royal Botanic Garden. Several warehouses to the east have been demolished. The Art Gallery building appears to have increased in size. The bunker fuel tank site appears unchanged.
1986	An extension to the Art Gallery is under construction. A car park has been constructed in vacant land to the east. No significant change to the surrounding lands, including the bunker fuel tank site, is visible.
1994	No significant change to the external appearance of the Art Gallery building and bunker fuel tank site or immediately surrounding area is visible.

Year	Observations
2002	No significant change to the external appearance of the Art Gallery building and bunker fuel tank site is visible. Land to the east has been developed into a garden and apartments.
2005 (Google Earth)	No significant change to the external appearance of the Art Gallery building and bunker fuel tank site or immediately surrounding area is visible.
2006 (Google Earth)	No significant change to the external appearance of the Art Gallery building and bunker fuel tank site or immediately surrounding area is visible.
2007 (Google Earth)	No significant change to the external appearance of the Art Gallery building and bunker fuel tank site or immediately surrounding area is visible.
2009 (Google Earth)	No significant change to the external appearance of the Art Gallery building and bunker fuel tank site or immediately surrounding area is visible
2012 (Google Earth)	No significant change to the external appearance of the Art Gallery building and bunker fuel tank site or immediately surrounding area is visible
2013 (Google Earth)	No significant change to the external appearance of the Art Gallery building and bunker fuel tank site or immediately surrounding area is visible

Selected aerial photographs are presented in Appendix D.

4.2. Land title certificates

Relevant land title certificates were reviewed to assess the current and historical ownership of the main site lots. Ownership information is summarised as follows:

Lot 101 DP 854472

- Prior to 1979 the lot was crown land. In 1979 the land was dedicated to the Royal Botanic Garden and Domain Trust and retains ownership to date.

Lot 34 DP 39586

- Prior to 1980 the lot was crown land. In 1980 the land was dedicated to the Royal Botanic Garden and Domain Trust and retains ownership to date.

Land title records are presented in Appendix E.

4.3. SafeWork NSW

A search of the Stored Chemical Information Database (SCID) and microfiche records held by Safework NSW (formerly NSW WorkCover Authority) was undertaken 1 May 2014.

The search did not identify license to store Dangerous Goods within the area defined as Lot 34 DP 39586 (area of the site containing the former fuel bunker).

Dangerous Goods documentation is presented in Appendix F.

4.4. Contaminated land register

The NSW Environment Protection Authority (EPA) Contaminated Land Record (http://www.epa.nsw.gov.au/prclmapp/searchregister.aspx) was accessed on 19 May 2016. The register indicated that there are currently no notices issued for the site or sites within a 500m radius under the NSW *Contaminated Land Management Act 1997*.

The list of NSW Contaminated Sites Notified to EPA (http://www.epa.nsw.gov.au/clm/publiclist.htm) was reviewed on 19 May 2016. The list indicated that the site has not been notified to the NSW EPA.

There is one notified site within a 500m radius of the Expansion Area which is the former BP service station located at 2 Dowling Street, Woolloomooloo. The record indicates that the contamination is being managed via the planning process (EP&A Act).

4.5. Other relevant information

4.5.1. General

The Domain Tunnel section of the Cahill Expressway divides the current location of the Art Gallery of NSW from the grassed fuel bunker site. The Cahill Expressway was built in two stages, the elevated section adjacent to Circular Quay was completed in 1958 and the Domain Tunnel section was completed in 1962 (source: http://history.cityofsydney.nsw.gov.au/sydneystreets/How_to_Build_a_Street/Cahill_Expressway/default.html). It is likely that fill was imported to site as part of the construction works, however it is reasonable to assume that as the works involved excavation into sandstone the majority of general fill material utilised in the construction was likely to have been locally sourced sandstone. RMS were contacted a number of times to provide plans of the Cahill Expressway design and construction however no further information could be obtained.

Coffey was provided with the following reports which relate to the former fuel bunker, located adjacent to Lincoln Crescent:

- Environmental & Earth Sciences (EES, 1996). Further Contamination Assessment of the Fuel Bunker at Woolloomooloo New South Wales
- AGC Woodward-Clyde Pty Ltd (Woodward-Clyde, 1999). Woolloomooloo Fuel Bunker Summary Audit Report. 14 April 1999.
- Hibbs & Associates Pty Limited (Hibbs, 2016). Former Garden Island Fuel Bunker – Preliminary Odour Assessment. 15 April 2016.

The Audit Report (AGC Woodward-Clyde, 1999) includes a review of the EES (1996) report, in addition to a number of other contamination assessments, as part of the requirements of the site audit.

The NSW EPA accredited auditor undertook a site audit in accordance with the definition in the Contaminated Land Management Act 1997. Therefore Coffey has not undertaken a detailed review of the EES report because findings of an expert review are presented in the Audit Report. Coffey referred to the Audit Report as a baseline for any significant changes to either the proposed land use or the endorsed guidelines since the audit was undertaken, and what implications this may have on the suitability of the site for future use.

4.5.2. Summary of Audit Report findings

An accredited Site Auditor from AGC Woodward-Clyde was appointed by the Department of Defence to undertake an audit of works related to the remediation of the fuel bunker, located adjacent to Lincoln Crescent, Woolloomooloo. The audit included all stages of assessment and the ultimate remediation of the fuel bunker site, for a proposed commercial/industrial end use.

At the time of the site audit the fuel bunker site was bounded by Lincoln Crescent to the east, Mrs Macquarie's Road to the northeast, the Cahill Expressway to the south and the Sydney Electricity City West Substation No. 1600 to the north.

The fuel bunker incorporates two concrete underground tanks which were constructed between 1938 and 1942 and designed to store approximately 14,200 tonnes of fuel oil as an emergency fuel supply for naval vessels during World War 2.

The Auditor reviewed the following reports:

- EES (1995) Contamination Assessment of the Fuel Bunker at Woolloomooloo New South Wales (not provided to Coffey)
- EES (1996) Further Contamination Assessment of the Fuel Bunker at Woolloomooloo New South Wales
- GHD (1997) Stage 1 Preliminary Site investigation, Woolloomooloo Fuel Bunker (not provided to Coffey.
- GHD (1998a) Woolloomooloo Fuel Bunker Detailed Investigation Progress Report A (not provided to Coffey)
- GHD (1998b) Woolloomooloo Fuel Bunker Stage 2 Detailed Site Investigation (not provided to Coffey)
- GHD (1999a) Woolloomooloo Fuel Bunker Remedial Action Plan (not provided to Coffey)
- GHD (1999b) Woolloomooloo Fuel Bunker Validation Report (not provided to Coffey)
- Beralon (1999a) Woolloomooloo Fuel Bunker Remedial Action Plan (not provided to Coffey)
- Beralon (1999b) Waste Disposal from the Domain Oil Tanks Remediation Stage C (not provided to Coffey)

The Auditor's report is referenced as:

- Woodward-Clyde (1999) Woolloomooloo Fuel Bunker Summary Audit Report. 14 April 1999. Reference DEF00038.

The Auditor's report included the following information and conclusions.

EES (1995) noted the presence of hydrocarbon impact in soil beneath the footpath of Lincoln Crescent, down-gradient from the bunker. The impacted soil was removed as part of the works undertaken by EES (1996). No other significant soil contamination was noted in the investigations undertaken (GHD, 1998b) and groundwater impact was limited to exceedances in concentrations of benzo(a)pyrene and total PAHs in wells directly down-gradient of the bunker, with groundwater impact not extending more than five meters from the edge of the tanks. The auditor was also satisfied that transportation of hydrocarbons in groundwater beneath Lincoln Crescent was not significant and did not present a significant risk of harm to human health or the environment, provided that the impact remained beneath the pavement.

Based on the history of the site the chemicals of potential concern (COPCs) identified in previous investigations were petroleum hydrocarbons including polycyclic aromatic hydrocarbons (PAHs) and monocyclic aromatic hydrocarbons such as benzene, toluene, ethylbenzene and xylenes (BTEX). Additionally the GHD investigations (summarised in the Auditor's report) stated that the oil product previously stored in the tanks comprises heavy hydrocarbon fractions and is readily distinguished through its odour, high viscosity and dark brown/black appearance. The oil adheres readily to surfaces.

A bunker inspection was undertaken in 1996 and the two tanks were noted to be generally in good condition with no evidence of major cracks or structural defects, however oil was observed to ooze from joints between the tank walls and along the bunker floor. Water ingress to the tanks was also identified through poor seals between walls and the bunker roof. bun

Based on the GHD investigation (GHD 1998b), summarised within the Auditor's report, the bunker site was characterised as follows:

- The fuel bunker is constructed of concrete within a former sandstone quarry.
- The concrete floors are bonded directly to the sandstone bedrock.
- The engineered drainage system within the structure contained a large volume of oil which had penetrated the floor of the fuel bunker through joints and along sealing strips. The oil was noted to be highly viscous, retarding migration.
- There had been some seepage of water from the fuel bunker to two locations along Lincoln Crescent, and minor oil was transported with the water seepage.
- Oil had penetrated joints in the floor and walls of the fuel bunker as well into bolt holes in the bases of the roof support columns and into imperfections in the concrete.

The remedial objectives for the site were to ensure the site was suitable for commercial/industrial use and ensure there were no unacceptable off-site impacts. To meet the remediation objectives removal of the oil within the sub-floor drainage system was deemed necessary as was a post-remediation groundwater monitoring regime. The Auditor concurred with the assessed COPCs, the site characterisation and the proposed remedial options. The Auditor further noted that aesthetics and odour would also need to be a consideration for future land use. Coffey consider that BTEX compounds are not associated with bunker fuel oil (other than at trace levels, if any), instead TRH and PAH would be the main COPCs (based on information in Testa and Winegardner, 1991).

The criteria for assessing the successful clean-up of the structure was to confirm no free oil remained inside the bunker, that residual oil was sealed into the fabric of the structure and that seepage of oil was not occurring from the walls, floor, columns or other parts of the structure. The criteria to show that clean-up of the structure was successful were qualitative and based on visual inspection of the bunker to show that oil was not entering the interior of the bunker. It was understood that residual amounts of oil would remain within the structure.

The criteria adopted for groundwater monitored as part of the post remediation program along the down-gradient boundary of the site was determined to be sufficient to protect off-site groundwater receptors in a commercial/industrial use.

The auditor concurred that the remedial objectives and criteria were appropriate and "that the investigation, assessments and remediation as detailed in the GHD's 1998 and 1999 reports had been thorough and performed to an acceptable level of competence such that they generally complied with the NSW EPA's requirements as stated in the relevant EPA technical policy documents.

On this basis the Auditor considered that the site was suitable for commercial/industrial use subject to:

- The land beneath the bunker (monitoring wells on Lincoln Crescent) requiring the on-going monitoring of groundwater to confirm that the source of oil has substantially been removed and will not provide a continuing source for off-site migration.
- The concrete building structure was considered suitable for commercial industrial use, notwithstanding that any occupier or proposed user would need to consider that minor seepage of oil from joints and boltholes may occur in the future. Odour from residual oil would also need to be considered and appropriate management procedures incorporated into any future development.

Coffey note that the Auditor's conclusions included above were made 15 years ago and consideration of the current structural integrity of the fuel bunker is being undertaken by others as part of the

Sydney Modern design. Coffey has also identified that assessment of hydrocarbon vapour should be undertaken (in accordance with current industry practice) to confirm the absence of elevated concentrations of petroleum hydrocarbons in ambient air within the fuel bunker. This was undertaken by Coffey and results are discussed in Section 9.2.2.

4.5.3. Hibbs (2016) odour assessment findings

The report indicates the following pertinent information:

- Accumulated water within the fuel bunker was sampled at four locations prior to discharge under a trade waste agreement. Reported concentrations of TRH, BTEX and PAHs were below the laboratory limit of reporting (LOR). Hibbs indicated that the water testing did not identify any contaminants at levels which would have presented an issue with regards to odour.
- The northern bunker was reported to be “self-ventilating to some extent”, although the means of ventilation was not described.
- No chemical odours were identified by Hibbs personnel at any stage during inspections into the north or south side of the former fuel bunker.
- Hibbs (2016) indicated that based on their assessment presented in the report, it is their professional opinion that the former fuel bunker at the time of inspection and testing did not present noticeable chemical odours.

Atmospheric testing was undertaken for confined space entry requirements only. Ambient air testing to assess residual chemical concentrations in the atmosphere within the fuel bunker has been undertaken by Coffey and the results are discussed in Section 9.2.2.

4.5.4. Identifying data gaps and recommendations

The proposed future use of the land as part of the Sydney Modern Project will include recreational/open space (parkland) and commercial use (Art Gallery building extension).

The former fuel bunker, assessed as part of the AGC Woodward-Clyde (1999) site audit, was considered suitable for commercial/industrial use. Soil and groundwater criteria used during the previous investigations undertaken by GHD and summarised in the AGC Woodward-Clyde (1999) Audit Report, was sourced from the NSW EPA Guidelines for Assessing Service Station Sites (1994). Based on a review of the aerial photographs the bunker fuel tank site was likely to have ceased operation sometime in the 1950’s and given the nature of the fuel (highly viscous oil) it is considered unlikely the contamination status of the bunker fuel site will have changed materially between when the site audit was undertaken and now. However, Coffey note the following data gaps which require further consideration:

- Previous investigations confirmed the structure of the bunker fuel tanks were in good condition, with only minor cracking in joints etc. providing pathways for oil seepage. However, the integrity of the structure may have deteriorated over time. The structural integrity of the bunker fuel tank site is outside of the scope of this contamination assessment and is being assessed by the structural engineering design team. Regardless of the condition of the structure, any future development would also need to consider possible oil seepage and odour, as per the Auditor’s conditions. This has been assessed and is discussed in Section 11.2.
- The previous Auditor’s site suitability statement (AGC Woodward-Clyde, 1999) was subject to the requirement for further groundwater monitoring to confirm that the remediation (removal of oil from the bunker fuel tank structure) was successful. Coffey have not been provided with any information regarding any post remediation groundwater monitoring. Coffey previously recommended that groundwater monitoring of the two off-site wells, located on the Lincoln Crescent side of the former fuel bunker, be undertaken to confirm that the original remediation works were successful and that notable offsite migration of oil is not occurring. This has been

assessed and is discussed in Coffey's groundwater monitoring reports presented in Appendix G and summarised in Section 12.

- The Auditor's site suitability statement was also subject to consideration of the potential for minor seepage of oil from joints and boltholes in the future and potential odour from residual oil. Odour assessment has been undertaken by Hibbs (2016) and assessment of concentrations of contaminants in ambient air has been undertaken by Coffey. These aspects are discussed in Sections 4.5.3 and 10.2.
- Based on the information provided to Coffey, the Site Audit and previous investigations appear to be limited to the former fuel bunker structure and do not address the wider Sydney Modern site.
- The building located adjacent to the north of the pump room (north of the former fuel bunker; refer to Figure 2) is understood to have previously been used as a Naval electrical substation. Plans included within the AGC Woodward-Clyde (1999) Audit report indicate that GHD's previous assessment works may have included assessment of soils within or in the vicinity of this building. A copy of GHD's previous report has been requested from AGNSW to confirm whether soils beneath the former electrical substation were adequately assessed. This is also discussed within the RAP (Coffey, 2016c).

4.6. Summary of site history

Based on a review of records available for this site, the Art Gallery building was originally constructed between 1896 and 1909 and has been extended several times since then. Our review of aerial photographs for the site indicated that the original structures still remain on site and the immediately adjacent land use has consistently been either parkland or roadways.

The Cahill Expressway was built in the late 1950s to early 1960s and likely involved the import of fill to assist with construction; however the origin of the fill is uncertain. Coffey consider that the majority of general fill material utilised during the expressway's construction is likely to have been locally derived from the excavation of sandstone along the expressway alignment. It is assumed that other road infrastructure within the area (Art Gallery Road) will have been constructed either during historical expansion of the Art Gallery or changes in landscaping. As such there is the potential for use of imported uncontrolled fill associated with the construction of older roads (such as Art Gallery Road). Impacts in uncontrolled fill may arise from the presence of asbestos containing material and/or ash from combustion of coal, or other contaminants.

With the exception of the former fuel bunker, the site history review did not identify any sources of contamination that would present a significant constraint to the proposed Sydney Modern Project, with respect to contamination. Based on the information provided in the Audit Report the fuel bunker would be considered suitable for either commercial/industrial use or recreational/open space use as long as the presence of residual oil and potential soil and groundwater hydrocarbon impact in the direct vicinity of the fuel bunker was considered in either the demolition or use of the fuel bunker structure. The fuel bunker is proposed to form part of the Sydney Modern building and further assessment of water within the bunker as well as odour and volatile hydrocarbon vapour considerations is discussed in Sections 4.5.3 and 12.

5. Potential areas of environmental concern and related chemicals

Based on the site history information and site observations several potentially contaminating activities/sources were noted along with the associated potential Areas of Environmental Concern (AECs) and Chemicals of potential Concern (COPCs). These are summarised in Table 5.1.

Table 5.1: Summary of Potentially Contaminating Activities, Potential Areas of Environmental Concern, Likelihood of Contamination and Potential Chemicals of Concern

Potentially Contaminating Activity/Source	Sub Component / Description	Potential Areas of Environmental Concern	Likelihood of Contamination*	Potential Chemicals of Concern
Garden maintenance	Possible use of pesticides	Contamination (if present) would typically be located in near surface soils. *Soil media potentially affected*	Low likelihood of soil contamination. Modern agricultural chemicals (i.e. dieldrin, heptachlor and DDT) are generally not persistent in the environment, that is, their predicted persistence is between five to 15 years (NSW EPA, 1995).	OCP, OPP and heavy metals
Uncontrolled Fill	Placement of fill materials of an unknown origin during previous site developments including construction of the Cahill Expressway and surrounding roads.	Contamination (if present) would typically be located in shallow surface soils. *Soil media potentially affected.*	Low likelihood of soil contamination. It is unknown if there has been any infilling as a result of the previous Art Gallery extensions. If so the proposed redevelopment of the site has little restriction to soil access and may result in an increased potential for exposure during construction. It is considered unlikely that fill imported to site as part of the Cahill Expressway construction would be exposed as part of the proposed Sydney Modern Project however the construction of roads such as Art Gallery Road may have resulted in infilling in the vicinity of road infrastructure. Based on when construction of the Cahill Expressway and other infrastructure in the project area was undertaken, there is potential that fill material which has been imported for use during this construction could have contained potential contaminants. However the likelihood that large volumes of fill was imported to the site from outside of the Cahill Expressway road construction area is considered to be low. The source of fill associated with the construction of older roads such as the Art Gallery Road is less certain and is considered a moderate risk.	Heavy metals, TRH, PAH, asbestos, BTEX, OCP and PCB. Potential aesthetic concerns also need to be considered.
Hazardous building materials	Weathering of hazardous building materials such as lead paint and fibre cement containing asbestos from former site structures Uncontrolled demolition of former site structures that may have contained hazardous materials	Near surface soils in the vicinity of former site structures *Soil media potentially affected.*	Low to moderate likelihood of soil contamination. The proposed redevelopment of the site has little restriction to soil access and may result in an increased potential for exposure during construction. It is difficult to determine from a review of aerial photographs whether any former site structures have been demolished which could have potentially impacted surface soils. Coffey understand that hazardous materials surveys are being undertaken to assess the presence, location and condition of hazardous materials which may require management or removal. If hazardous materials are identified on the exterior of existing site	Heavy metals (including copper, zinc and lead) and asbestos

Potentially Contaminating Activity/Source	Sub Component / Description	Potential Areas of Environmental Concern	Likelihood of Contamination*	Potential Chemicals of Concern
			building or structures then assessment of the likelihood of contamination of surrounding soils should be undertaken. Any proposed removal of hazardous building materials will need to be undertaken in accordance with relevant codes of practice and standards to limit the possibility of contamination to surface soils.	
Presence of fuel bunker	Seepage of oil from bunker through joints in walls and floor	Near surface soils in the vicinity of former site structures, namely soils beneath the footpath of Lincoln Crescent. Groundwater beneath Lincoln Crescent, downgradient from the bunker. *Soil media potentially affected.*	Moderate likelihood of soil and groundwater contamination. The proposed redevelopment of the site has little restriction to soil access and may result in an increased potential for exposure during construction. Groundwater was assessed in previous investigations to be present at the bunker/sandstone rock interface to approximately two metres below the level of Lincoln Crescent. The risk of exposure to contaminated soil and/or groundwater in the vicinity of the former fuel bunker will be limited after completion of construction works (based on the current design). However, contaminated soils and/or groundwater may potentially be encountered in the vicinity of the fuel bunker and offsite (between Lincoln Crescent and Woolloomooloo Bay) during construction works.	TRH, PAH
	Elevated concentrations of contaminants in ambient air within fuel bunker	Ambient air within fuel bunker	Moderate likelihood due to potential for residual oil impregnated within bunker but limited volatility of bunker oil.	TRH, BTEX, Naphthalene
Former Naval electrical substation	Potential leakage or spillage of oils from electrical equipment	Near surface soils in vicinity of former Naval electrical substation (adjacent to north of pump room)	Low likelihood based on presence of hardstanding surfaces within the former electrical substation and likely limited volume of oil storage.	TRH, PCBs

Notes:

* *It is important to note that this is not an assessment of financial risk associated with the AECs in the event contamination is detected, but a qualitative assessment of the probability of contamination being detected at the potential AECs, based on the site history study and field observations.*

TRH = Total Recoverable Hydrocarbons; BTEX = Benzene, Toluene, Ethylbenzene, Xylene; PAH = Polycyclic Aromatic Hydrocarbons; Heavy Metals = arsenic, cadmium, chromium, copper, lead, nickel, mercury, zinc; OCP = Organochlorine Pesticides; Organophosphorus Pesticides = OPP; VHC = Volatile Halogenated Compounds, PCBs = Polychlorinated Biphenyl.

6. Soil investigation and ambient air sampling

6.1. General

A preliminary environmental investigation was undertaken in conjunction with the geotechnical investigation undertaken by Coffey between the 8 and 24 April 2014 (ref Coffey, 2017b). Soil was sampled for chemical analysis at six geotechnical borehole locations (BH1, BH2, BH4 to BH7) located across three areas of the site (adjacent to the current Art Gallery and to the north and south of the fuel bunker). Further soil assessment comprising the boring of six hand augers was undertaken on 29 April 2016 to delineate soil contamination identified in BH2 and BH4 (bored in in 2014) and to investigate the presence of a suspected concrete slab encountered during drilling of BH2 (2014[1]).

The aim of the soil sampling was to screen soils for COPCs identified in Table 5.1 in areas where future sub-surface works are proposed and to delineate the previously identified contamination. As outlined in the RAP, further assessment and validation is proposed as part of future site works to confirm the absence of contamination in other areas of the site, in accordance with the Sampling Design Guidelines (NSW EPA, 1995) and the Guidelines for the NSW Site Auditor Scheme (NSW DEC, 2006).

The aim of the ambient air sampling was to assess concentrations (if any) of volatile petroleum hydrocarbon contamination in the ambient air inside the former fuel bunker.

6.2. Investigation and sampling methodology

The investigation and soil and ambient air sampling methodology is outlined in Table 6.1. Groundwater sampling methodology is described in the reports included in Appendix G.

Table 6.1: Summary of Sampling Locations and Methodologies

Activity	Details
Sampling Locations	Nine boreholes (BH1 to BH8 and BH2A) were drilled as part of the geotechnical scope of investigation in 2014. Six of these boreholes (BH1, BH2, BH4 to BH7) provided environmental soil samples. A further six hand auger locations (HA1 to HA5 and BH02) were subsequently bored and sampled in the vicinity of BH2 and BH4 for contamination delineation purposes. Borehole, hand auger and ambient air sampling locations are shown on Figure 2.
Soil Sampling	The majority of boreholes were drilled using a track mounted Drillcat, however BH01 and BH05 were drilled using a track mounted XC Drill, which is suitable for limited access locations. The boreholes were advanced in soils using solid flight augers with a Tungsten Carbide (TC) drill bit. For boreholes located on concrete paved areas a diatube was used to core the concrete prior to drilling. The

[1] One of the hand auger locations bored in 2016 was named BH02. The reference ‘2014’ or ‘2016’ has been appended to this assessment location name, where relevant, to indicate whether the referenced location was completed in 2014 or 2016.

Activity	Details
	boreholes were continued into the sandstone bedrock using NMLC coring. Grab samples were collected by hand from the hand auger.
Ambient air sampling	Ambient air within the former fuel bunker was assessed for concentrations of volatile petroleum hydrocarbon contaminants using Radiello ® passive-diffusive samplers and adsorbing cartridges. The adsorbing cartridges were unwrapped and removed from the glass tube onsite and installed in the diffusive body. The diffusive body was held vertically and screwed onto the supporting plate before being labelled and suspended from cord from the northern and southern fuel bunker hatches (refer to Figure 2 for locations). The samplers were suspended approximately 4m below the fuel bunker hatches for 13 days. The samplers were removed from the tanks at the end of the sampling period and the adsorbing cartridges were placed in the glass transportation tubes and transported to the laboratory.
Soil Logging	A Coffey practitioner directed the drilling, undertook the hand augering, recorded test results, sampled soils and logged the ground conditions encountered in each borehole or hand auger. Soil logging was carried out in general accordance with Coffey's relevant Standard Operating Procedure (SOP), which uses the Unified Soil Classification System. The borehole and hand auger logs are presented in Appendix H.
Soil Screening	A portion of the sample was placed inside a sealed plastic bag for soil headspace screening. Soil samples were screened for volatile organic compounds using a calibrated Photoionisation Detector (PID). The PID readings, together with other field observations (particularly odour and staining), were used to aid selection of soil samples for laboratory analysis.
Sample Handling and Transportation	Soil sample collection, storage and transport were in general accordance with the Coffey's relevant SOP. Soil samples were immediately placed into laboratory supplied jars, with Teflon lined seals and placed into an ice filled cooler box. Samples for asbestos analysis were placed in plastic ziplock bags. The samples were dispatched to Eurofins MGT and Envirolab, which are NATA accredited laboratories, under chain of custody control. Ambient air sample collection, storage and transport was in general accordance with Sigma-Aldrich (2006).
Decontamination of equipment	Sampling equipment for re-use was decontaminated with Decon 90 solution in potable water, and rinsed with potable water prior to use and between samples.
Disposal of soil cuttings	Soil cuttings from drilling were backfilled into the boreholes and hand auger holes.
Laboratory Analysis	Samples were scheduled for laboratory analytical suites comprising heavy metals, TRH, BTEX, PAH, OCP, OPP and/or asbestos. Primary and duplicate soil samples were analysed by Eurofins MGT, Lane Cove which is a NATA accredited laboratory for the analyses requested. The 2014 triplicate sample was analysed by Envirolab, Chatswood and the 2016 triplicate

Activity	Details
	sample was analysed by ALS Environmental in Smithfield which are also NATA accredited laboratories for the analyses requested. The ambient air sample absorbing cartridges were initially analysed by SGS Laboratories in Alexandria. The samples were subsequently analysed by SGS's Melbourne laboratory which is a NATA accredited laboratory for the analyses requested.

6.3. Quality Assurance / Quality Control

6.3.1. QA/QC indicators

QA/QC indicators are based on the assessment of field and laboratory quality control sample results, and in general accordance with AS 4482.1-2005 and Appendix C in Schedule B2 of the ASC NEPM (NEPC 1999, amended 2013). Indicators and associated control limits for field and laboratory QA/QC samples are listed in Table 6.2.

Table 6.2: QA/QC Indicators

Type of Quality Control Sample	Control Limit
Duplicate Samples	Relative Percent Difference (RPD) within 30% and 50%for inorganic and organic analytes respectively. Where the reported soil concentration was less than 10 times LOR, no limit applies.
Spikes	Recoveries within the following ranges: 70% - 130% for inorganics / metals 60% - 140% for organics
Trip Blanks and Equipment Rinsate Samples	Analytes not detected.

6.3.2. Field QA/QC

The primary sample/duplicate/triplicate combinations are summarised in Table 6.3.

Duplicate and triplicate sample results are provided in Table 6 at the end of this report, along with their calculated RPD values.

Table 6.3: Duplicate/Triplicate Samples

Primary Sample	Sample Type	Duplicate Sample	Triplicate Sample
BH7_0.5	Fill: Silty sand	QC1	QC2
BH1_0.5	Fill: Sand	QC8	QC9

HA05_0.5	Fill: Silty clay	DUP1	DUP1A

6.3.3. Duplicate and triplicate samples

Soil samples were submitted for analysis for a selection of the COPCs including heavy metals, TRH, BTEX, PAH, OCP, OPP and asbestos.

Two duplicate soil samples and two triplicate soil samples were analysed for QC purposes during the 2014 sampling, as outlined above. One duplicate and one triplicate samples were analysed as part of the 2016 delineation assessment.

Primary and QC sample results and calculated RPD values are listed in Table 6 at the end of this report. The majority of RPDs were below the control limits listed in Table 6.2 with the exception of RPD exceedances for metals and PAHs in BH7_0.5 and its duplicate and triplicate QC1 and QC2, BH1_0.5 and its triplicate QC9 and PAHs and TRH C_{10}-C_{36} in sample HA05_1.0m and duplicate sample SUP1. A review of the laboratory results indicated that the elevated RPDs recorded in this investigation are likely attributable to:

- Analyte concentrations close to the laboratory LOR (generally < 5 times LOR), which can exaggerate the RPD result. Acceptance targets for RPDs in the case where analyte concentrations are close to the LOR are not applied;
- One of the sample pairs reporting a detectable concentration, while the duplicate/triplicate sample reported a concentration below the laboratory LOR which resulted in an exaggerated percentage difference. This was noted to be relevant particularly for BTEX; and
- The heterogeneous nature of soils and uneven distribution of contaminants within the soil matrix.

6.3.4. Other field QA/QC

Three trip blanks (TB140407-3, TB140409-4 and TB0102653), two trip spikes (TS140409-4 and TS0102654) and three rinsate samples (QC3, QC7 and QC10) were included during the 2014 soil sampling. One trip blank and one trip spike were included during the 2016 sampling.

A rinsate sample was also collected from the hand auger during the 2016 sampling and was placed on ‘hold’ pending the result of the laboratory analysis. The hand auger was decontaminated between locations and given the low likelihood of cross contamination based on observation of field conditions, the rinsate sample was not analysed.

The results of the laboratory analysis indicated the following:

- The trip blank samples included in the soil sampling program reported concentrations less than the laboratory LOR, indicating no external impacts on the samples.
- The trip spike samples included in the soil sampling program reported percent recoveries within the acceptable range, indicating no apparent effects on volatile compounds from sample storage and transport.
- Two of the rinsate samples collected during the 2014 soil sampling program reported concentrations less than the laboratory LOR, indicating no cross-contamination as a result of equipment decontamination methods employed. One rinsate sample (QC3) collected on the 8 April 2014 reported a zinc concentration above the laboratory limit of reporting (LOR). Based on the concentrations of zinc in soil samples at the site being generally below 50 mg/kg it is considered unlikely that the zinc concentration in the rinsate sample is a result of inadequate decontamination. The other possible source is the deionised water used to rinse the equipment. Zinc concentrations in deionised water can be present as a result of leaching from the plastic caps on the sample bottles or gloves. This can occur under acidic conditions and can be seen at levels up to 50 µg/L. Based on the presence of zinc in the rinsate blank a review of Coffey’s field

procedures was completed to determine the potential for cross-contamination and the following was noted:

- QC3 was collected at the end of the day after decontamination of the hand auger.
- The deionised water collected for the rinsate samples was used for the final rinse on the equipment between sampling locations.
- Coffey considers there to be no potential for material cross-contamination between the affected water and the sampling locations given the negligible quantity of water on the equipment that could have been transferred to other sampling locations.

Field QA/QC results are presented in Table 5 at the end of this report.

6.3.5. Laboratory QA/QC

In accordance with NATA accreditation requirements, the project laboratories performed an internal QA/QC assessment. The assessment is typically described as a multi-level approach whereby standard laboratory control procedures are implemented, including laboratory duplicates, method blanks, matrix spikes and surrogate spikes.

Laboratory QC analytical results for soil are summarised below:

- Laboratory analysis of samples was undertaken by NATA accredited environmental laboratories.
- The laboratory confirmed that samples were received in an insulated container where the attempt to chill was evident.
- Samples were placed in appropriate sample containers with Teflon liners and minimal headspace for samples requested for analysis of volatile compounds.
- Samples were received, extracted and analysed within the appropriate holding time.
- No target analytes were detected in any of the method blanks.
- RPDs for laboratory duplicate soil samples were within the acceptable range for all samples.
- Percentage recovery results for laboratory control samples were within the acceptable range.
- Percentage recovery results for surrogate samples were within the acceptable range.
- Percentage recovery results for matrix spikes were within the acceptable range.

Laboratory QC analytical results for the ambient air sample are summarised below:

- Laboratory analysis of samples was undertaken by a NATA accredited environmental testing laboratory.
- RPDs for the laboratory duplicate sample were within the acceptable range.
- Percentage recovery results for the laboratory duplicate sample were within the acceptable range.
- Percentage recovery results for the matrix spike were within the acceptable range.

6.4. Data quality assessment

Based on an assessment of the field and laboratory QA/QC results, Coffey considers that the data obtained is generally representative of subsurface conditions at the sampling locations. Overall, it is assessed that the results are acceptable for the purposes of this investigation.

6.5. Analytical results

Soil analytical results are summarised in Tables 1 to 4 at the end of this report. Chain of custody records and certified laboratory reports, including ambient air sample results, are included in Appendix I and Appendix J respectively.

7. Groundwater assessment

As part of the site assessment works, Coffey assessed groundwater quality in two existing wells downgradient of the former fuel bunker and water within a sump in the former pump room (refer to Figure 2 for locations). These works have been reported separately and are included in Appendix G.

8. Site assessment criteria

8.1. Basis for assessment criteria

Assessment criteria were selected with consideration to the current and future recreational use as public open space, which results in criteria more conservative than those relevant to commercial land use. Assessment criteria for ambient air within the former fuel bunker were selected based on the proposed commercial use as part of the art gallery buildings.

These exposure scenarios are consistent with the zoning of the Art Gallery of NSW and proposed Sydney Modern project area (B8 – Metropolitan Centre, RE1 – Public Recreation and SP2 – Classified Road).

Additionally assessment criteria were selected with consideration of the proposed sub-surface works and potential for risk to the human health of future construction workers on the site.

8.2. Soil investigation levels

Coffey adopted applicable Soil Investigation Levels (SILs) from the following guidelines:

- ASC NEPM (NEPC 1999, amended 2013) Schedule B1 Guideline on Investigation Levels for Soil and Groundwater.

Schedule B1 of the ASC NEPM provides a framework for Tier 1 human and ecological risk assessment for petroleum hydrocarbons and other contaminants. The assessment process initially includes assessment against health screening levels (HSLs) followed by ecological investigation levels (EILs), ecological screening levels (ESLs), and then consideration of management limits for petroleum hydrocarbons.

8.2.1. Health investigation levels

Considering the proposed land use and zoning, Coffey considers the site should be assessed against Health-based Investigation Levels (HILs) from Columns C and D, Table 1A(1) in Schedule B1 of the ASC NEPM as follows:

- Recreational: Public open space such as parks, playgrounds, playing fields, secondary schools and footpaths.
- Commercial/Industrial: includes premises such as shops, offices, factories and industrial sites.

Petroleum hydrocarbons, as TRH, BTEX and naphthalene, will be assessed against the soil Health Screening Levels (HSLs) for vapour intrusion from the relevant depth and soil matrix applicable to commercial/industrial land use (HSL D) from Schedule B1 of the ASC NEPM as this is considered more appropriate than a comparison to HSLs for recreational land use which assumes no occupation of indoor space. Coffey notes that HSLs are dependent on soil consistency and depth of impact below the surface.

The nominated health criteria for soil impact analysis are included with the soil analytical results in Table 1.

8.2.2. Ecological investigation levels

Schedule B1 of the ASC NEPM also provides terrestrial ecological screening levels (ESLs) for three groups of land uses: areas of ecological significance, urban residential/public open space, and commercial/industrial. Based on the zoning and proposed land use the analytical results were compared to the urban residential and public open space levels as these are more conservative than the ESLs for commercial and industrial land use.

EILs were obtained using the ASC NEPM toolbox (http://www.scew.gov.au/node/941), taking into consideration site specific soil conditions (average pH of 8.15).

The nominated ecological criteria for soil assessment are included with the soil analytical results in Table 2.

8.2.3. Management limits

Due to the potential for exposure of workers to soil during the proposed sub-surface works soil results were also assessed against the management limits for petroleum hydrocarbon compounds for a commercial and industrial land use listed in Table 1 B(7) in Schedule B1 of the ASC NEPM. The management limits consider the following factors:

- Free phase formation.
- Exposure of workers in trenches to hydrocarbon vapours.
- Fire and explosive hazards.
- Effects on buried infrastructure.
- Aesthetic considerations.
- Technological factors.

The nominated management limits for soil impact analysis are included with the soil analytical results in Table 3 following the text.

8.3. Ambient air criteria

Coffey assessed the data obtained from the ambient air sampling inside the former fuel bunker against the target air concentrations corresponding to HSLs for commercial / industrial land use scenarios, contained in:

- CRC CARE Technical Report 10: health screening levels for petroleum hydrocarbons in soil and groundwater. Part 1: Technical development document. Appendix H – target air concentration (CRC CARE, 2011);

The target air concentrations are presented in Table H3 – Target air concentration corresponding to HSL commercial / industrial use scenario (HSL-D) in Appendix H of the document and are duplicated in Table 8.1.

Table 8.1: Ambient air HSL for commercial building (indoor air criteria)

Chemical	Health Screening Level (mg/m^3)
Benzene[1]	0.018
Toluene	23
Ethylbenzene[2]	5.9
Xylene	4
Naphthalene[2]	0.014
TRH C_6-C_{10}	3.2
TRH >C_{10}-C_{16}	2.3

Notes:

1. Ethylbenzene and naphthalene are Group 2B (possible carcinogens to humans) by IARC, however slope factors are yet to be published by US EPA ARIS and WHO. Therefore HSL is based on threshold endpoints and is subject to change in the future.

2. Based on incremental lifetime cancer risk above background exposure, and therefore air concentration, the benzene guideline applies to increase above background air concentration as a result of site contamination.

8.4. Waste classification for offsite disposal

The procedures for classifying waste are provided in the Waste Classification Guidelines Part 1: Classifying Waste (NSW EPA, 2014).

Following NSW EPA (2014), the steps for waste classification below must be applied in the order stated below. Once a waste classification has been established under a particular step, the next step is typically not required.

Step 1 – Is it special waste?

Step 2 – Is it liquid waste?

Step 3 – Is waste pre-classified?

- Hazardous waste;
- Restricted Solid Waste;
- General Solid Waste (Putrescible); or
- General Solid Waste (Non-Putrescible).

Step 4 – Does waste possess hazardous characteristics?

Step 5 – Waste Classification if waste not classified in steps 1 to 4.

A – Classification using specific contaminant concentration (SCC) only.

Material requiring disposal is classified by comparing analytical results of the material to threshold concentrations provided in NSW EPA (2014) for two different waste categories, namely general solid waste and restricted solid waste. The wastes which have concentrations above threshold values for restricted solid waste classify as hazardous waste. Based on the SCC alone (without leachability testing), the test value for each contaminant must be less than or equal to the contaminant threshold (CT) specified for that contaminant in Table 1 of NSW EPA, (2014). These threshold concentrations are significantly higher than would apply when leachability testing is undertaken.

- General Solid Waste ≤ CT1
- Restricted Solid Waste ≤ CT2

Where CT2 is exceeded a TCLP test will be necessary to determine leachable concentrations and class of waste.

B – Classifying using both the SCC test and TCLP.

For those wastes that are not classified into a waste category, NSW EPA (2014) provides threshold values for total concentrations and leachable concentrations based on TCLP test. These threshold levels are given for about 50 contaminants and groups of contaminants. For a waste to be classified under a given category, both total and leachable concentrations of the waste should meet the respective threshold concentrations.

- General Solid Waste ≤ CT1 and ≤ TCLP1
- Restricted Solid Waste ≤ CT2 and ≤ TCLP2
- Hazardous Waste > CT2 or >TCLP2

Step 6 – Is the waste putrescible or non-putrescible?

The nominated waste classification guideline levels are included with the soil analytical results in Table 4.

9. Results

9.1. Subsurface conditions

9.1.1. 2014 assessment

Coffey (2017a) indicates that subsurface conditions at the investigated locations generally comprise fill material overlying sandstone bedrock to the maximum depth of investigation (approximately 20 m below ground surface (bgs)).

Fill consisted of sand with silt and/or gravels and varied in thickness from 0.6 m to 3.2 m across the site. Glass, brick, concrete and tile fragments were observed in fill material at several locations. In addition, coal or coal-like gravels were observed in fill material in borehole BH2 between 1m and 1.5m and in BH4 between 1m and 1.25m. The field borehole log for BH1, located directly south of the bunker fuel tanks, noted the presence of oil stained sandstone gravels at 2.0 m.

The sandstone bedrock was generally slightly to moderately weathered and medium strength. Where bedding jointing or parting was encountered a more weathered, lower strength, iron stained sandstone was observed. The degree of weathering of sandstone decreases with increasing depth.

Groundwater was not observed during drilling however groundwater entered the bores overnight and was measured at depths below ground surface of between 8.3 m and 12 m bgs in boreholes BH04, BH06 and BH08.

Hydrocarbon odour was noted in borehole BH02 (at 1.1 m) and BH04 (1.0 to 1.5). Samples were screened for potential volatile hydrocarbon vapour using a PID. The PID readings were below 11 ppm, indicating that concentrations of volatile hydrocarbons were unlikely to be present in those samples. The presence of hydrocarbon odour and coal or coal-like gravels within some of the boreholes would indicate the presence of heavier end hydrocarbon contamination. Samples of soil from BH2, BH4, BH6 and BH7 that were sent to the laboratory for asbestos analysis were also described by the laboratory as containing “bitumen” or “bitumen-like material” which may be the same as the material described by Coffey as coal or coal-like material.

No ACM was observed in the environmental samples collected.

9.1.2. 2016 assessment

The hand auger delineation assessment locations bored in the vicinity of BH2 and BH4 encountered topsoil over sand fill or silty / sandy clay fill to between 0.4m and 0.8m bgs. Suspected natural soil comprising a band of yellow to red high plasticity clay underlain by weathered sandstone was also encountered in two of the locations (HA5 and BH2). Evidence of sandstone bedrock was encountered at all locations between 0.4m and 1.3m bgs.

A concrete obstruction was identified in BH02 during the 2014 assessment. However, a sixth hand auger named BH02 was bored in close proximity to the 2014 BH2 location as part of the 2016 delineation exercise. Sandstone was identified in the base of the bore at approximately 1.25m bgs, and no evidence of a concrete slab or other concrete structure was found. No visual or olfactory evidence of contamination was observed in hand auger boring BH02, which differed from hydrocarbon odours observed in BH2 in 2014.

The 2016 delineation assessment works found no evidence of a buried concrete slab or other potential sources of hydrocarbon contamination in the vicinity of BH2 (2014) and BH4. Assessment of historical photos and maps of the area showed that the area is located close to the land bridge crossing Cahill Expressway and review of photos taken during construction of the expressway and land bridge indicated that the area may have been used as a construction compound or materials storage area where there is potential for spillage or leakage from construction plant or temporary fuel storage. No other evidence of contamination sources has been identified. The presence of coal or bitumen within the samples is likely to be associated with fill from former roads that were previously present in the area.

Coffey understand that the former fuel bunker was filled from Woolloomooloo Bay via fuel pipes connected to the pump room at the northeastern end of the bunker. No evidence of fuel pipes or road tanker discharge activities has been identified in the vicinity of BH2 and BH4.

9.2. Laboratory results

9.2.1. Soils

Laboratory results for soil samples were compared to relevant assessment criteria are summarised in Table 1 to Table 3. Copies of the laboratory certificates of analysis are provided in Appendix J.

With reference to the health investigation levels, ecological investigation levels and management limits presented in Table 1 to Table 3 the following is noted:

- Concentrations of COPC were reported either below the adopted HILs and HSLs or below the LOR for the majority of primary samples collected except at locations:
  - BH2 (2014; 0.5m and 1.0m), BH4 (1.0m) and HA05 (1.0m) where Carcinogenic PAH concentrations (expressed as benzo(a)pyrene TEQ) were above the HIL for public open space;
  - BH04 (1.0m) where total PAH concentration was above the HILs for public open space
- TRH C_{16} – C_{34} concentration was above the Management Limit in BH4 (1.0m).
- TRH C_{16} – C_{34} concentrations were above the open space EIL in BH4 (1.0m) and BH06 (0.5m) as well as benzo(a)pyrene (BaP) in BH2 (2014; 0.5m and 1.0m), BH02 (2016; 0.5m), BH4 (1.0m) and HA05 (0.5m and 1.0m)
- No asbestos was detected in the fill samples collected from the 2014 boreholes and no asbestos was observed in the 2016 hand auger bores.

BH02 and BH04 are adjacent to Art Gallery Road and upslope of the former fuel bunker. Drilling at BH02 terminated on concrete and a very strong hydrocarbon odour was observed at 1m to 1.5m below the surface. The borehole log for BH02 notes the presence of concrete, which may have been associated with an underground service or concrete structure. The depth of fill at BH04 was 1.25m and a strong hydrocarbon odour was observed in the fill from 1m to 1.25m, immediately above sandstone bedrock.

The 2016 hand auger delineation did not identify the presence of a concrete slab / structure or hydrocarbon odours in any of the locations, including BH02 which was bored in the vicinity of the 2014 BH2 location. All of the hand auger locations were terminated on sandstone. The Ground Penetrating Radar (GPR) survey, undertaken during service clearance activities prior to boring of the hand augers, also found no evidence of an underground slab or similar structure.

Concentrations of PAHs and TRH in the delineation hand auger bores, including BH02 (2016), were generally low. Coffey consider that the elevated concentrations of PAHs and / or TRH at BH2 (2014), BH4 and HA5 is associated with the presence of coal or bitumen within the sampled soils for the following reasons:

- With the exception of HA5, coal or bitumen like materials were observed in these locations, either by Coffey during the fieldworks, or by the laboratory undertaken asbestos analysis;
- The ratio of heavier molecular weight PAHs relative to the total PAH concentrations is relatively high (typically 8-12% for benzo(a)pyrene). Conversely, the ratio of lighter molecular weight PAHs such as naphthalene, acenaphthylene and acenaphthene (where detected), relative to the total PAH concentration, is low or below the LOR. This suggests that the PAHs are associated with a source that has been subject to heating or combustion, such as coal or bitumen;
- Elevated PID readings were not recorded in the samples.

Table 1A(1) Schedule B1 of the ASC NEPM (health investigation levels for soil contaminants) indicates that “where the B(a)P occurs in bitumen fragments it is relatively immobile and does not represent a significant health risk”. The same is true for other PAH compounds and immobile PAHs also do not present a significant ecological risk due to their limited bioavailability. The recorded TRH concentrations (and observed hydrocarbon odour) are also likely to be immobile and associated with bitumen or coal within the soils.

Based on the above, the recorded concentrations of TRH and PAHs do not present an unacceptable health risk to future construction workers.

Coffey conclude that whilst concentrations of TRH and PAH were reported above the adopted criteria at several locations, these occurrences are likely to be associated with the presence of bitumen or coal material within fill and are immobile in nature. The recorded concentrations of TRH and PAHs therefore do not present an unacceptable risk to future users of the site, construction workers or ecological receptors.

However, localised remediation is necessary in the vicinity of BH2 and BH4 to remove fill material where strong hydrocarbon odours have been observed and coal and / or bitumen impacts.

9.2.2. Ambient air

The laboratory results for ambient air sampling are included in Appendix J. The results indicate concentrations of BTEX, naphthalene, TRH C_6-C_{10} and TRH >C_{10}-C_{16} well below the HSLs for commercial use.

9.2.3. Groundwater

Groundwater results were reported separately and copies of reports are provided in Appendix G.

9.3. Preliminary waste classification

Soil laboratory results were compared to the waste classification thresholds as summarised in Table 4. Copies of the laboratory certificates providing analytical results are provided in Appendix J.

The laboratory results for samples of fill material from five sampling locations indicated:

- Samples collected from BH1, BH5 and HA03 to HA05 meet the general solid waste (GSW) classification as the concentrations were detected below the respective CT1 threshold values (NSW EPA, 2014).
- Samples from BH06 and BH07, HA01, HA05 and BH02 (2016) exceed the general solid waste CT1 thresholds for lead and benzo(a)pyrene, however Coffey's experience in managing similar materials is that these concentrations would likely not exceed the thresholds with TCLP testing.
- Samples from BH02 (2014) and BH04 exceed the restricted solid waste CT2 thresholds for benzo(a)pyrene. Based on Coffey's experience and the fact that the B(a)P is likely associated with bitumen or coal in the fill, the recorded concentration in BH02 (2014) would likely not exceed the TCLP1 and SCC1 general solid waste thresholds with TCLP testing, and would therefore likely be classified as GSW.
- The recorded concentration of B(a)P in BH4 is above the SCC2 Restricted Solid Waste threshold. However, NSW EPA (2014) indicates that "asphalt waste (including asphalt resulting from road construction and waterproofing works)" is pre-classified as General Solid Waste. The B(a)P in the vicinity of BH4 is likely to be associated with asphalt waste due to former roads which used to intersect this area (refer to aerial photographs in Appendix D) and the presence of Art Gallery Road adjacent to the west. However, this should be reconfirmed during excavation works through visual observation of the material and testing to confirm that the B(a)P is not leachable.
- Based on Coffey's observations, the material is considered to be non-putrescible.

Excavated sandstone rock not impacted by bunker fuel or any other contamination, and not mixed with any other waste, may meet the VENM definition for potential onsite or offsite reuse, subject to further confirmation.

10. Issues and potential impacts

The risk of land contamination issues as a result of project construction and operation is discussed in this section. Refer to Section 1.1 for details regarding the proposed development construction and operation methodology.

Contaminated soils have been identified above sandstone bedrock in the vicinity of BH2 and BH4 to the north / northwest of the existing art gallery due to the presence of concentrations of PAHs and / or lead above investigation levels. Strong hydrocarbon odours were also observed in the fill in BH2 and BH4 during the 2014 assessment. Fill in other areas of the site may have similar localised impact from contamination and further assessment and validation is proposed in these areas prior to development.

10.1. Construction

Potential issues and impacts comprise:

- Contaminated soils could potentially be transported or transferred to other areas of the site or offsite through tracking of the soils with plant and equipment, generation of dust, transport via surface water runoff, accidental spillage or deliberate movement. This may result in cross contamination of other areas of the site and present a health risks to future site users or could enter Woolloomooloo Bay if the soils enter surface water drains, presenting a potential risk to aquatic ecosystems.
- Contaminated soils could potentially present a health risk to construction workers or members of the public if not adequately managed.
- Contaminated groundwater downgradient of the former fuel bunker (beneath Lincoln Crescent) could potentially present a health risk to construction workers or marine ecosystems in Woolloomooloo Bay if not adequately managed.
- Acid Sulfate Soil may be present beneath Lincoln Crescent, land to the north and Woolloomooloo Bay where excavation and possibly dewatering / excavation water removal works are proposed as part of construction of the seawater heat exchange system. This could result in generation of acid runoff which may result in adverse impacts to ecological receptors within Woolloomooloo Bay.
- Incorrect waste classification may occur if contaminated soils are not correctly segregated from uncontaminated or uncontaminated soils may need to be disposed as a higher waste classification resulting in additional costs.
- Odours could potentially be generated during excavation or stockpiling of the contaminated soils resulting in nuisance issues. Strong hydrocarbon odours were previously observed in fill materials in BH2 and BH4.

The risks are considered low to moderate due to the duration and the localised nature of the identified contamination. The potential for other areas of unidentified contamination exists, although the risk of a substantial volume of fill being impacted is low given the apparent absence of potential sources of contamination other than possible imported fill, and the likely limited thickness in remaining areas of the site (Cahill Expressway land bridge and soil cover over fuel bunker). However, this is to be assessed further prior to construction works as part of the RAP (Coffey, 2017c).

10.2. Operation

Operation activities include continued use of external areas of the site as public open space as well as occupation of the existing fuel bunker and new buildings for commercial use. Potential issues and impacts comprise:

- Soil contamination in the vicinity of BH2 and BH4, if not properly managed during construction, presents a potential health risk to future site users including members of the public and site workers including maintenance workers and / or gardeners. Persistent odours are unlikely to be generated from the recorded contaminant concentrations.
- There is the potential for minor oil seeps from joints and bolt holes within the fuel bunker which may present a minor aesthetic issue.
- If contaminated soils are not properly managed during construction of the seawater heat exchange construction works then these may present a potential risk to human health and / or ecological receptors in these areas.

Concentrations of contaminants have also been recorded above ecological assessment criteria in several locations. However, with the exception of BH2 (2014) and BH4, risks to ecological receptors are low based on the recorded concentrations and the apparent absence of vegetation stress.

Given the apparent absence of odours in the fuel bunker at the time of the Hibbs (2016) assessment, risks associated with odours within the fuel bunker from residual oil is considered to be low. This is further supported by the absence of elevated concentrations of petroleum hydrocarbon contamination in accumulated water within the fuel bunker (Hibbs, 2016) or elevated concentrations in ambient air sampling undertaken by Coffey. Air conditioning and ventilation of the proposed Sydney Modern buildings would further reduce the likelihood of odour issues. Ground disturbance around the concrete bunker during construction could upset the equilibrium of residual oil in sandstone, which may result in a short term local seepage and/or odour impact during construction works.

11. Avoidance, mitigation and management measures

This section outlines the avoidance, mitigation and management measures which will be implemented to lessen the impacts of the project during construction and operation.

11.1. Construction

It is recommended that the following measures be undertaken to ensure contamination impacts are effectively mitigated:

- Contaminated soils requiring remediation must be remediated in accordance with an Auditor-endorsed Remediation Action Plan (RAP) which outlines excavation, management and disposal requirements including management of potential environmental risks and dealing with unexpected finds. The RAP outlines requirements to prevent uncontrolled transfer of contaminated soils to other areas of the site or stormwater drains.
- Further assessment must be undertaken in areas of the site not previously investigated if soils are to remain, are to be reused in other areas of the site or where subsurface excavation is proposed, to confirm the absence of unidentified contamination in those areas. This includes assessment of soils adjacent to existing building or structures if the hazardous materials surveys indicate the presence of hazardous materials on the exterior, in other areas of the site not previously assessed and along Lincoln Crescent and in the vicinity of the proposed seawater heat exchange infrastructure. Further assessment and validation requirements are outlined in the RAP (Coffey, 2017c). Coffey understands that the majority of soils covering the land bridge and on the top of the fuel bunker will be removed and disposed as part of the redevelopment.
- GHDs previous assessment reports (as referenced in AGC Woodward-Clyde (1999)) should be reviewed to assess whether soils beneath and in the vicinity of the former Naval electrical substation (adjacent to the north of the pump room) were adequately assessed, and to confirm the absence of unacceptable contamination. Refer to the RAP (Coffey, 2017c) for further information.
- Construction works, including site preparation activities, should be undertaken in accordance with a Construction Environmental Management Plan (CEMP) which includes requirements for dealing

with unexpected finds. An Unexpected Finds Protocol (UFP) is presented in Appendix A of the RAP (Coffey, 2017c).

- Soils should be segregated (to the extent practicable) based on their waste classification to minimise cross contamination or mixing of soils. Natural soils (sandstone and weathered sandstone) should be segregated from fill material to maximise potential onsite or offsite beneficial reuse as Virgin Excavated Natural Material (VENM).
- Soils to be imported to site must be suitable for use from a contamination perspective and must be either VENM, ENM or a material compliant with a relevant specific Resource Recovery Exemption. Further information on requirements for imported soils are outlined in the RAP.
- Soils requiring disposal offsite must be disposed or recycled at an appropriately licensed facility.
- If localised seepages containing oily water are observed within or in the immediate vicinity of the fuel bunker then these will need to be managed and contained and either appropriately disposed at a liquid waste treatment facility or to Sydney Water sewer under a Trade Waste Consent. Management and containment could include minimising water infiltration through the work area, diversion or pumping of oil seepage water to the fuel bunker pump room and / or treatment at the seepage point using absorbent socks or granular activated carbon. Odour impacts in the vicinity of seepages (if they occur) will also need to be managed so there is no noticeable odour at the boundary of the development site. This may involve application of odour suppressant in the vicinity of the seepage point for example.
- Groundwater to be removed from excavations downgradient of the former fuel bunker must be assessed for the presence of contamination. Contaminated water must be appropriately managed to prevent discharge to stormwater and surface water receptors and disposal to a licenced liquid waste treatment facility.
- Works involving excavation of soils / sediments and / or dewatering of soils / sediments within Woolloomooloo Bay or Class 2 land (as marked on Sydney Local Environmental Plan 2012 map sheet ASS_021) must be undertaken in accordance with an Acid Sulfate Soil management Plan (ASSMP). Class 2 land is located beneath Lincoln Crescent and to the north, in the vicinity of the proposed seawater heat exchange infrastructure.

11.2. Operation

There is a low likelihood of minor to moderate impacts occurring if soils and/or fill material impacted by residual contamination are not effectively managed. The following mitigation and management measures should be implemented:

- Contaminated soils in the vicinity of BH2 and BH4 must be remediated prior to or during construction works. As indicated above, a RAP has been developed which outlines excavation, management and disposal requirements including management of potential environmental risks and dealing with unexpected finds.
- Further assessment must be undertaken in areas of the site not previously investigated, including in the vicinity of the seawater heat exchange infrastructure, if soils are to remain in-situ, are to be reused in other areas of the site or where subsurface excavation is proposed, to confirm the absence of unidentified contamination in those areas. Further assessment and validation requirements are outlined in the RAP (Coffey, 2017c).

- Visual assessment of the interior of the tank should be undertaken once access is available, to confirm the absence of minor oil seeps from joints and bolt holes within the fuel bunker which may present a minor aesthetic issue. If seeps are observed then appropriate management measures should be developed which may include routine cleaning of the seepage point and / or sealing of the seepage points with a low permeability grout, resin or putty.

12. Conclusions and recommendations

The results of the Revised Stage 1 PES identified the following potential sources of contamination at the site:

- Limited use of pesticides – low likelihood.
- Weathering of hazardous materials from current structures and uncontrolled demolition of site structures either currently or historically located on-site – low to moderate likelihood close to the Art Gallery building and the former fuel bunker. If hazardous materials are identified by the hazardous materials surveys on the exterior of existing site building or structures then assessment of the likelihood of contamination of surrounding soils should be undertaken.
- Fill materials of unknown origin – moderate likelihood in localised areas associated with older road construction and Art Gallery expansions.
- Former fuel bunker – whilst the site Audit report undertaken by AGC Woodward-Clyde (1999) confirmed the fuel bunker site is suitable for commercial/industrial use, the Audit was conditional and required:
    - Ongoing groundwater monitoring, of which Coffey could find no information. Coffey has undertaken two groundwater monitoring events, one in 2014 and one in 2016 (refer to Appendix G). Although residual oil droplets / oil smearing was noted in one well (MW2) during both events, the concentrations were not indicative of the presence of separate phase hydrocarbons (oil) which may be migrating from the site.
    - Consideration of minor oil seeps that may occur from joints and bolt holes and potential odours from residual oil impregnated within the fuel bunker structure. Assessment of odours was undertaken by Hibbs (2016) and risks associated with odours within the fuel bunker from residual oil is considered to be low. Air conditioning and ventilation of the proposed Sydney Modern buildings would further reduce the likelihood of odour issues. Assessment of potential minor oil seeps will be assessed further once access to the interior of the fuel bunker is available. The assessment is discussed in the RAP (Coffey, 2017c) and the presence of minor oil seeps within the fuel bunker is unlikely to change the conclusions of this report.

  The potential for residual petroleum hydrocarbon vapours within the fuel bunker was subsequently identified by Coffey and has been assessed.
- Former electrical substation to the north of the pump room – low likelihood of TRH and / or PCB contamination. Further assessment is proposed and is discussed further in the RAP (Coffey, 2017c).
- An area of fill to the east of the Cahill Expressway and adjacent to Art Gallery Road (in the vicinity of BH2 and BH4 on Figure 2) contains elevated concentrations of PAHs likely associated with coal and / or bitumen and strong hydrocarbon odours were observed during boring of BH2 and BH4. Based on additional assessment and delineation works undertaken, the area of impact appears to be localised. Based on the results and subject to leachate testing as part of future waste classification works, soils in this area would likely classify as General Solid Waste. Visual observation of soil in the vicinity of BH4 is also required during excavation works to confirm that the source of B(a)P in BH4 is likely to be attributed to asphalt waste.

No evidence of other potential sources of contamination has been identified.

With the exception of the potential sources of contamination noted above, the desktop study did not identify significant AECs or sources of contamination that would present a material constraint to the proposed works, with respect to contamination. However, additional assessment and validation sampling is proposed, as outlined in the RAP, to assess the site in accordance with the NSW EPA (1995) Sampling Design Guidelines and confirm the absence of unacceptable contamination in other areas of the site. It is noted that the majority of fill beneath the proposed locations of new buildings will be removed and disposed offsite as part of the construction works.

Avoidance, mitigation and management measures proposed to address potential issues and impacts are outlined in Section 11 of this report

Based on the information obtained as part of this Revised PES and in accordance with Clause 7 of SEPP55, Coffey consider that the site can be made suitable for the proposed art gallery development through remediation and validation in accordance with the RAP (Coffey, 2017c).

This report should be read in conjunction with the attached “Important Information about your Coffey Environmental Report”.

13. References

ASC NEPM (2013) National Environment Protection (Assessment of Site Contamination) Measure (NEPC 1999, amended April 2013).

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Important information about your **Coffey** Environmental Report

Introduction

This report has been prepared by Coffey for you, as Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice,

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Coffey should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Coffey prepared the report and has familiarity with the site, Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Coffey disowns any responsibility for such misinterpretation.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

Tables

Table 1
Soil Analytical Results (HSLs and HILs)
Sydney Modern Project - Stage 1 Preliminary Environmental Study

						Field_ID	Field_ID	BH1_0.5M	BH1_2.0M	BH2_0.5	BH2_1.0	BH4_0.5	BH4_1.0	BH5_0.2M	BH6_0.5	BH7_0.5	BH02_0.5m	HA01_0.5m	HA03_0.5m	HA04_0.4m	HA05_0.5m	HA05_1.0m	HA05_1.3m
						Sampled_Date	Sampled_Date	23/04/2014	23/04/2014	7/04/2014	7/04/2014	10/04/2014	10/04/2014	22/04/2014	8/04/2014	9/04/2014	29/04/2016	29/04/2016	29/04/2016	29/04/2016	29/04/2016	29/04/2016	29/04/2016
Chem_Group	**ChemName**	**Units**	**EQL**	**NEPM 2013 HSL D for Vapour Intrusion 0 - <1 m**	**NEPM 2013 HSL D for Vapour Intrusion 1 - <2 m**	**NEPM 2013 HILs C**	**NEPM 2013 HILs D**																
BTEX	Benzene	mg/kg	0.1	3	3			<0.1	<0.1	<0.1	<0.1	<0.1	<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	NL (64)	NL (64)			<0.1	<0.1	<0.1	<0.1	<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					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Xylene (m & p)	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	<0.2	<0.2	<0.2	<0.2	<0.2
	Xylene (o)	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	<0.1	<0.1	<0.1	<0.1	<0.1
	Xylene Total	mg/kg	0.3	230	NL (300)			<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
TPH	C6-C10 less BTEX (F1)	mg/kg	20	260	370			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C6-C10	mg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C10-C16	mg/kg	50					<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C16-C34	mg/kg	100					<100	<100	190	300	<100	3600	<100	460	<100	<100	<100	<100	<100	100	170	<100
	C34-C40	mg/kg	100					<100	<100	<100	<100	<100	570	<100	<100	<100	<100	<100	<100	<100	<100	100	<100
	F2-NAPHTHALENE	mg/kg	50	NL (560)	NL (560)			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C6 - C9	mg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C10 - C14	mg/kg	20					<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C15 - C28	mg/kg	50					<50	<50	94	150	<50	1900	<50	250	<50	<50	<50	<50	62	130	<50	<50
	C29-C36	mg/kg	50					<50	<50	89	140	<50	1500	<50	200	<50	<50	<50	<50	<50	58	81	<50
	+C10 - C36 (Sum of total)	mg/kg	50					<50	<50	183	290	<50	3400	<50	450	<50	<50	<50	<50	<50	120	211	<50
Metals	Arsenic	mg/kg	2			300	3000	<2	<2	2.4	<2	2	<2	<2	5.4	4.8	-	-	-	-	-	-	-
	Cadmium	mg/kg	0.4			90	900	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	0.5	0.6	-	-	-	-	-	-	-
	Chromium (III+VI)	mg/kg	5			300	3600	5.9	11	6.4	5.3	9.3	12	14	18	41	-	-	-	-	-	-	-
	Copper	mg/kg	5			17000	240,000	9.7	11	16	12	8.7	8.6	15	70	50	-	-	-	-	-	-	-
	Lead	mg/kg	5			600	1500	12	6.2	59	25	16	27	10	180	150	-	-	-	-	-	-	-
	Mercury	mg/kg	0.05			80	730	0.05	<0.05	0.3	0.11	0.13	0.13	<0.05	1.1	1.1	-	-	-	-	-	-	-
	Nickel	mg/kg	5			1200	6000	<5	<5	<5	<5	6.6	6.8	8.1	12	31	-	-	-	-	-	-	-
	Zinc	mg/kg	5			30000	400,000	24	6.3	39	20	30	22	20	190	46	-	-	-	-	-	-	-
Organochlorine Pesticides	4,4-DDE	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	a-BHC	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Aldrin	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Aldrin + Dieldrin	mg/kg				10	45	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-
	b-BHC	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	chlordane	mg/kg	0.1			70	530	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-
	d-BHC	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	DDD	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	DDT	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	DDT+DDE+DDD	mg/kg				400	3600	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	-	-	-	-	-	-	-
	Dieldrin	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Endosulfan I	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Endosulfan II	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Endosulfan sulphate	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Endrin	mg/kg	0.05			20	100	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Endrin aldehyde	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Endrin ketone	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	g-BHC (Lindane)	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Heptachlor	mg/kg	0.05			10	50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Heptachlor epoxide	mg/kg	0.05					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Methoxychlor	mg/kg	0.2			400	2500	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-
	Toxaphene	mg/kg	1			30	160	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	-
Organophosphorous Pesticides	Azinophos methyl	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Chlorpyrifos	mg/kg	0.5			250	2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Coumaphos	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Demeton (total)	mg/kg	1					<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	-
	Diazinon	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Dichlorvos	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Dimethoate	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Disulfoton	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Ethoprop	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Fenitrothion	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Fensulfothion	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Fenthion	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Malathion	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Methyl parathion	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Mevinphos (Phosdrin)	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Monocrotophos	mg/kg	10					<10	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	-	-
	Parathion	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Phorate	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Profenofos	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Prothiofos	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Ronnel	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Stirophos	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Trichloronate	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
PAHs	Acenaphthene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Acenaphthylene	mg/kg	0.5					<0.5	<0.5	0.9	1.4	<0.5	<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	1.3	1.3	<0.5	5.9	<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	3.2	4.3	<0.5	37	<0.5	1	<0.5	0.8	0.9	<0.5	<0.5	1.4	1.6	<0.5
	Benzo(a) pyrene	mg/kg	0.5					<0.5	<0.5	2.9	4.6	<0.5	41	<0.5	1	<0.5	1.1	1	<0.5	<0.5	1.8	2.4	<0.5
	Benzo[b+j]fluoranthene	mg/kg	0.5					<0.5	<0.5	2.3	4.7	<0.5	34	<0.5	0.8	<0.5	1	0.8	<0.5	<0.5	1.6	1.8	<0.5
	Benzo(g,h,i)perylene	mg/kg	0.5					<0.5	<0.5	1.7	2.7	<0.5	19	<0.5	<0.5	<0.5	0.6	0.6	<0.5	<0.5	1	1.3	<0.5
	Benzo(k)fluoranthene	mg/kg	0.5					<0.5	<0.5	2.2	3.9	<0.5	33	<0.5	1	<0.5	0.5	1	<0.5	<0.5	1.6	2.2	<0.5
	Chrysene	mg/kg	0.5					<0.5	<0.5	2.6	3.7	<0.5	31	<0.5	0.9	<0.5	1	0.9	<0.5	<0.5	1.8	2	<0.5
	Dibenz(a,h)anthracene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	29	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Fluoranthene	mg/kg	0.5					0.9	<0.5	6.5	7.2	<0.5	59	<0.5	1.7	<0.5	1.6	1.6	<0.5	<0.5	3.2	3.1	0.7
	Fluorene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5	<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-c,d)pyrene	mg/kg	0.5					<0.5	<0.5	1.4	2.3	<0.5	16	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	1	<0.5
	Naphthalene	mg/kg	0.5	NL (9)	NL (9)			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	PAHs (Sum of total)	mg/kg	0.5			300	4000	1.7	<0.5	35	45	<0.5	380	<0.5	8.9	<0.5	9.2	8.7	<0.5	<0.5	17.7	19.3	1.3
	Phenanthrene	mg/kg	0.5					<0.5	<0.5	4.3	1.5	<0.5	7.7	<0.5	<0.5	<0.5	0.7	0.5	<0.5	<0.5	1.9	1	<0.5
	Pyrene	mg/kg	0.5					0.8	<0.5	5.7	7.8	<0.5	69	<0.5	1.8	<0.5	1.5	1.4	<0.5	<0.5	2.6	2.9	0.6
	Benzo(a)pyrene TEQ (lower bound)*	mg/kg	0.5			3	40	<0.5	<0.5	3.8	6.2	<0.5	82	<0.5	2	<0.5	1.1	1.3	<0.5	<0.5	2.4	3.1	<0.5
	Benzo(a)pyrene TEQ (medium bound)*	mg/kg	0.5					0.6	0.6	4.1	6.5	0.6	82	0.6	2	0.6	1.4	1.6	0.6	0.6	2.6	3.3	0.6
	Benzo(a)pyrene TEQ (upper bound)*	mg/kg	0.5					1.2	1.2	4.3	6.7	1.2	82	1.2	2.1	1.2	1.7	1.8	1.2	1.2	2.9	3.6	1.2
Asbestos								No asbestos detected	-	No asbestos detected	-	No asbestos detected	-	No asbestos detected	No asbestos detected	No asbestos detected	-	-	-	-	-	-	-

ASC NEPM (2013) HSL C - Recreatioal/Open Space
ASC NEPM (2013) HSL D - Commercial/Industrial
NL - not limited to soil saturation concentration (in brackets)
Material consistency - sand
Refer to Coffey (2016) Revised Preliminary Environmental Study. Source of benzo(a)pyrene is likely asphalt / bitumen.

Table 2
Soil Analytical Results (ESLs and EILs)
Sydney Modern Project - Stage 1 Preliminary Environmental Study

					Field_ID	BH1_0.5M	BH1_1.0M	BH1_2.0M	BH2_0.5	BH2_1.0	BH4_0.5	BH4_1.0	BH5_0.2M	BH5_0.5M	BH6_0.5	BH7_0.5	BH02_0.5m	HA01_0.5m	HA03_0.5m	HA04_0.4m	HA05_0.5m	HA05_1.0m	HA05_1.3m
					Sampled_Date	23/04/2014	23/04/2014	23/04/2014	7/04/2014	7/04/2014	10/04/2014	10/04/2014	22/04/2014	22/04/2014	8/04/2014	9/04/2014	29/04/2016	29/04/2016	29/04/2016	29/04/2016	29/04/2016	29/04/2016	29/04/2016
Chem_Group	**ChemName**	**Units**	**EQL**	**NEPM 2013 ESLs Open Space**	**NEPM 2013 EILS Open Space**																		
BTEX	Benzene	mg/kg	0.1	50		<0.1	-	<0.1	<0.1	<0.1	<0.1	<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	70		<0.1	-	<0.1	<0.1	<0.1	<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	85		<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Xylene (m & p)	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	<0.2	<0.2	<0.2	<0.2	<0.2
	Xylene (o)	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	<0.1	<0.1	<0.1	<0.1	<0.1
	Xylene Total	mg/kg	0.3	105		<0.3	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
	C6-C10 less BTEX (F1)	mg/kg	20			<20	-	<20	<20	<20	<20	<20	<20	-	<20	<20	<20	<20	<20	<20	<20	<20	<20
TPH	C6-C10	mg/kg	20	180		<20	-	<20	<20	<20	<20	<20	<20	-	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C10-C16	mg/kg	50	120		<50	-	<50	<50	<50	<50	<50	<50	-	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C16-C34	mg/kg	100	300		<100	-	<100	190	300	<100	3600	<100	-	460	<100	<100	<100	<100	<100	100	170	<100
	C34-C40	mg/kg	100			<100	-	<100	<100	<100	<100	570	<100	-	<100	<100	<100	<100	<100	<100	<100	100	<100
	F2-NAPHTHALENE	mg/kg	50			<50	-	<50	<50	<50	<50	<50	<50	-	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C6 - C9	mg/kg	20			<20	-	<20	<20	<20	<20	<20	<20	-	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C10 - C14	mg/kg	20			<20	-	<20	<20	<20	<20	<20	<20	-	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C15 - C28	mg/kg	50			<50	-	<50	94	150	<50	1900	<50	-	250	<50	<50	<50	<50	62	130	<50	<50
	C29-C36	mg/kg	50			<50	-	<50	89	140	<50	1500	<50	-	200	<50	<50	<50	<50	<50	58	81	<50
	+C10 - C36 (Sum of total)	mg/kg	50			<50	-	<50	183	290	<50	3400	<50	-	450	<50	<50	<50	<50	<50	120	211	<50
Metals	Arsenic	mg/kg	2		100	<2	-	<2	2.4	<2	2	<2	<2	-	5.4	4.8	-	-	-	-	-	-	-
	Cadmium	mg/kg	0.4			<0.4	-	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	-	0.5	0.6	-	-	-	-	-	-	-
	Chromium (III+VI)	mg/kg	5		190*	5.9	-	11	6.4	5.3	9.3	12	14	-	18	41	-	-	-	-	-	-	-
	Copper	mg/kg	5		110*	9.7	-	11	16	12	8.7	8.6	15	-	70	50	-	-	-	-	-	-	-
	Lead	mg/kg	5		1100	12	-	6.2	59	25	16	27	10	-	180	150	-	-	-	-	-	-	-
	Mercury	mg/kg	0.05			0.05	-	<0.05	0.3	0.11	0.13	0.13	<0.05	-	1.1	1.1	-	-	-	-	-	-	-
	Nickel	mg/kg	5		35*	<5	-	<5	<5	<5	6.6	6.8	8.1	-	12	31	-	-	-	-	-	-	-
	Zinc	mg/kg	5		310*	24	-	6.3	39	20	30	22	20	-	190	46	-	-	-	-	-	-	-
Organochlorine Pesticides	4,4-DDE	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	a-BHC	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Aldrin	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Aldrin + Dieldrin	mg/kg				<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	-	-	-	-	-	-
	b-BHC	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	chlordane	mg/kg	0.1			<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	-	-	-	-	-	-
	d-BHC	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	DDD	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	DDT	mg/kg	0.05		180	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	DDT+DDE+DDD	mg/kg				<0.15	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	-	<0.15	<0.15	-	-	-	-	-	-	-
	Dieldrin	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Endosulfan I	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Endosulfan II	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Endosulfan sulphate	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Endrin	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Endrin aldehyde	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Endrin ketone	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	g-BHC (Lindane)	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Heptachlor	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Heptachlor epoxide	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Hexachlorobenzene	mg/kg	0.05			<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Methoxychlor	mg/kg	0.2			<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	-	-	-	-	-	-	-
	Toxaphene	mg/kg	1			<1	-	<1	<1	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-
Organophosphorous Pesticides	Azinophos methyl	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Chlorpyrifos	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Coumaphos	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Demeton (total)	mg/kg	1			<1	-	<1	<1	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-
	Diazinon	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Dichlorvos	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Dimethoate	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Disulfoton	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Ethoprop	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Fenitrothion	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Fensulfothion	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Fenthion	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Malathion	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Methyl parathion	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Mevinphos (Phosdrin)	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Monocrotophos	mg/kg	10			<10	-	<10	<10	<10	<10	<10	<10	-	<10	<10	-	-	-	-	-	-	-
	Parathion	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Phorate	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Profenofos	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Prothiofos	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Ronnel	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Stirophos	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Trichloronate	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	
PAH	Acenaphthene	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Acenaphthylene	mg/kg	0.5			<0.5	-	<0.5	0.9	1.4	<0.5	<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	1.3	1.3	<0.5	5.9	<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	3.2	4.3	<0.5	37	<0.5	-	1	<0.5	0.8	0.9	<0.5	<0.5	1.4	1.6	<0.5
	Benzo(a) pyrene	mg/kg	0.5	0.7		<0.5	-	<0.5	2.9	4.6	<0.5	41	<0.5	-	1	<0.5	1.1	1	<0.5	<0.5	1.8	2.4	<0.5
	Benzo[b+j]fluoranthene	mg/kg	0.5			<0.5	-	<0.5	2.3	4.7	<0.5	34	<0.5	-	0.8	<0.5	1	0.8	<0.5	<0.5	1.6	1.8	<0.5
	Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	-	<0.5	1.7	2.7	<0.5	19	<0.5	-	<0.5	<0.5	0.6	0.6	<0.5	<0.5	1	1.3	<0.5
	Benzo(k)fluoranthene	mg/kg	0.5			<0.5	-	<0.5	2.2	3.9	<0.5	33	<0.5	-	1	<0.5	0.5	1	<0.5	<0.5	1.6	2.2	<0.5
	Chrysene	mg/kg	0.5			<0.5	-	<0.5	2.6	3.7	<0.5	31	<0.5	-	0.9	<0.5	1	0.9	<0.5	<0.5	1.8	2	<0.5
	Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	29	<0.5	-	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Fluoranthene	mg/kg	0.5			0.9	-	<0.5	6.5	7.2	<0.5	59	<0.5	-	1.7	<0.5	1.6	1.6	<0.5	<0.5	3.2	3.1	0.7
	Fluorene	mg/kg	0.5			<0.5	-	<0.5	<0.5	<0.5	<0.5	<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-c,d)pyrene	mg/kg	0.5			<0.5	-	<0.5	1.4	2.3	<0.5	16	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	1	<0.5
	Naphthalene	mg/kg	0.5		170	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	PAHs (Sum of total)	mg/kg	0.5			1.7	-	<0.5	35	45	<0.5	380	<0.5	-	8.9	<0.5	9.2	8.7	<0.5	<0.5	17.7	19.3	1.3
	Phenanthrene	mg/kg	0.5			<0.5	-	<0.5	4.3	1.5	<0.5	7.7	<0.5	-	<0.5	<0.5	0.7	0.5	<0.5	<0.5	1.9	1	<0.5
	Pyrene	mg/kg	0.5			0.8	-	<0.5	5.7	7.8	<0.5	69	<0.5	-	1.8	<0.5	1.5	1.4	<0.5	<0.5	2.6	2.9	0.6
	Benzo(a)pyrene TEQ (lower bound)*	mg/kg	0.5			<0.5	-	<0.5	3.8	6.2	<0.5	82	<0.5	-	2	<0.5	1.1	1.3	<0.5	<0.5	2.4	3.1	<0.5
	Benzo(a)pyrene TEQ (medium bound)*	mg/kg	0.5			0.6	-	0.6	4.1	6.5	0.6	82	0.6	-	2	0.6	1.4	1.6	0.6	0.6	2.6	3.3	0.6
	Benzo(a)pyrene TEQ (upper bound)*	mg/kg	0.5			1.2	-	1.2	4.3	6.7	1.2	82	1.2	-	2.1	1.2	1.7	1.8	1.2	1.2	2.9	3.6	1.2
Inorganics	Chloride	mg/kg	10			-	<10	<10	-	-	-	-	<10	<10	-	-	-	-	-	-	-	-	-
	Moisture Content (dried @ 103°C)	%	0.1			6.4	35	3.1	16	19	12	8	10	6.8	17	17	-	-	-	-	-	-	-
	pH (aqueous extract)	pH_Units	0.1			-	8.3	7.8	-	-	-	-	8.4	8.4	-	-	-	-	-	-	-	-	-
	Sulphate as S	mg/kg	10			-	<10	43	-	-	-	-	<10	<10	-	-	-	-	-	-	-	-	-
Asbestos						No asbestos detected	-	-	No asbestos detected	-	No asbestos detected	-	No asbestos detected	-	No asbestos detected	No asbestos detected	-	-	-	-	-	-	-

* = Soil specific contaminant limits based on pH of 8, CEC of 5 (most conservative),) iron and low traffic volume

Table 2
Soil Analytical Results (Management Limits)
Sydney Modern Project - Stage 1 Preliminary Environmental Study

Chem_Group	ChemName	Units	EQL	NEPM 2013 Mgmt Limits Commercial and industrial, Coarse Soil	BH1_0.5M	BH1_1.0M	BH1_2.0M	BH2_0.5	BH2_1.0	BH4_0.5	BH4_1.0	BH5_0.2M	BH5_0.5M	BH6_0.5	BH7_0.5	BH02_0.5m	HA01_0.5m	HA03_0.5m	HA04_0.4m	HA05_0.5m	HA05_1.0m	HA05_1.3m
				Sampled_Date	23/04/2014	23/04/2014	23/04/2014	7/04/2014	7/04/2014	10/04/2014	10/04/2014	22/04/2014	22/04/2014	8/04/2014	9/04/2014	29/04/2016	29/04/2016	29/04/2016	29/04/2016	29/04/2016	29/04/2016	29/04/2016
BTEX	Benzene	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	<0.1	<0.1	<0.1	<0.1	<0.1
	Ethylbenzene	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	<0.1	<0.1	<0.1	<0.1	<0.1
	Toluene	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	<0.1	<0.1	<0.1	<0.1	<0.1
	Xylene (m & p)	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	<0.2	<0.2	<0.2	<0.2	<0.2
	Xylene (o)	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	<0.1	<0.1	<0.1	<0.1	<0.1
	Xylene Total	mg/kg	0.3		<0.3	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
TPH	C6-C10 less BTEX (F1)	mg/kg	20		<20	-	<20	<20	<20	<20	<20	<20	-	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C6-C10	mg/kg	20	700	<20	-	<20	<20	<20	<20	<20	<20	-	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C10-C16	mg/kg	50	1000	<50	-	<50	<50	<50	<50	<50	<50	-	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C16-C34	mg/kg	100	3500	<100	-	<100	190	300	<100	3600	<100	-	460	<100	<100	<100	<100	<100	100	170	<100
	C34-C40	mg/kg	100	10000	<100	-	<100	<100	<100	<100	570	<100	-	<100	<100	<100	<100	<100	<100	<100	100	<100
	F2-NAPHTHALENE	mg/kg	50		<50	-	<50	<50	<50	<50	<50	<50	-	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C6 - C9	mg/kg	20		<20	-	<20	<20	<20	<20	<20	<20	-	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C10 - C14	mg/kg	20		<20	-	<20	<20	<20	<20	<20	<20	-	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C15 - C28	mg/kg	50		<50	-	<50	94	150	<50	1900	<50	-	250	<50	<50	<50	<50	62	130	<50	<50
	C29-C36	mg/kg	50		<50	-	<50	89	140	<50	1500	<50	-	200	<50	<50	<50	<50	<50	58	81	<50
	+C10 - C36 (Sum of total)	mg/kg	50		<50	-	<50	183	290	<50	3400	<50	-	450	<50	<50	<50	<50	<50	120	211	<50
Metals	Arsenic	mg/kg	2		<2	-	<2	2.4	<2	2	<2	<2	-	5.4	4.8	-	-	-	-	-	-	-
	Cadmium	mg/kg	0.4		<0.4	-	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	-	0.5	0.6	-	-	-	-	-	-	-
	Chromium (III+VI)	mg/kg	5		5.9	-	11	6.4	5.3	9.3	12	14	-	18	41	-	-	-	-	-	-	-
	Copper	mg/kg	5		9.7	-	11	16	12	8.7	8.6	15	-	70	50	-	-	-	-	-	-	-
	Lead	mg/kg	5		12	-	6.2	59	25	16	27	10	-	180	150	-	-	-	-	-	-	-
	Mercury	mg/kg	0.05		0.05	-	<0.05	0.3	0.11	0.13	0.13	<0.05	-	1.1	1.1	-	-	-	-	-	-	-
	Nickel	mg/kg	5		<5	-	<5	<5	<5	6.6	6.8	8.1	-	12	31	-	-	-	-	-	-	-
	Zinc	mg/kg	5		24	-	6.3	39	20	30	22	20	-	190	46	-	-	-	-	-	-	-
Organochlorine Pesticides	4,4-DDE	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	a-BHC	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Aldrin	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Aldrin + Dieldrin	mg/kg			<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	-	-	-	-	-	-
	b-BHC	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	chlordane	mg/kg	0.1		<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	-	-	-	-	-	-
	d-BHC	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	DDD	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	DDT	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	DDT+DDE+DDD	mg/kg			<0.15	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	-	<0.15	<0.15	-	-	-	-	-	-	-
	Dieldrin	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Endosulfan I	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Endosulfan II	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Endosulfan sulphate	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Endrin	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Endrin aldehyde	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Endrin ketone	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	g-BHC (Lindane)	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Heptachlor	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Heptachlor epoxide	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Hexachlorobenzene	mg/kg	0.05		<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	-	-	-
	Methoxychlor	mg/kg	0.2		<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	-	-	-	-	-	-	-
	Toxaphene	mg/kg	1		<1	-	<1	<1	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-
Organophosphorous Pesticides	Azinophos methyl	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Chlorpyrifos	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Coumaphos	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Demeton (total)	mg/kg	1		<1	-	<1	<1	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-
	Diazinon	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Dichlorvos	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Dimethoate	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Disulfoton	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Ethoprop	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Fenitrothion	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Fensulfothion	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Fenthion	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Malathion	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Methyl parathion	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Mevinphos (Phosdrin)	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Monocrotophos	mg/kg	10		<10	-	<10	<10	<10	<10	<10	<10	-	<10	<10	-	-	-	-	-	-	-
	Parathion	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Phorate	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Profenofos	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Prothiofos	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Ronnel	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Stirophos	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
	Trichloronate	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	-	-	-	-	-	-
PAH	Acenaphthene	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Acenaphthylene	mg/kg	0.5		<0.5	-	<0.5	0.9	1.4	<0.5	<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	1.3	1.3	<0.5	5.9	<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	3.2	4.3	<0.5	37	<0.5	-	1	<0.5	0.8	0.9	<0.5	<0.5	1.4	1.6	<0.5
	Benzo[b+j]fluoranthene	mg/kg	0.5		<0.5	-	<0.5	2.3	4.7	<0.5	34	<0.5	-	0.8	<0.5	1.1	1	<0.5	<0.5	1.8	2.4	<0.5
	Benzo(a) pyrene	mg/kg	0.5		<0.5	-	<0.5	2.9	4.6	<0.5	41	<0.5	-	1	<0.5	1	0.8	<0.5	<0.5	1.6	1.8	<0.5
	Benzo(g,h,i)perylene	mg/kg	0.5		<0.5	-	<0.5	1.7	2.7	<0.5	19	<0.5	-	<0.5	<0.5	0.6	0.6	<0.5	<0.5	1	1.3	<0.5
	Benzo(k)fluoranthene	mg/kg	0.5		<0.5	-	<0.5	2.2	3.9	<0.5	33	<0.5	-	1	<0.5	0.5	1	<0.5	<0.5	1.6	2.2	<0.5
	Chrysene	mg/kg	0.5		<0.5	-	<0.5	2.6	3.7	<0.5	31	<0.5	-	0.9	<0.5	1	0.9	<0.5	<0.5	1.8	2	<0.5
	Dibenz(a,h)anthracene	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	29	<0.5	-	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Fluoranthene	mg/kg	0.5		0.9	-	<0.5	6.5	7.2	<0.5	59	<0.5	-	1.7	<0.5	1.6	1.6	<0.5	<0.5	3.2	3.1	0.7
	Fluorene	mg/kg	0.5		<0.5	-	<0.5	<0.5	<0.5	<0.5	<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-c,d)pyrene	mg/kg	0.5		<0.5	-	<0.5	1.4	2.3	<0.5	16	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	1	<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	<0.5	<0.5	<0.5	<0.5	<0.5
	PAHs (Sum of total)	mg/kg	0.5		1.7	-	<0.5	35	45	<0.5	380	<0.5	-	8.9	<0.5	9.2	8.7	<0.5	<0.5	17.7	19.3	1.3
	Phenanthrene	mg/kg	0.5		<0.5	-	<0.5	4.3	1.5	<0.5	7.7	<0.5	-	<0.5	<0.5	0.7	0.5	<0.5	<0.5	1.9	1	<0.5
	Pyrene	mg/kg	0.5		0.8	-	<0.5	5.7	7.8	<0.5	69	<0.5	-	1.8	<0.5	1.5	1.4	<0.5	<0.5	2.6	2.9	0.6
	Benzo(a)pyrene TEQ (lower bound)*	mg/kg	0.5		<0.5	-	<0.5	3.8	6.2	<0.5	82	<0.5	-	2	<0.5	1.1	1.3	<0.5	<0.5	2.4	3.1	<0.5
	Benzo(a)pyrene TEQ (medium bound)*	mg/kg	0.5		0.6	-	0.6	4.1	6.5	0.6	82	0.6	-	2	0.6	1.4	1.6	0.6	0.6	2.6	3.3	0.6
	Benzo(a)pyrene TEQ (upper bound)*	mg/kg	0.5		1.2	-	1.2	4.3	6.7	1.2	82	1.2	-	2.1	1.2	1.7	1.8	1.2	1.2	2.9	3.6	1.2
Inorganics	Chloride	mg/kg	10		-	<10	<10	-	-	-	-	<10	<10	-	-	-	-	-	-	-	-	-
	Moisture Content (dried @ 103°C)	%	0.1		6.4	35	3.1	16	19	12	8	10	6.8	17	17	-	-	-	-	-	-	-
	pH (aqueous extract)	pH_Units	0.1		-	8.3	7.8	-	-	-	-	8.4	8.4	-	-	-	-	-	-	-	-	-
	Sulphate as S	mg/kg	10		-	<10	43	-	-	-	-	<10	<10	-	-	-	-	-	-	-	-	-
	Asbestos				No asbestos detected	-	-	No asbestos detected	-	No asbestos detected	-	No asbestos detected	-	No asbestos detected	No asbestos detected	-	-	-	-	-	-	-

Table 4
Soil Analytical Results (Waste Classification Guidelines)
Sydney Modern Project - Stage 1 Preliminary Environmental Study

Chem_Group	ChemName	Units	EQL	NSW 2014 General Solid Waste - CT1 (without TCLP)	NSW 2014 Restricted Solid Waste CT2 - (without TCLP)	Field_ID: BH1_0.5M Sampled_Date: 23/04/2014	BH1_2.0M 23/04/2014	BH2_0.5 7/04/2014	BH2_1.0 7/04/2014	BH4_0.5 10/04/2014	BH4_1.0 10/04/2014	BH5_0.2M 22/04/2014	BH6_0.5 8/04/2014	BH7_0.5 9/04/2014	BH02_0.5m 29/04/2016	HA01_0.5m 29/04/2016	HA03_0.5m 29/04/2016	HA04_0.4m 29/04/2016	HA05_0.5m 29/04/2016	HA05_1.0m 29/04/2016	HA05_1.3m 29/04/2016
BTEX	Benzene	mg/kg	0.1	10	40	<0.1	<0.1	<0.1	<0.1	<0.1	<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	2400	<0.1	<0.1	<0.1	<0.1	<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	1152	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Xylene (m & p)	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	<0.2	<0.2	<0.2	<0.2	<0.2
	Xylene (o)	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	<0.1	<0.1	<0.1	<0.1	<0.1
	Xylene Total	mg/kg	0.3	1000	4000	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
TPH	C6-C10 less BTEX (F1)	mg/kg	20			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C6-C10	mg/kg	20			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C10-C16	mg/kg	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C16-C34	mg/kg	100			<100	<100	190	300	<100	3600	<100	460	<100	<100	<100	<100	<100	100	170	<100
	C34-C40	mg/kg	100			<100	<100	<100	<100	<100	570	<100	<100	<100	<100	<100	<100	<100	<100	100	<100
	F2-NAPHTHALENE	mg/kg	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C6 - C9	mg/kg	20	650	2600	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C10 - C14	mg/kg	20			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C15 - C28	mg/kg	50			<50	<50	94	150	<50	1900	<50	250	<50	<50	<50	<50	62	130	<50	<50
	C29-C36	mg/kg	50			<50	<50	89	140	<50	1500	<50	200	<50	<50	<50	<50	<50	58	81	<50
	+C10 - C36 (Sum of total)	mg/kg	50	10,000	40,000	<50	<50	183	290	<50	3400	<50	450 - 460	<50	<50	<50	<50	<50	120	211	<50
Metals	Arsenic	mg/kg	2	100	400	<2	<2	2.4	<2	2	<2	<2	5.4	4.8	-	-	-	-	-	-	-
	Cadmium	mg/kg	0.4	20	80	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	0.5	0.6	-	-	-	-	-	-	-
	Chromium (III+VI)	mg/kg	5			5.9	11	6.4	5.3	9.3	12	14	18	41	-	-	-	-	-	-	-
	Copper	mg/kg	5			9.7	11	16	12	8.7	8.6	15	70	50	-	-	-	-	-	-	-
	Lead	mg/kg	5	100	400	12	6.2	59	25	16	27	10	180	150	-	-	-	-	-	-	-
	Mercury	mg/kg	0.05	4	16	0.05	<0.05	0.3	0.11	0.13	0.13	<0.05	1.1	1.1	-	-	-	-	-	-	-
	Nickel	mg/kg	5	40	160	<5	<5	<5	<5	6.6	6.8	8.1	12	31	-	-	-	-	-	-	-
	Zinc	mg/kg	5			24	6.3	39	20	30	22	20	190	46	-	-	-	-	-	-	-
Organochlorine Pesticides	4,4-DDE	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	a-BHC	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Aldrin	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Aldrin + Dieldrin	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-
	b-BHC	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	chlordane	mg/kg	0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-
	d-BHC	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	DDD	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	DDT	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	DDT+DDE+DDD	mg/kg				<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	-	-	-	-	-	-	-
	Dieldrin	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Endosulfan I	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Endosulfan II	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Endosulfan sulphate	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Endrin	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Endrin aldehyde	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Endrin ketone	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	g-BHC (Lindane)	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Heptachlor	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Heptachlor epoxide	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Hexachlorobenzene	mg/kg	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-
	Methoxychlor	mg/kg	0.2			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	-	-	-	-	-
	Toxaphene	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	-
Organophosphorous Pesticides	Azinophos methyl	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Chlorpyrifos	mg/kg	0.5	4	16	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Coumaphos	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Demeton (total)	mg/kg	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	-
	Diazinon	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Dichlorvos	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Dimethoate	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Disulfoton	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Ethoprop	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Fenitrothion	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Fensulfothion	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Fenthion	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Malathion	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Methyl parathion	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Mevinphos (Phosdrin)	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Monocrotophos	mg/kg	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	-	-
	Parathion	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Phorate	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Profenofos	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Prothiofos	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Ronnel	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Stirophos	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
	Trichloronate	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-
PAH	Acenaphthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Acenaphthylene	mg/kg	0.5			<0.5	<0.5	0.9	1.4	<0.5	<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	1.3	1.3	<0.5	5.9	<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	3.2	4.3	<0.5	37	<0.5	1	<0.5	0.8	0.9	<0.5	<0.5	1.4	1.6	<0.5
	Benzo(a) pyrene[1]	mg/kg	0.5	0.8	3.2	<0.5	<0.5	2.9	4.6	<0.5	41	<0.5	1	<0.5	1.1	1	<0.5	<0.5	1.8	2.4	<0.5
	Benzo[b+j]fluoranthene	mg/kg	0.5			<0.5	<0.5	2.3	4.7	<0.5	34	<0.5	0.8	<0.5	1	0.8	<0.5	<0.5	1.6	1.8	<0.5
	Benzo(g,h,i)perylene	mg/kg	0.5			<0.5	<0.5	1.7	2.7	<0.5	19	<0.5	<0.5	<0.5	0.6	0.6	<0.5	<0.5	1	1.3	<0.5
	Benzo(k)fluoranthene	mg/kg	0.5			<0.5	<0.5	2.2	3.9	<0.5	33	<0.5	1	<0.5	0.5	1	<0.5	<0.5	1.6	2.2	<0.5
	Chrysene	mg/kg	0.5			<0.5	<0.5	2.6	3.7	<0.5	31	<0.5	0.9	<0.5	1	0.9	<0.5	<0.5	1.8	2	<0.5
	Dibenz(a,h)anthracene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	29	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Fluoranthene	mg/kg	0.5			0.9	<0.5	6.5	7.2	<0.5	59	<0.5	1.7	<0.5	1.6	1.6	<0.5	<0.5	3.2	3.1	0.7
	Fluorene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<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-c,d)pyrene	mg/kg	0.5			<0.5	<0.5	1.4	2.3	<0.5	16	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	1	<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	<0.5	<0.5	<0.5	<0.5	<0.5
	PAHs (Sum of total)	mg/kg	0.5	200	800	1.7	<0.5	35	45	<0.5	380	<0.5	8.9	<0.5	9.2	8.7	<0.5	<0.5	17.7	19.3	1.3
	Phenanthrene	mg/kg	0.5			<0.5	<0.5	4.3	1.5	<0.5	7.7	<0.5	<0.5	<0.5	0.7	0.5	<0.5	<0.5	1.9	1	<0.5
	Pyrene	mg/kg	0.5			0.8	<0.5	5.7	7.8	<0.5	69	<0.5	1.8	<0.5	1.5	1.4	<0.5	<0.5	2.6	2.9	0.6
	Benzo(a)pyrene TEQ (lower bound)*	mg/kg	0.5			<0.5	<0.5	3.8	6.2	<0.5	82	<0.5	2	<0.5	1.1	1.3	<0.5	<0.5	2.4	3.1	<0.5
	Benzo(a)pyrene TEQ (medium bound)*	mg/kg	0.5			0.6	0.6	4.1	6.5	0.6	82	0.6	2	0.6	1.4	1.6	0.6	0.6	2.6	3.3	0.6
	Benzo(a)pyrene TEQ (upper bound)*	mg/kg	0.5			1.2	1.2	4.3	6.7	1.2	82	1.2	2.1	1.2	1.7	1.8	1.2	1.2	2.9	3.6	1.2
Inorganics	Chloride	mg/kg	10			-	<10	-	-	-	-	<10	-	-	-	-	-	-	-	-	-
	Moisture Content (dried @ 103°C)	%	0.1			6.4	3.1	16	19	12	8	10	17	17	-	-	-	-	-	-	-
	pH (aqueous extract)	pH_Units	0.1			-	7.8	-	-	-	-	8.4	-	-	-	-	-	-	-	-	-
	Sulphate as S	mg/kg	10			-	43	-	-	-	-	<10	-	-	-	-	-	-	-	-	-
Asbestos						No asbestos detected	-	-	No asbestos detected	-	No asbestos detected	-	No asbestos detected	-	-	-	-	-	-	-	-

1. Refer to Coffey (2016) Revised Preliminary Environmental Study. Source of benzo(a)pyrene is likely asphalt waste which is preclassified as General Solid Waste.

coffey

Table 5
Field QA/QC Results (TBs, TSs and Rinsates)
Sydney Modern Project - Stage 1 Preliminary Environmental Study

			SDG	07751-52	07751-52	7254	07751-52	07751-52	07751-52	7254	7254	499010	499010
			Field_ID	QC3	QC7	QC10	TB140407-3	TB140409-4	TS140409-4	TB 0102653	TS 0102654	TRIP Spike	TRIP BLANK
			Sampled_Date	8/04/2014	7/04/2014	24/04/2014	7/04/2014	9/04/2014	9/04/2014	24/04/2014	24/04/2014	29/04/2016	29/04/2016
			Sample_Type	Rinsate	Rinsate	Rinsate	Trip_B	Trip_B	Trip_Spike	Trip_B	Trip_Spike	Trip_S	Trip_B
Chem_Group	**ChemName**	**Units**	**EQL**										
BTEX	Benzene	µg/l	1	<1	<1	<1	<1	<1	91%	<1	97%	99%	<1
	Ethylbenzene	µg/l	1	<1	<1	<1	<1	<1	93%	<1	84%	105%	<1
	Toluene	µg/l	1	<1	<1	<1	<1	<1	95%	<1	80%	107%	<1
	Xylene (m & p)	µg/l	2	<2	<2	<2	<2	<2	93%	<2	90%	101%	<2
	Xylene (o)	µg/l	1	<1	<1	<1	<1	<1	95%	<1	89%	100%	<1
	Xylene Total	µg/l	3	<3	<3	<3	<3	<3	94%	<3	89%	101%	<3
TPH	C6-C10 less BTEX (F1)	mg/l	0.02	<0.02	<0.02	<0.02	<0.02	<0.02				-	<0.02
	C6-C10	mg/l	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	84%		84%	115%	<0.02
	C10-C16	mg/l	0.05	<0.05	<0.05	<0.05							
	C16-C34	mg/l	0.1	<0.1	<0.1	<0.1							
	C34-C40	mg/l	0.1	<0.1	<0.1	<0.1							
	F2-NAPHTHALENE	mg/l	0.05	<0.05	<0.05	<0.05							
	C6 - C9	µg/l	20	<20	<20	<20	<20	<20	69%	<20	79%	**58%**	<20
	C10 - C14	µg/l	50	<50	<50	<50							
	C15 - C28	µg/l	100	<100	<100	<100							
	C29-C36	µg/l	100	<100	<100	<100							
	+C10 - C36 (Sum of total)	µg/l	100	<100	<100	<100							
Metals	Arsenic	mg/l	0.005	<0.005	<0.005	<0.001							
	Cadmium	mg/l	0.0005	<0.0005	<0.0005	<0.0001							
	Chromium (III+VI)	mg/l	0.005	<0.005	<0.005	<0.001							
	Copper	mg/l	0.005	<0.005	<0.005	<0.001							
	Lead	mg/l	0.005	<0.005	<0.005	<0.001							
	Mercury	mg/l	0.0001	<0.0001	<0.0001	<0.0001							
	Nickel	mg/l	0.005	<0.005	<0.005	<0.001							
	Zinc	mg/l	0.005	**0.01**	<0.005	<0.005							
Organochlorine Pesticides	4,4-DDE	µg/l	0.1	<0.1	<0.1	<0.1							
	a-BHC	µg/l	0.1	<0.1	<0.1	<0.1							
	Aldrin	µg/l	0.1	<0.1	<0.1	<0.1							
	b-BHC	µg/l	0.1	<0.1	<0.1	<0.1							
	chlordane	µg/l	1	<1	<1	<1							
	d-BHC	µg/l	0.1	<0.1	<0.1	<0.1							
	DDD	µg/l	0.1	<0.1	<0.1	<0.1							
	DDT	µg/l	0.1	<0.1	<0.1	<0.1							
	Dieldrin	µg/l	0.1	<0.1	<0.1	<0.1							
	Endosulfan I	µg/l	0.1	<0.1	<0.1	<0.1							
	Endosulfan II	µg/l	0.1	<0.1	<0.1	<0.1							
	Endosulfan sulphate	µg/l	0.1	<0.1	<0.1	<0.1							
	Endrin	µg/l	0.1	<0.1	<0.1	<0.1							
	Endrin aldehyde	µg/l	0.1	<0.1	<0.1	<0.1							
	Endrin ketone	µg/l	0.1	<0.1	<0.1	<0.1							
	g-BHC (Lindane)	µg/l	0.1	<0.1	<0.1	<0.1							
	Heptachlor	µg/l	0.1	<0.1	<0.1	<0.1							
	Heptachlor epoxide	µg/l	0.1	<0.1	<0.1	<0.1							
	Hexachlorobenzene	µg/l	0.1	<0.1	<0.1	<0.1							
	Methoxychlor	µg/l	0.1	<0.1	<0.1	<0.1							
	Toxaphene	mg/l	0.01	<0.01	<0.01	<0.01							
Organophosphorous Pesticides	Azinophos methyl	µg/l	2	<2	<2	<2							
	Chlorpyrifos	µg/l	2	<2	<2	<2							
	Coumaphos	µg/l	2	<2	<2	<2							
	Demeton (total)	µg/l	4	<4	<4	<4							
	Diazinon	µg/l	2	<2	<2	<2							
	Dichlorvos	µg/l	2	<2	<2	<2							
	Dimethoate	µg/l	2	<2	<2	<2							
	Disulfoton	µg/l	2	<2	<2	<2							
	Ethoprop	µg/l	2	<2	<2	<2							
	Fenitrothion	µg/l	2	<2	<2	<2							
	Fensulfothion	µg/l	2	<2	<2	<2							
	Fenthion	µg/l	2	<2	<2	<2							
	Malathion	µg/l	2	<2	<2	<2							
	Methyl parathion	µg/l	2	<2	<2	<2							
	Mevinphos (Phosdrin)	µg/l	2	<2	<2	<2							
	Monocrotophos	µg/l	20	<20	<20	<20							
	Parathion	µg/l	2	<2	<2	<2							
	Profenofos	µg/l	2	<2	<2	<2							
	Prothiofos	µg/l	2	<2	<2	<2							
	Ronnel	µg/l	2	<2	<2	<2							
	Stirophos	µg/l	2	<2	<2	<2							
	Trichloronate	µg/l	2	<2	<2	<2							
PAH	Acenaphthene	µg/l	1	<1	<1	<1							
	Acenaphthylene	µg/l	1	<1	<1	<1							
	Anthracene	µg/l	1	<1	<1	<1							
	Benz(a)anthracene	µg/l	1	<1	<1	<1							
	Benzo(a) pyrene	µg/l	1	<1	<1	<1							
	Benzo[b+j]fluoranthene	mg/l	0.001	<0.001	<0.001	<0.001							
	Benzo(g,h,i)perylene	µg/l	1	<1	<1	<1							
	Benzo(k)fluoranthene	µg/l	1	<1	<1	<1							
	Chrysene	µg/l	1	<1	<1	<1							
	Dibenz(a,h)anthracene	µg/l	1	<1	<1	<1							
	Fluoranthene	µg/l	1	<1	<1	<1							
	Fluorene	µg/l	1	<1	<1	<1							
	Indeno(1,2,3-c,d)pyrene	µg/l	1	<1	<1	<1							
	Naphthalene	µg/l	1	<20	<20	<20						115%	<10
	PAHs (Sum of total)	µg/l	1	<1	<1	<1							
	Phenanthrene	µg/l	1	<1	<1	<1							
	Pyrene	µg/l	1	<1	<1	<1							

coffey

Table 6
Field QA/QC Results (RPDs)
Sydney Modern Project - Stage 1 Preliminary Environmental Study

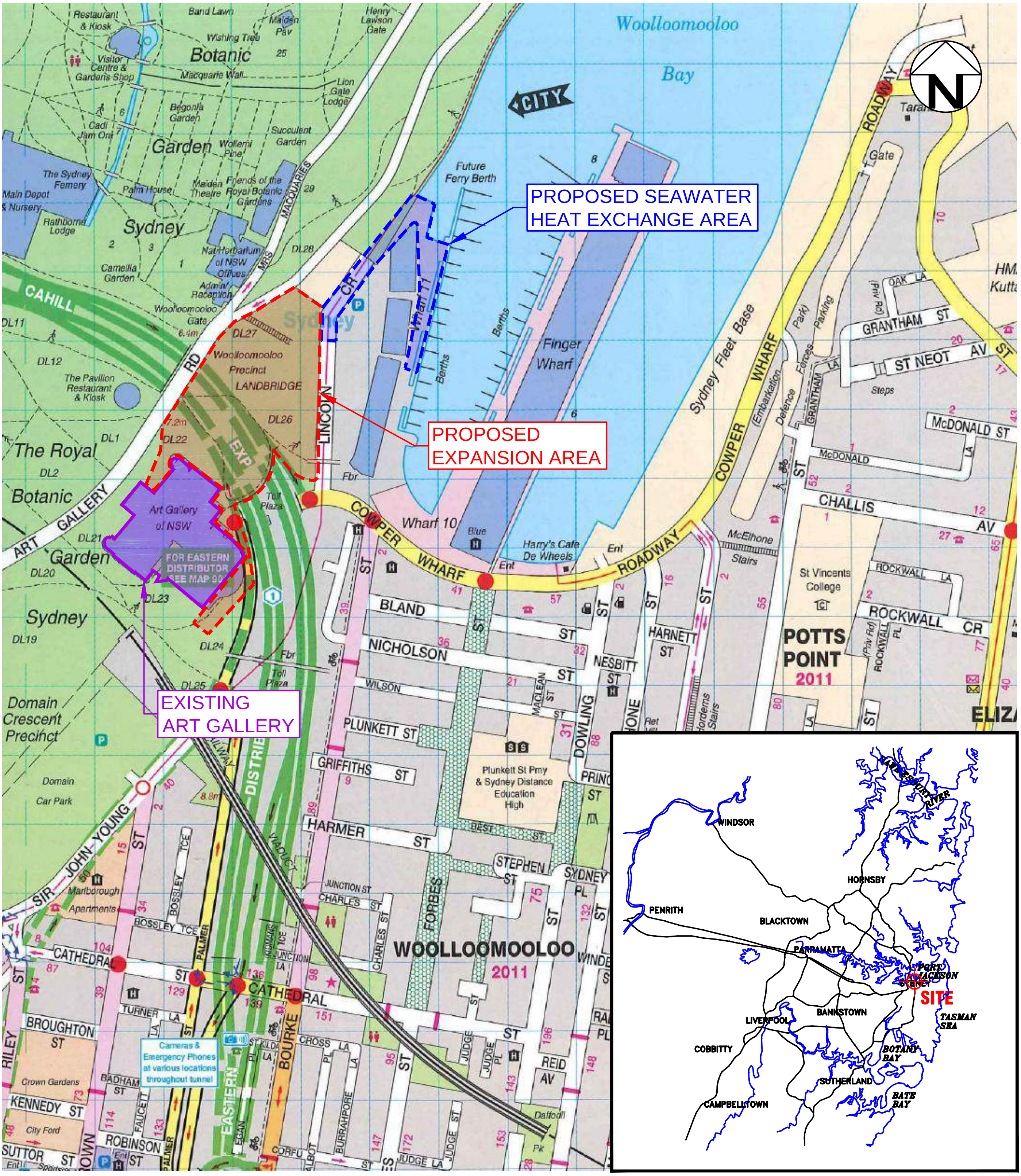
			SDG	07751-52	07751-52		07751-52	Interlab_D		7254	7254		108967-1	Interlab_D		499010	499010		499010	ES1609454	
			Field_ID	BH7_0.5	QC1	RPD	BH7_0.5	QC2	RPD	BH1_0.5M	QC8	RPD	BH1_0.5M	QC9	RPD	HA05_1.0m	DUP1	RPD	HA05_1.0m	DUP 1A	RPD
			Sampled_Date-Time	9/04/2014	9/04/2014		9/04/2014	9/04/2014		23/04/2014	23/04/2014		23/04/2014	23/04/2014		29/04/2016	29/04/2016		29/04/2016	29/04/2016	
Chem_Group	**ChemName**	**Units**	**EQL**																		
BTEX	Benzene	mg/kg	0.1 (Primary): 0.2 (Interlab)	<0.1	<0.1	0	<0.1	<0.2	0	<0.1	<0.1	0	<0.1	<0.2	0	<0.1	<0.1	0	<0.1	<0.2	0
	Ethylbenzene	mg/kg	0.1 (Primary): 1 (Interlab)	<0.1	<0.1	0	<0.1	<1.0	0	<0.1	<0.1	0	<0.1	<1.0	0	<0.1	<0.1	0	<0.1	<0.5	0
	Toluene	mg/kg	0.1 (Primary): 0.5 (Interlab)	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.1	0	<0.1	<0.5	0
	Xylene (m & p)	mg/kg	0.2 (Primary): 2 (Interlab)	<0.2	<0.2	0	<0.2	<2.0	0	<0.2	<0.2	0	<0.2	<2.0	0	<0.2	<0.2	0	<0.2	<0.5	0
	Xylene (o)	mg/kg	0.1 (Primary): 1 (Interlab)	<0.1	<0.1	0	<0.1	<1.0	0	<0.1	<0.1	0	<0.1	<1.0	0	<0.1	<0.1	0	<0.1	<0.5	0
	Xylene Total	mg/kg	0.3	<0.3	<0.3	0	<0.3			<0.3	<0.3	0	<0.3			<0.3	<0.3	0	<0.3	<0.5	0
TPH	C6-C10 less BTEX (F1)	mg/kg	20 (Primary): 25 (Interlab)	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<10.0	0
	C6-C10	mg/kg	20 (Primary): 25 (Interlab)	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<10.0	0
	C10-C16	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0
	C16-C34	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	170.0	320.0	61	170.0	<100.0	52
	C34-C40	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	<100.0	<100.0	0	100.0	190.0	62	100.0	<100.0	0
	F2-NAPHTHALENE	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0	<50.0	<50.0	0
	C6 - C9	mg/kg	20 (Primary): 25 (Interlab)	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<10.0	0
	C10 - C14	mg/kg	20 (Primary): 50 (Interlab)	<20.0	<20.0	0	<20.0	<50.0	0	<20.0	<20.0	0	<20.0	<50.0	0	<20.0	<20.0	0	<20.0	<50.0	0
	C15 - C28	mg/kg	50 (Primary): 100 (Interlab)	<50.0	<50.0	0	<50.0	<100.0	0	<50.0	<50.0	0	<50.0	<100.0	0	130.0	300.0	79	130.0	<100.0	26
	C29-C36	mg/kg	50 (Primary): 100 (Interlab)	<50.0	<50.0	0	<50.0	<100.0	0	<50.0	<50.0	0	<50.0	<100.0	0	81.0	210.0	89	81.0	<100.0	0
	+C10 - C36 (Sum of total)	mg/kg	50	<50.0	<50.0	0	<50.0			<50.0	<50.0	0	<50.0			**211.0**	**510.0**	**83**	211.0	<50.0	123
	C6-C10	mg/kg	20 (Primary): 25 (Interlab)	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<25.0	0	<20.0	<20.0	0	<20.0	<10.0	0
Metals	Arsenic	mg/kg	2 (Primary): 4 (Interlab)	4.8	5.7	17	4.8	9.0	61	<2.0	2.1	5	**4.8**	**<4**	**82**						
	Cadmium	mg/kg	0.4	0.6	<0.4	40	0.6	0.4	40	<0.4	<0.4	0	**0.6**	**<0.4**	**66**						
	Chromium (III+VI)	mg/kg	5 (Primary): 1 (Interlab)	41.0	36.0	13	41.0	34.0	19	5.9	8.3	34	**41.0**	**8**	**134**						
	Copper	mg/kg	5 (Primary): 1 (Interlab)	50.0	45.0	11	**50.0**	**84.0**	**51**	9.7	10.0	3	**50.0**	**14**	**112**						
	Lead	mg/kg	5 (Primary): 1 (Interlab)	150.0	170.0	13	**150.0**	**310.0**	**70**	12.0	13.0	8	**150.0**	**17**	**159**						
	Mercury	mg/kg	0.05 (Primary): 0.1 (Interlab)	1.1	0.92	18	1.1	1.1	0	0.05	0.05	0	**1.1**	**<0.1**	**182**						
	Nickel	mg/kg	5 (Primary): 1 (Interlab)	31.0	20.0	43	31.0	20.0	43	<5.0	5.5	10	**31.0**	**5**	**144**						
	Zinc	mg/kg	5 (Primary): 1 (Interlab)	46.0	41.0	11	**46.0**	**84.0**	**58**	24.0	30.0	22	**46.0**	**22**	**70**						
Organochlorine Pesticides	4,4-DDE	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	a-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	Aldrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	b-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	chlordane	mg/kg	0.1	<0.1	<0.1	0	<0.1			<0.1	<0.1	0	<0.1								
	d-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	DDD	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	DDT	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	Dieldrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	Endosulfan I	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	Endosulfan II	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	Endosulfan sulphate	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	Endrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	Endrin aldehyde	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	Endrin ketone	mg/kg	0.05	<0.05	<0.05	0	<0.05			<0.05	<0.05	0	<0.05								
	g-BHC (Lindane)	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	Heptachlor	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	Heptachlor epoxide	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	Hexachlorobenzene	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.1	0	<0.05	<0.05	0	<0.05	<0.1	0						
	Methoxychlor	mg/kg	0.2 (Primary): 0.1 (Interlab)	<0.2	<0.2	0	<0.2	<0.1	0	<0.2	<0.2	0	<0.2	<0.1	0						
	Toxaphene	mg/kg	1	<1.0	<1.0	0	<1.0			<1.0	<1.0	0	<1.0								
Organophosphorous Pesticides	Azinophos methyl	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Chlorpyrifos	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0						
	Coumaphos	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Demeton (total)	mg/kg	1	<1.0	<1.0	0	<1.0			<1.0	<1.0	0	<1.0								
	Diazinon	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0						
	Dichlorvos	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Dimethoate	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0						
	Disulfoton	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Ethoprop	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Fenitrothion	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0						
	Fensulfothion	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Fenthion	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Malathion	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Methyl parathion	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Mevinphos (Phosdrin)	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Monocrotophos	mg/kg	10	<10.0	<10.0	0	<10.0			<10.0	<10.0	0	<10.0								
	Parathion	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Phorate	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Profenofos	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Prothiofos	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Ronnel	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0						
	Stirophos	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Trichloronate	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
PAH	Acenaphthene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Acenaphthylene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	0.1	0	<0.5	<0.5	0	<0.5	0.2	22	<0.5	<0.5	0	<0.5	<0.5	0
	Anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	0.1	0	<0.5	<0.5	0	**<0.5**	**0.1**	**85**	<0.5	0.6	18	<0.5	<0.5	0
	Benzo(a)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	0.6	18	<0.5	<0.5	0	**<0.5**	**0.6**	**82**	1.6	2.6	48	1.6	1.6	0
	Benzo(a)pyrene	mg/kg	0.5 (Primary): 0.05 (Interlab)	<0.5	<0.5	0	**<0.5**	**0.97**	**64**	<0.5	<0.5	0	**<0.5**	**0.54**	**73**	2.4	3.8	45	2.4	1.8	29
	Benzo[b+j]fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5			1.8	2.9	47	1.8	1.7	6
	Benzo(g,h,i)perylene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	0.7	33	<0.5	<0.5	0	<0.5			1.3	1.7	27	1.3	0.7	60
	Benzo(k)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	**<0.5**	**0.9**	**113**	2.2	3.1	34	2.2	0.6	114
	Chrysene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	0.7	33	<0.5	<0.5	0	**<0.5**	**0.6**	**82**	2.0	3.3	49	2.0	1.5	29
	Dibenz(a,h)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	0.1	0	<0.5	<0.5	0	**<0.5**	**0.1**	**85**	<0.5	<0.5	0	<0.5	<0.5	0
	Fluoranthene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	**<0.5**	**1.2**	**82**	0.9	<0.5	57	**<0.5**	**1.2**	**131**	**3.1**	**5.3**	**52**	3.1	2.7	14
	Fluorene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	0.7	33	<0.5	<0.5	0	<0.5	0.3	18	1.0	1.5	40	1.0	0.6	50
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)	<0.5	<0.5	0	<0.5	<1.0 - 0.2	0	<0.5	<0.5	0	<0.5	<0.1	0	<0.5	<0.5	0	<0.5	<0.5	0
	PAHs (Sum of total)	mg/kg	0.5	<0.5	<0.5	0	<0.5	8.8	178	1.7	<0.5	109	**<0.5**	**8.5**	**188**	**19.3**	**32.0**	**50**	19.3	15.2	24
	Phenanthrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	0.5	0	<0.5	<0.5	0	**<0.5**	**1.8**	**151**	1.0	2.6	89	1.0	1.0	0
	Pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	**<0.5**	**1.3**	**89**	0.8	<0.5	46	**<0.5**	**1.4**	**139**	2.9	4.6	45	2.9	3.0	3
	Benzo(a)pyrene TEQ (lower bound)*	mg/kg	0.5	<0.5	<0.5	0	<0.5			<0.5	<0.5	0	<0.5								
	Benzo(a)pyrene TEQ (medium bound)*	mg/kg	0.5	0.6	0.6	0	0.6			0.6	0.6	0	0.6								
	Benzo(a)pyrene TEQ (upper bound)*	mg/kg	0.5	1.2	1.2	0	1.2			1.2	1.2	0	1.2								

*RPDs have only been considered where a concentration is greater than 0 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 200 (0-10 x EQL); 50 (10-20 x EQL); 30 (> 20 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Figures



SOURCE:UBD STREET DIRECTORY GREGORYS
SYDNEY, NEW SOUTH WALES
48TH EDITION, 2013, MAP:J

GENERAL AREA MAP

50 0 50 100 150 200 250

Scale (metres) 1:5000

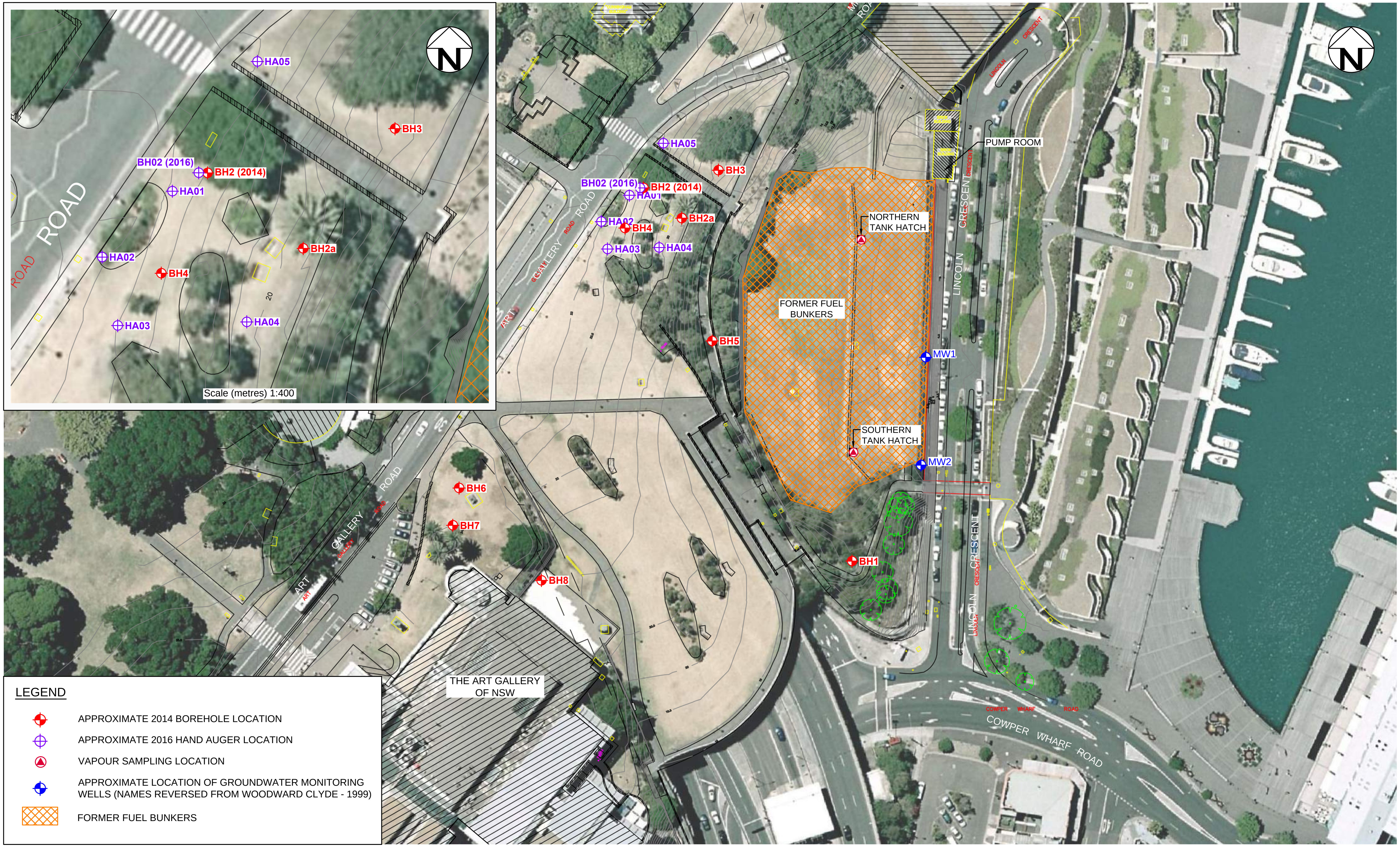
drawn	LF / AW
approved	-
date	23 / 05 / 16
scale	AS SHOWN
original size	A4

coffey
A TETRA TECH COMPANY

client:	ART GALLERY OF NSW
project:	STAGE 1 PRELIMINARY ENVIRONMENTAL STUDY SYDNEY MODERN PROJECT ART GALLERY ROAD, SYDNEY, NSW
title:	SITE LOCATION PLAN

project no:	GEOTLCOV25037AC-R01	figure no:	FIGURE 1	rev:	A

PLOT DATE: 30/05/2016 4:56:12 PM DWG FILE: F:\GEOTECHNICS\1.PROJECTS\GEOTLCOV25037AC\GEOTLCOV25037AC-R01.DWG



revision	no.	description	drawn	approved	date

Scale (metres) 1:400

Scale (metres) 1:1000

drawn	LF / AW
approved	-
date	23 / 05 / 16
scale	1:1000
original size	A3

coffey A TETRA TECH COMPANY

client: ART GALLERY OF NSW

project: STAGE 1 PRELIMINARY ENVIRONMENTAL STUDY
SYDNEY MODERN PROJECT
ART GALLERY ROAD, SYDNEY, NSW

title: SITE LAYOUT AND ASSESSMENT LOCATION PLAN

project no: GEOTLCOV25037AC-R01 figure no: FIGURE 2 rev: A

PLOT DATE: 23/05/2016 11:05:59 AM DWG FILE: F:\GEOTECHNIC\51 PROJECTS\GEOTLCOV25037AC ART GALLERY NSW CONTAMINATION ASSESSMENT\CAD\GEOTLCOV25037AC-R01.DWG

Appendix A - Architectural Drawings Illustrating the Proposed Development

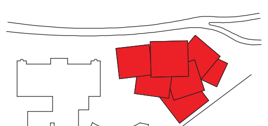
Revision	Description	Date
A	SSDA DRAFT	04 10 2017
B	SSDA DRAFT	06 10 2017
C	SSDA Issue	19 10 2017
D	SSDA Issue	03 11 2017

Scale:
1:500 @ A1
1:1000 @ A3
0 5 10 15

checked LJ/JW/JJ
drawn Architectus
project no 140419

Do not scale drawings.

Key Plan:



Client:

Art Gallery of NSW
Art Gallery Road
Sydney, NSW, 2000
T (61 2) 9225 1780

Lead Architect: SANAA
Kazuyo Sejima + Ryue Nishizawa / S A N A A
SANAA JIMUSHO LTD.
Tokyo, 3698
1-5-27 Tatsumi, Koto-ku, Tokyo
Japan 135-0053
T +81.3.5534.1780
sanaa@sanaa.co.jp
www.sanaa.co.jp

Executive Architect: architectus
Architectus Sydney
Level 18 MLC Centre 19 Martin Place
Sydney NSW 2000
T (61 2) 8252 8400
F (61 2) 8252 8600
sydney@architectus.com.au
ABN 11 098 489 448

project
ART GALLERY OF NSW EXPANSION
PROJECT - SYDNEY MODERN

drawing
Proposed Site Plan

drawing no. DA_0100
Revision D

1 Plan

Scale: 1 : 250

Revision	Description	Date
A	SSDA DRAFT	04 10 2017
B	SSDA DRAFT	06 10 2017
C	SSDA Issue	19 10 2017
D	SSDA Issue	03 11 2017

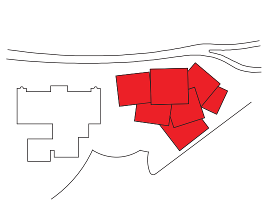
Scale:
1:250 @ A1
1:500 @ A3
0 2.5 5 7.5 10

checked LJ/JW/JJ

drawn Architectus project no 140419

Do not scale drawings.

Key Plan:



Client:

ART GALLERY NSW

Art Gallery of NSW
Art Gallery Road
Sydney, NSW, 2000
T (61 2) 9225 1780

Lead Architect: SANAA
Kazuyo Sejima + Ryue Nishizawa / S A N A A
SANAA JIMUSHO LTD.
Tokyo, 3698
1-5-27 Tatsumi, Koto-ku, Tokyo
Japan 135-0053
T +81.3.5534.1780
sanaa@sanaa.co.jp
www.sanaa.co.jp

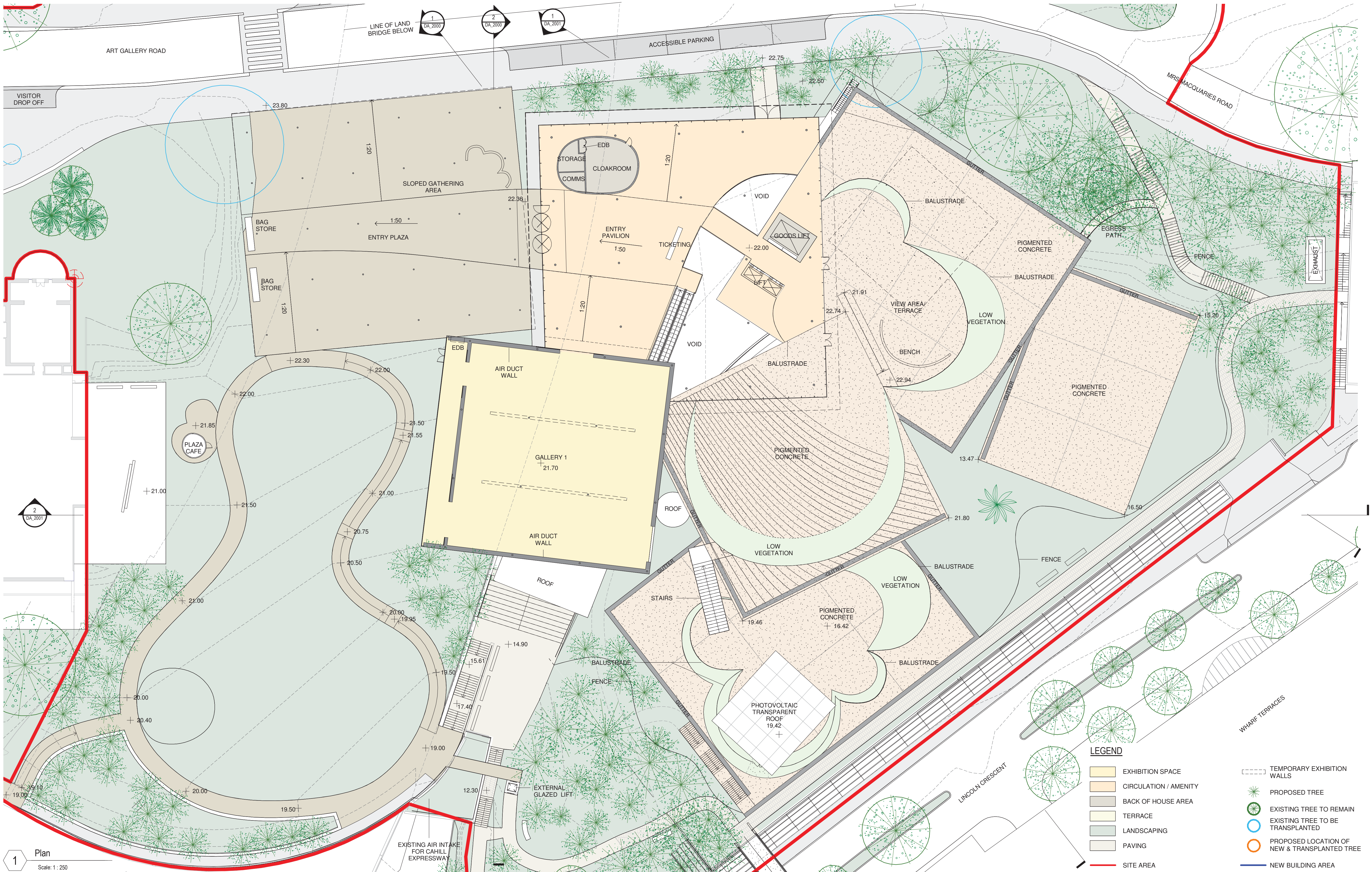
Executive Architect: architectus
Architectus Sydney
Level 18 MLC Centre 19 Martin Place
Sydney NSW 2000
T (61 2) 8252 8400
F (61 2) 8252 8600
sydney@architectus.com.au
ABN 11 098 489 448

project
ART GALLERY OF NSW EXPANSION PROJECT - SYDNEY MODERN

drawing
Roof Plan

drawing no. DA_1000

Revision D



Revision	Description	Date
A	SSDA DRAFT	04 10 2017
B	SSDA DRAFT	06 10 2017
C	SSDA Issue	19 10 2017
D	SSDA Issue	03 11 2017

Scale:
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1:500 @ A3
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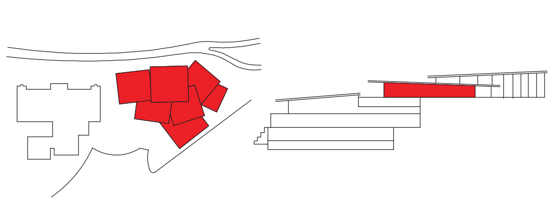
checked LJ/JW/JJ
drawn Architectus
project no 140419

Do not scale drawings.

Key Plan:

Key Section:



Client:

ART GALLERY NSW

Art Gallery of NSW
Art Gallery Road
Sydney, NSW, 2000

T (61 2) 9225 1780

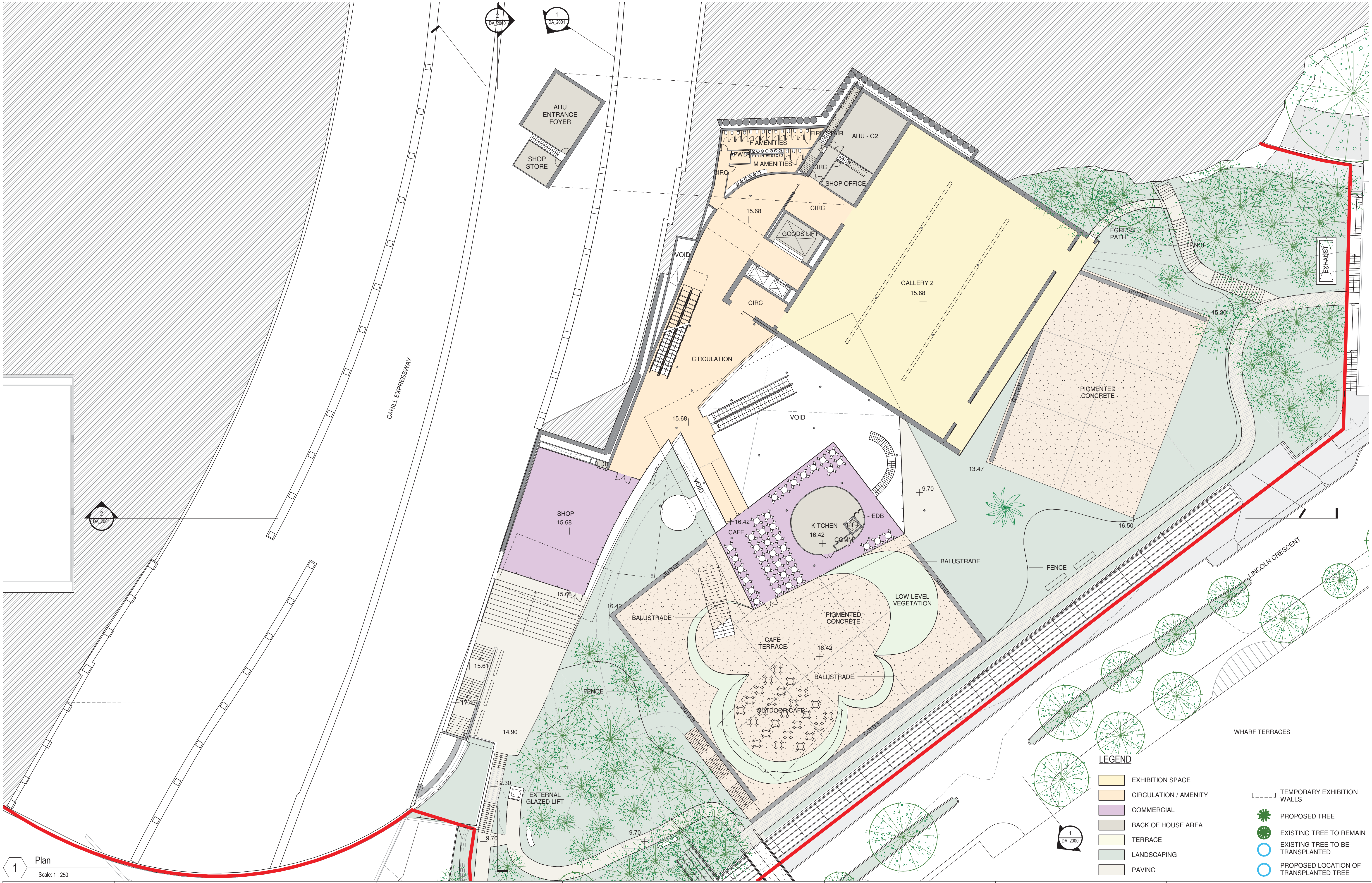
Lead Architect: SANAA
Kazuyo Sejima + Ryue Nishizawa / S A N A A
SANAA JIMUSHO LTD.
Tokyo, 3698
1-5-27 Tatsumi, Koto-ku, Tokyo
Japan 135-0053
T +81.3.5534.1780
sanaa@sanaa.co.jp
www.sanaa.co.jp

Executive Architect: architectus
Architectus Sydney
Level 18 MLC Centre 19 Martin Place
Sydney NSW 2000
T (61 2) 8252 8400
F (61 2) 8252 8600
sydney@architectus.com.au
ABN 11 098 489 448

project
ART GALLERY OF NSW EXPANSION PROJECT - SYDNEY MODERN

drawing
Entry Level Plan

drawing no. DA_1001
Revision D



Revision	Description	Date
A	SSDA DRAFT	04 10 2017
B	SSDA DRAFT	06 10 2017
C	SSDA Issue	19 10 2017
D	SSDA Issue	03 11 2017

Scale:
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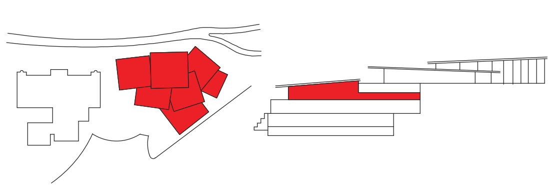
checked LJ/JW/JJ
drawn Architectus project no 140419
Do not scale drawings.

Key Plan: **Key Section:**



Client:

ART GALLERY NSW

Art Gallery of NSW
Art Gallery Road
Sydney, NSW, 2000
T (61 2) 9225 1780

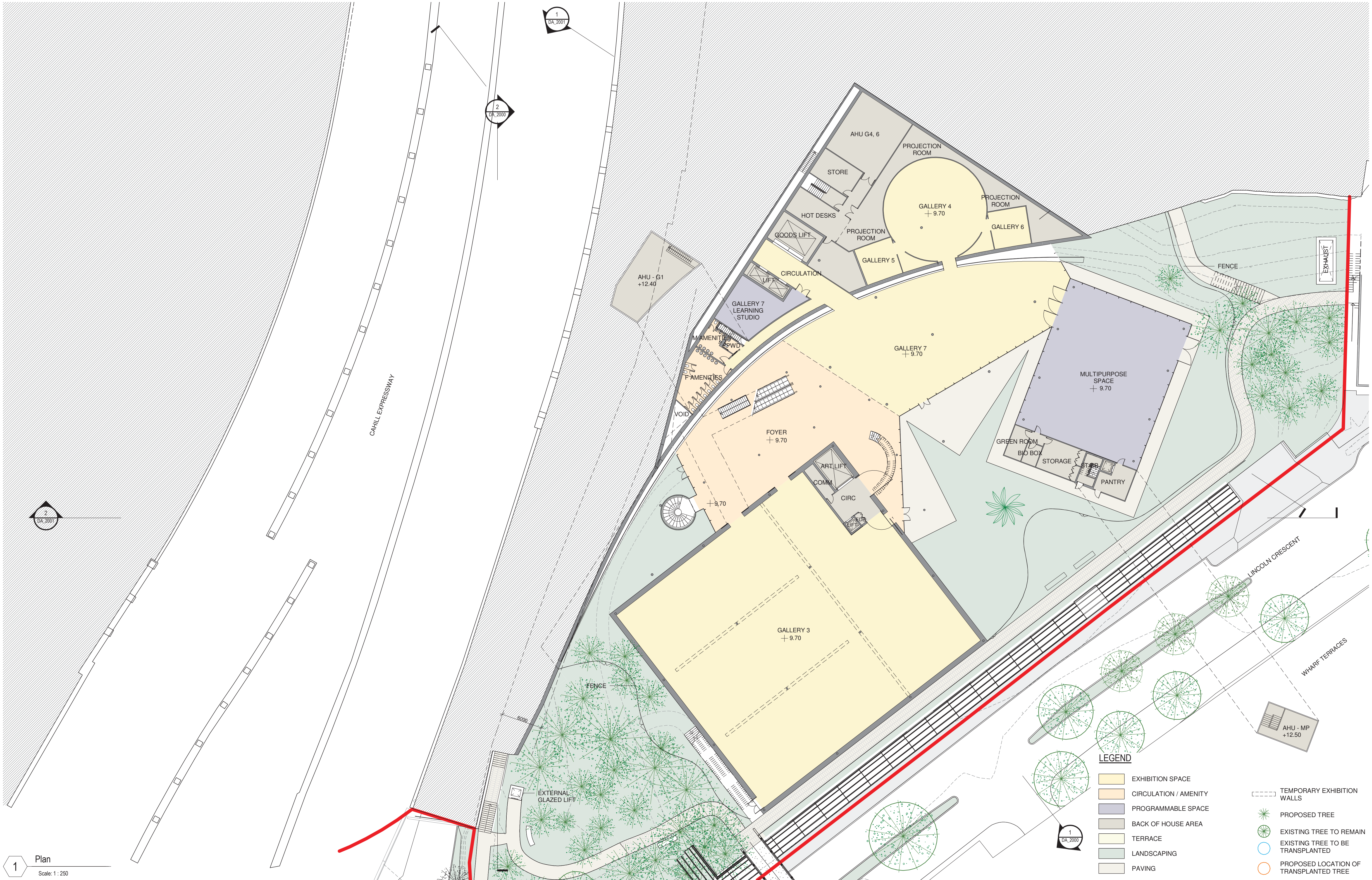
Lead Architect: S A N A A
Kazuyo Sejima + Ryue Nishizawa / S A N A A
SANAA JIMUSHO LTD.
Tokyo, 3698
1-5-27 Tatsumi, Koto-ku, Tokyo
Japan 135-0053
T +81.3.5534.1780
sanaa@sanaa.co.jp
www.sanaa.co.jp

Executive Architect: architectus
Architectus Sydney
Level 18 MLC Centre 19 Martin Place
Sydney NSW 2000
T (61 2) 8252 8400
F (61 2) 8252 8600
sydney@architectus.com.au
ABN 11 098 489 448

project
ART GALLERY OF NSW EXPANSION PROJECT - SYDNEY MODERN

drawing
Lower Level 1 Plan

drawing no. **DA_1002**
Revision **D**



1 Plan

Scale: 1 : 250

Revision	Description	Date
A	SSDA DRAFT	04 10 2017
B	SSDA DRAFT	06 10 2017
C	SSDA Issue	19 10 2017
D	SSDA Issue	03 11 2017

Scale:
1:250 @ A1
1:500 @ A3

0 2.5 5 7.5 10

checked LJ/JW/JJ

drawn Architectus project no 140419

Do not scale drawings.

Key Plan:

Key Section:

Client:

ART GALLERY NSW

Art Gallery of NSW
Art Gallery Road
Sydney, NSW, 2000
T (61 2) 9225 1780

Lead Architect: S A N A A
Kazuyo Sejima + Ryue Nishizawa / S A N A A
SANAA JIMUSHO LTD.
Tokyo, 3698
1-5-27 Tatsumi, Koto-ku, Tokyo
Japan 135-0053
T +81.3.5534.1780
sanaa@sanaa.co.jp
www.sanaa.co.jp

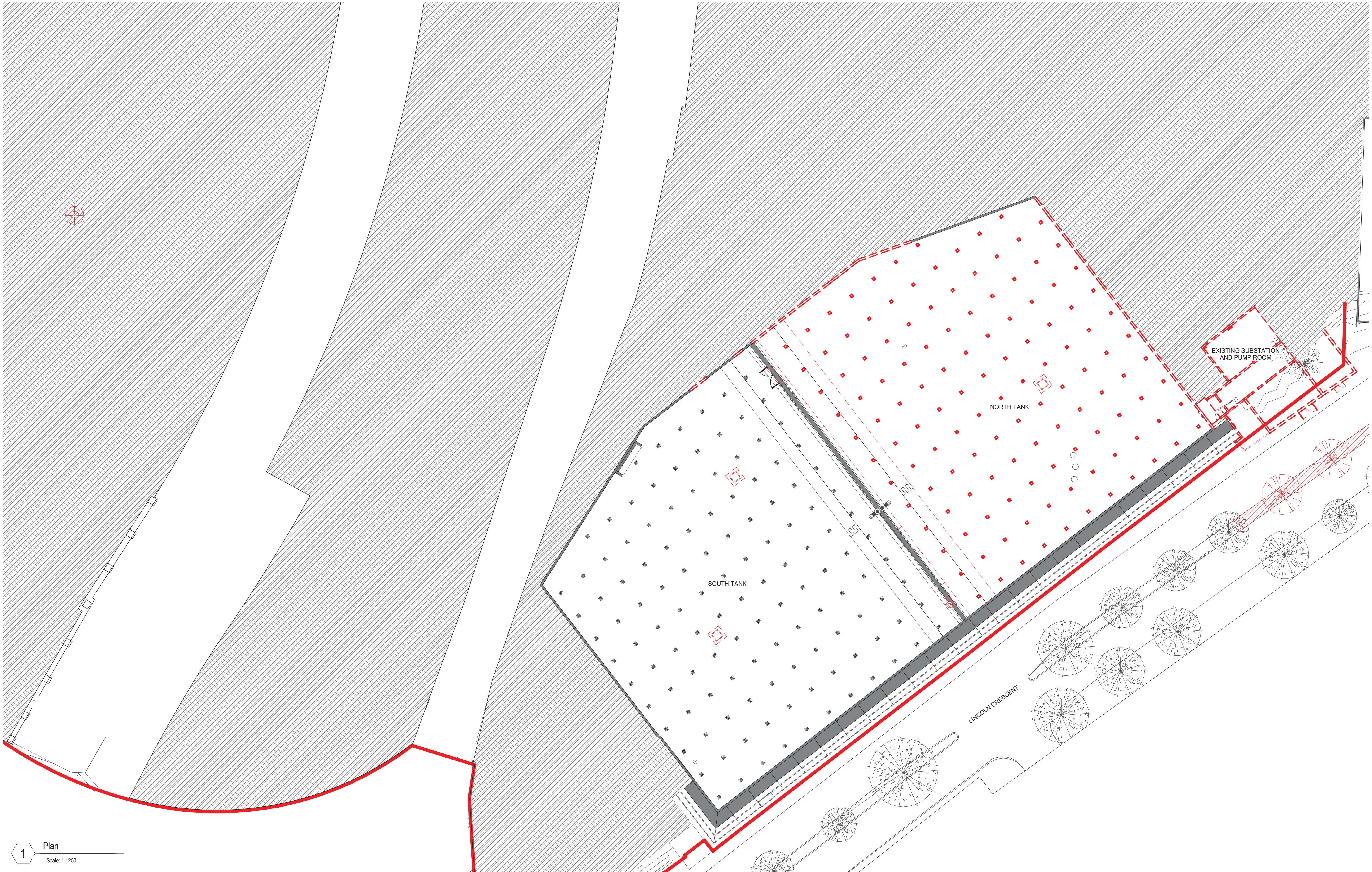
Executive Architect: architectus
Architectus Sydney
Level 18 MLC Centre 19 Martin Place
Sydney NSW 2000
T (61 2) 8252 8400
F (61 2) 8252 8600
sydney@architectus.com.au
ABN 11 098 489 448

project
ART GALLERY OF NSW EXPANSION PROJECT - SYDNEY MODERN

drawing
Lower Level 2 Plan

drawing no. DA_1003

Revision D



1 Plan

Scale: 1 : 250

Revision	Description	Date
A	SSDA DRAFT	06 10 2017
B	SSDA Issue	19 10 2017
C	SSDA Issue	03 11 2017

Scale:
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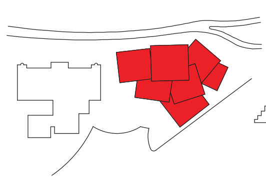
0 2.5 5 7.5 10

checked LJ/JW/JJ
drawn Architectus
project no 140419

Do not scale drawings.

Key Plan:



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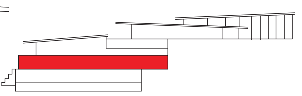

Client:

Art Gallery of NSW
Art Gallery Road
Sydney, NSW, 2000
T (61 2) 9225 1780

Lead Architect: S A N A A
Kazuyo Sejima + Ryue Nishizawa / S A N A A
SANAA JIMUSHO LTD.
Tokyo, 3698
1-5-27 Tatsumi, Koto-ku, Tokyo
Japan 135-0053
T +81.3.5534.1780
sanaa@sanaa.co.jp
www.sanaa.co.jp

Executive Architect: architectus
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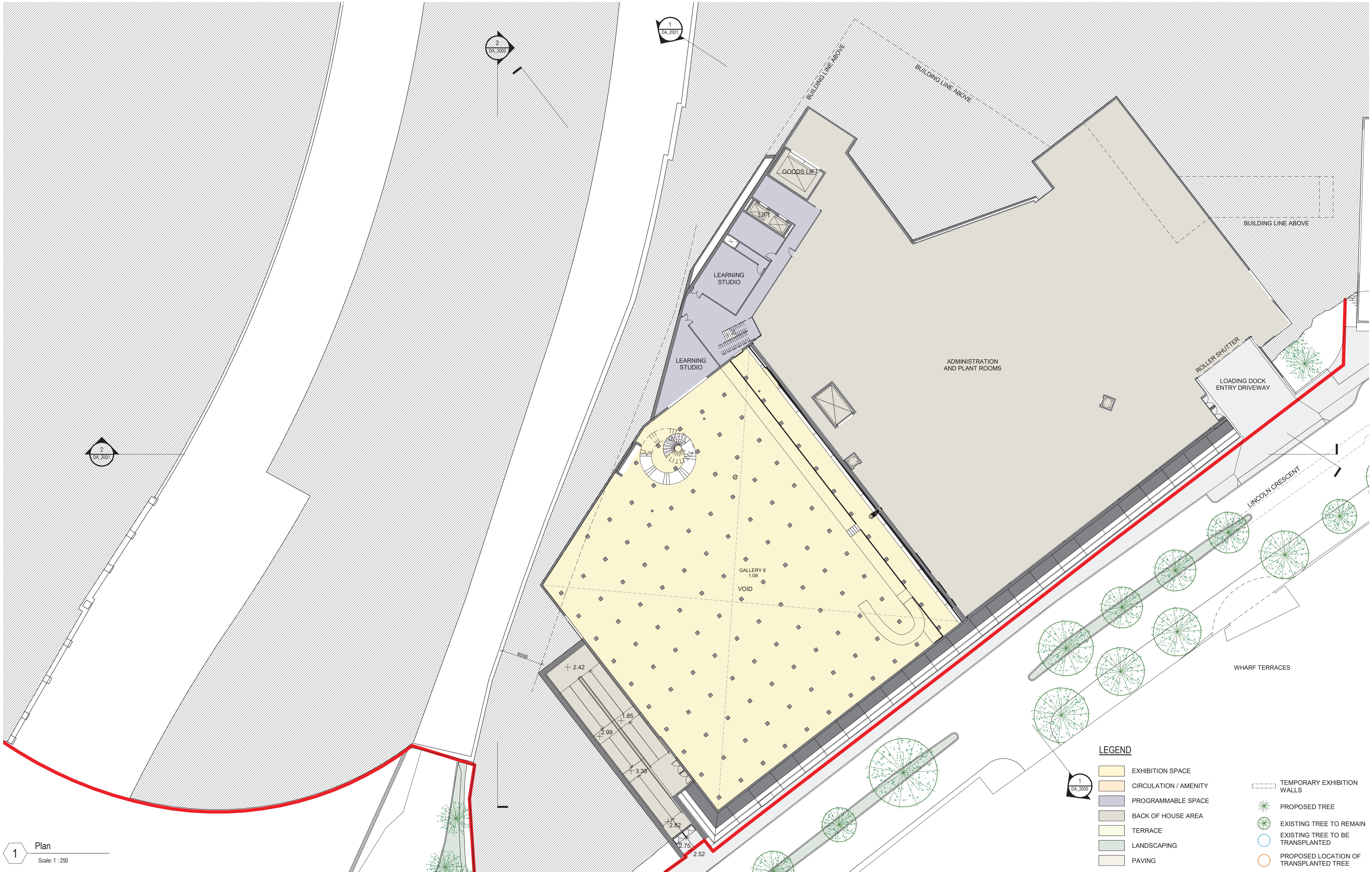
Level 18 MLC Centre 19 Martin Place
Sydney NSW 2000
T (61 2) 8252 8400
F (61 2) 8252 8600
sydney@architectus.com.au
ABN 11 098 489 448

project
ART GALLERY OF NSW EXPANSION PROJECT - SYDNEY MODERN

drawing
Lower Level 3 Plan - Demolition plan

drawing no. **DA_1004**
Revision **C**



1 Plan

Scale: 1 : 250

Revision	Description	Date
A	SSDA DRAFT	04 10 2017
B	SSDA DRAFT	06 10 2017
C	SSDA Issue	19 10 2017
D	SSDA Issue	03 11 2017

Scale:
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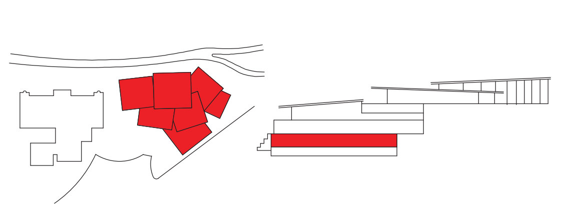
1:500 @ A3
0 2.5 5 7.5 10

checked LJ/JW/JJ

drawn Architectus project no 140419

Do not scale drawings.

Key Plan: **Key Section:**



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Tokyo, 3698
1-5-27 Tatsumi, Koto-ku, Tokyo
Japan 135-0053
T +81.3.5534.1780
sanaa@sanaa.co.jp
www.sanaa.co.jp

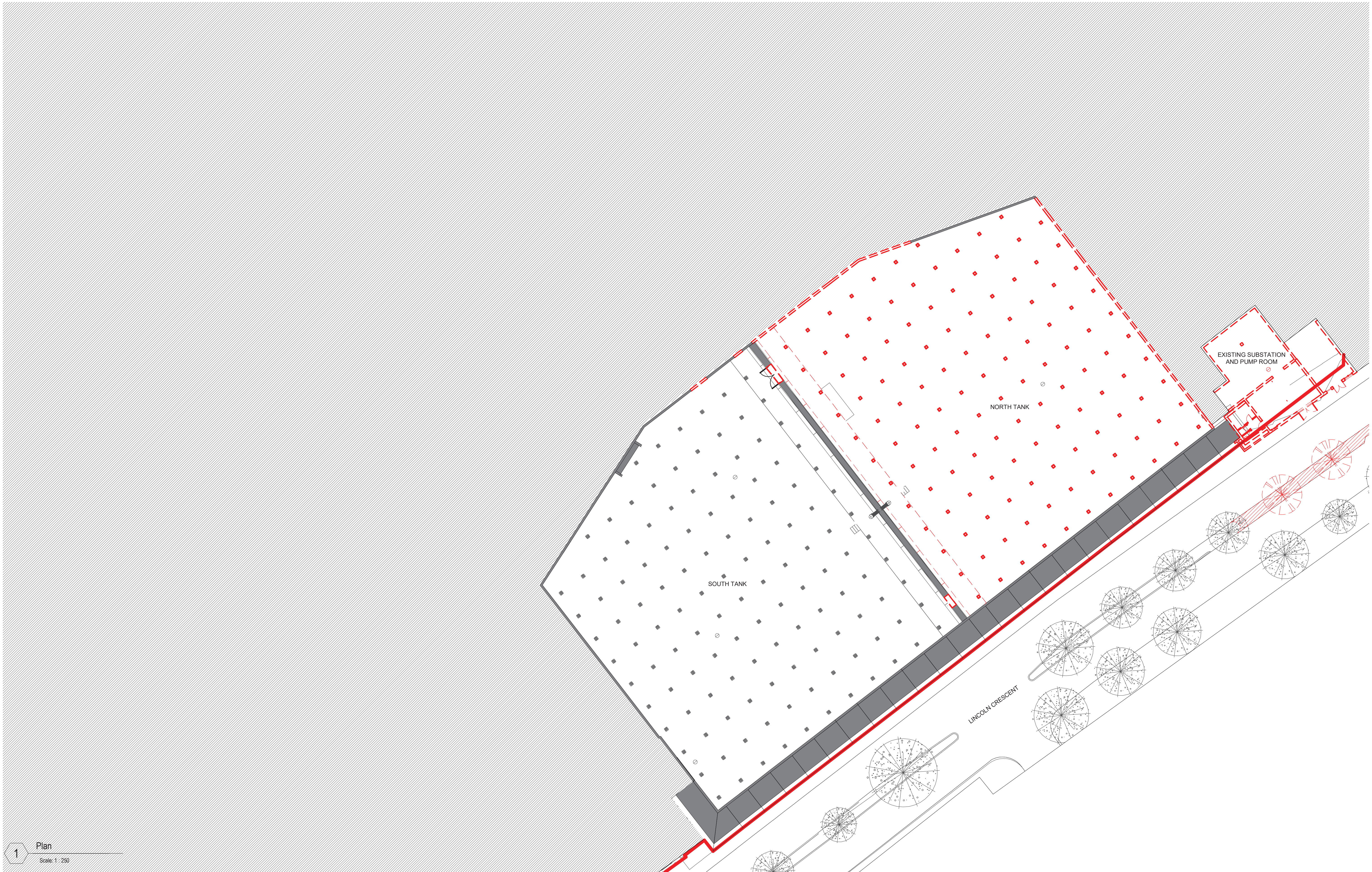
Executive Architect: architectus
Architectus Sydney
Level 18 MLC Centre 19 Martin Place
Sydney NSW 2000
T (61 2) 8252 8400
F (61 2) 8252 8600
sydney@architectus.com.au
ABN 11 098 489 448

project
ART GALLERY OF NSW EXPANSION PROJECT - SYDNEY MODERN

drawing
Lower Level 3 Plan - Proposed Plan

drawing no. **DA_1005**

Revision **D**



1 Plan

Scale: 1 : 250

Revision	Description	Date
A	SSDA DRAFT	06 10 2017
B	SSDA Issue	19 10 2017
C	SSDA Issue	03 11 2017

Scale:

1:250 @ A1
1:500 @ A3

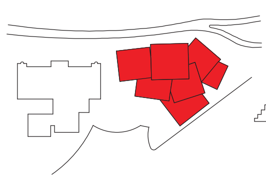
0 2.5 5 7.5 10

checked LJ/JW/JJ

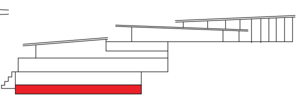
drawn Architectus project no 140419

Do not scale drawings.

Key Plan:



Key Section:



Client:

ART GALLERY NSW

Art Gallery of NSW

Art Gallery Road
Sydney, NSW, 2000

T (61 2) 9225 1780

Lead Architect: SANAA

Kazuyo Sejima + Ryue Nishizawa / S A N A A

SANAA JIMUSHO LTD.
Tokyo, 3698
1-5-27 Tatsumi, Koto-ku, Tokyo
Japan 135-0053
T +81.3.5534.1780
sanaa@sanaa.co.jp
www.sanaa.co.jp

Executive Architect: architectus

Architectus Sydney
Level 18 MLC Centre 19 Martin Place
Sydney NSW 2000
T (61 2) 8252 8400
F (61 2) 8252 8600
sydney@architectus.com.au
ABN 11 098 489 448

project

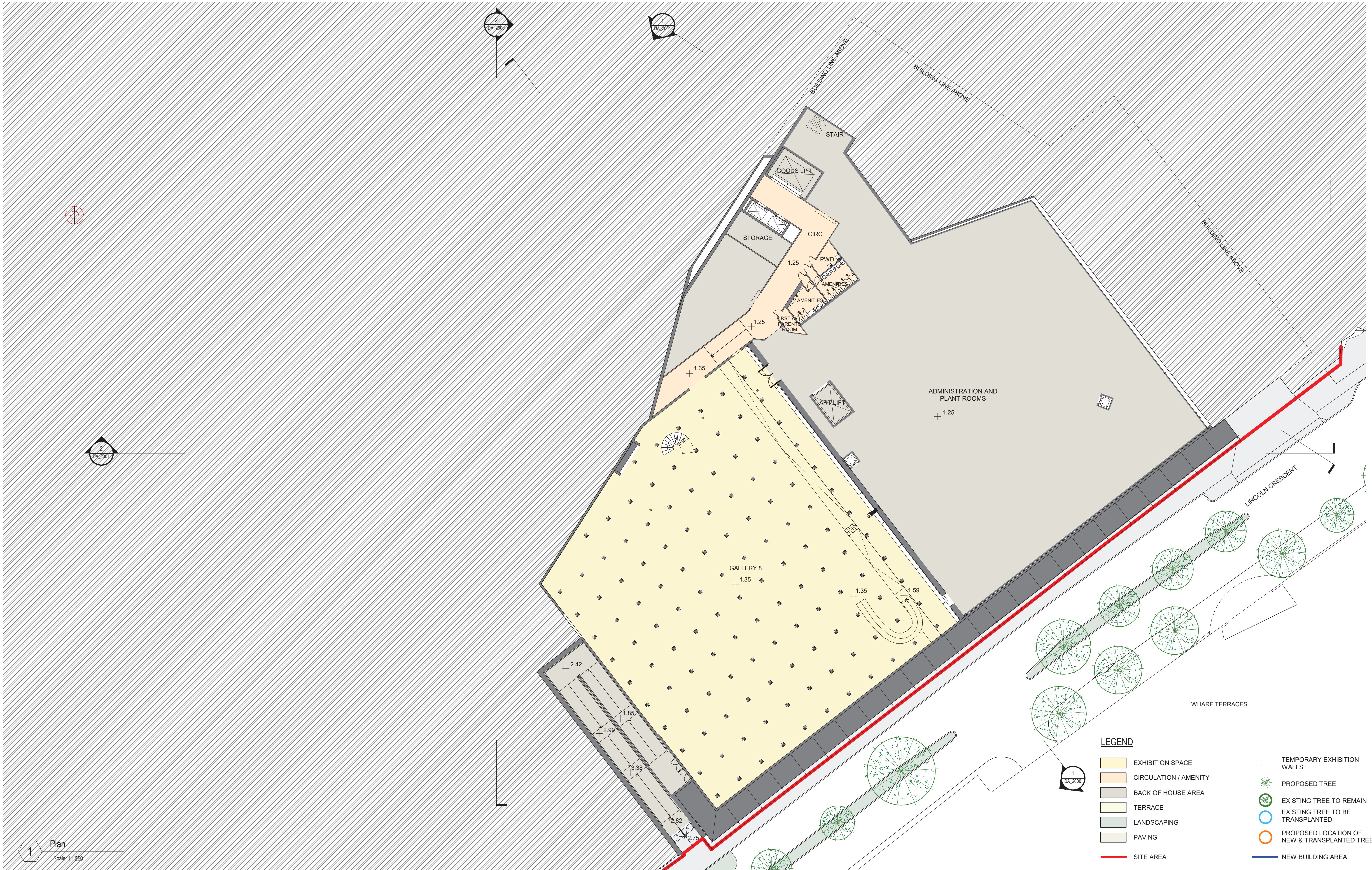
ART GALLERY OF NSW EXPANSION PROJECT - SYDNEY MODERN

drawing

Lower Level 4 Plan - Demolition Plan

drawing no. **DA_1006**

Revision **C**



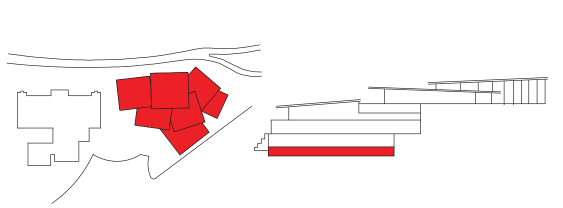
Revision	Description	Date
A	SSDA DRAFT	04 10 2017
B	SSDA DRAFT	06 10 2017
C	SSDA Issue	19 10 2017
D	SSDA Issue	03 11 2017

Scale:
1:250 @ A1
1:500 @ A3

checked LJ/JW/JJ
drawn Architectus
project no 140419

Do not scale drawings.

Key Plan: **Key Section:**



Client:

ART GALLERY NSW

Art Gallery of NSW
Art Gallery Road
Sydney, NSW, 2000
T (61 2) 9225 1780

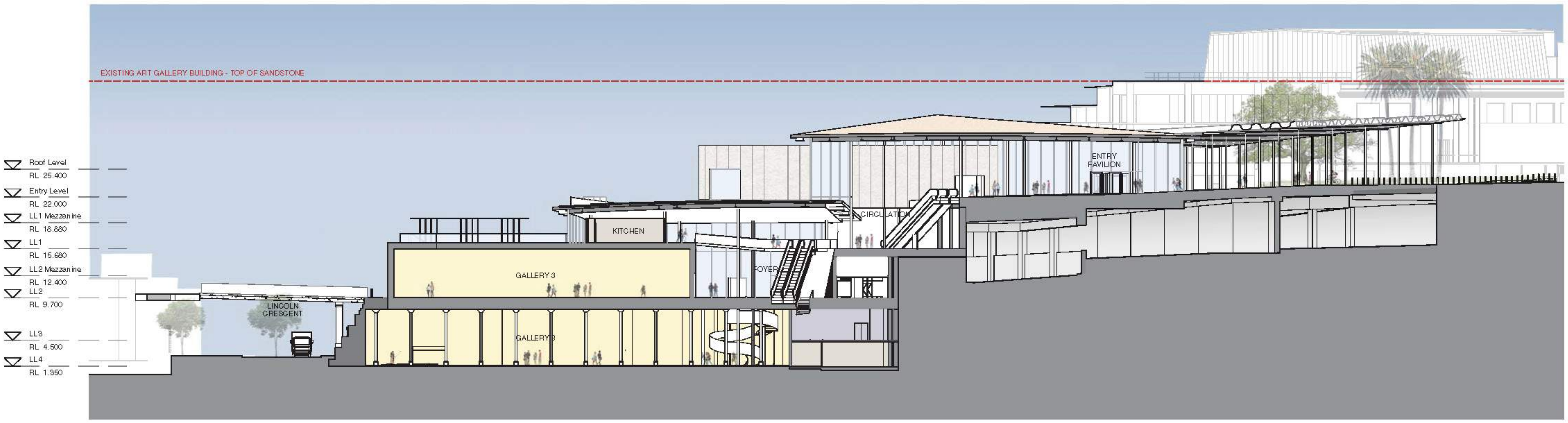
Lead Architect: SANAA
Kazuyo Sejima + Ryue Nishizawa / S A N A A
SANAA JIMUSHO LTD.
Tokyo, 3698
1-5-27 Tatsumi, Koto-ku, Tokyo
Japan 135-0053
T +81.3.5534.1780
sanaa@sanaa.co.jp
www.sanaa.co.jp

Executive Architect: architectus
Architectus Sydney
Level 18 MLC Centre 19 Martin Place
Sydney NSW 2000
T (61 2) 8252 8400
F (61 2) 8252 8600
sydney@architectus.com.au
ABN 11 098 489 448

project
ART GALLERY OF NSW EXPANSION PROJECT - SYDNEY MODERN

drawing
Lower Level 4 Plan - Proposed Plan

drawing no. DA_1007
Revision D



① Section AA
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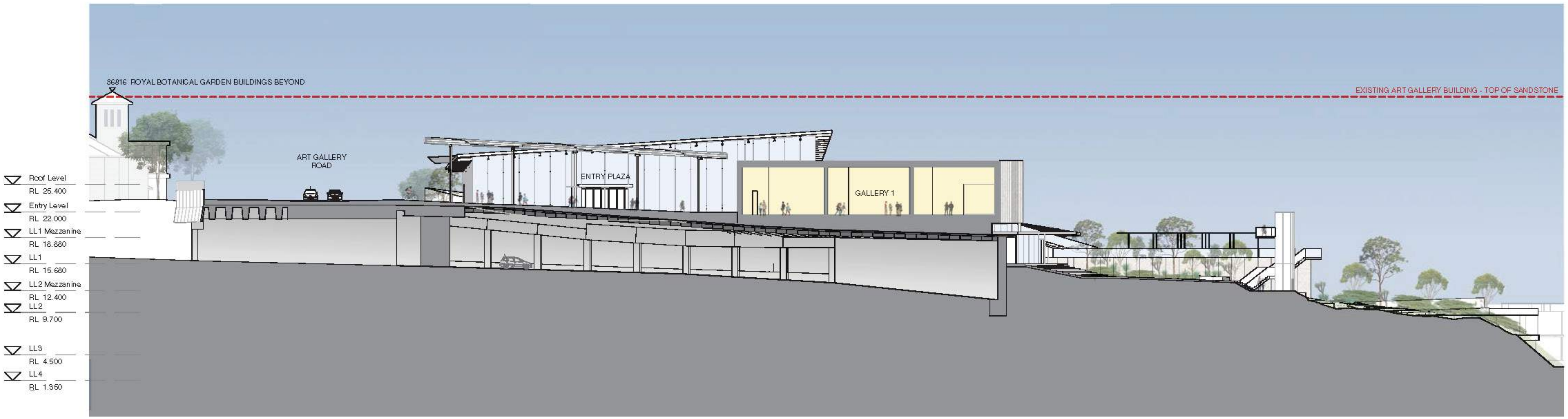


② Section BB
Scale: 1 : 250

Copyright

Revision	Description	Date
A	SSDA DRAFT	04 10 2017
B	SSDA DRAFT	06 10 2017
C	SSDA Issue	19 10 2017
D	SSDA Issue	03 11 2017

Scale:
1:250 @ A1
1:500 @ A3
0 2.5 5 7.5 10

checked LJ/JW/JJ
drawn Architectus
project no 140419
Do not scale drawings.

Client:
ART GALLERY NSW
Art Gallery of NSW
Art Gallery Road
Sydney, NSW, 2000
T (61 2) 9225 1700

Lead Architect: SANAA
Kazuyo Sejima + Ryue Nishizawa / S A N A A
SANAA JIMUSHO LTD.
Japan 135-0053
www.sanaa.co.jp

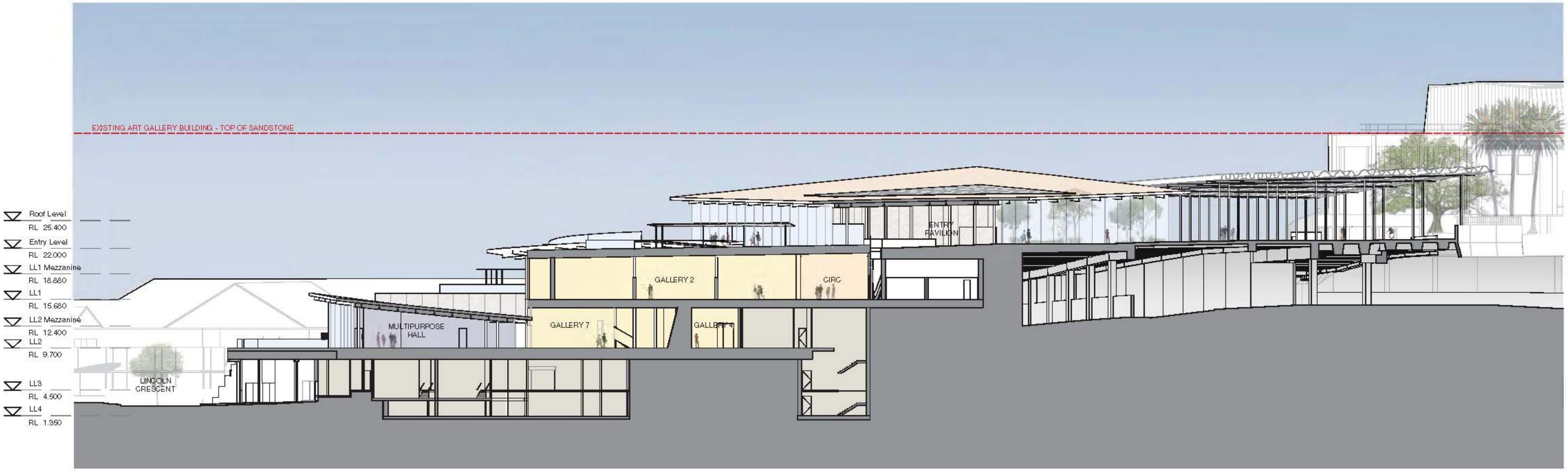
Executive Architect: architectus
Architectus Sydney
Level 18 MLC Centre 19 Martin Place
Sydney NSW 2000

project
ART GALLERY OF NSW EXPANSION PROJECT - SYDNEY MODERN

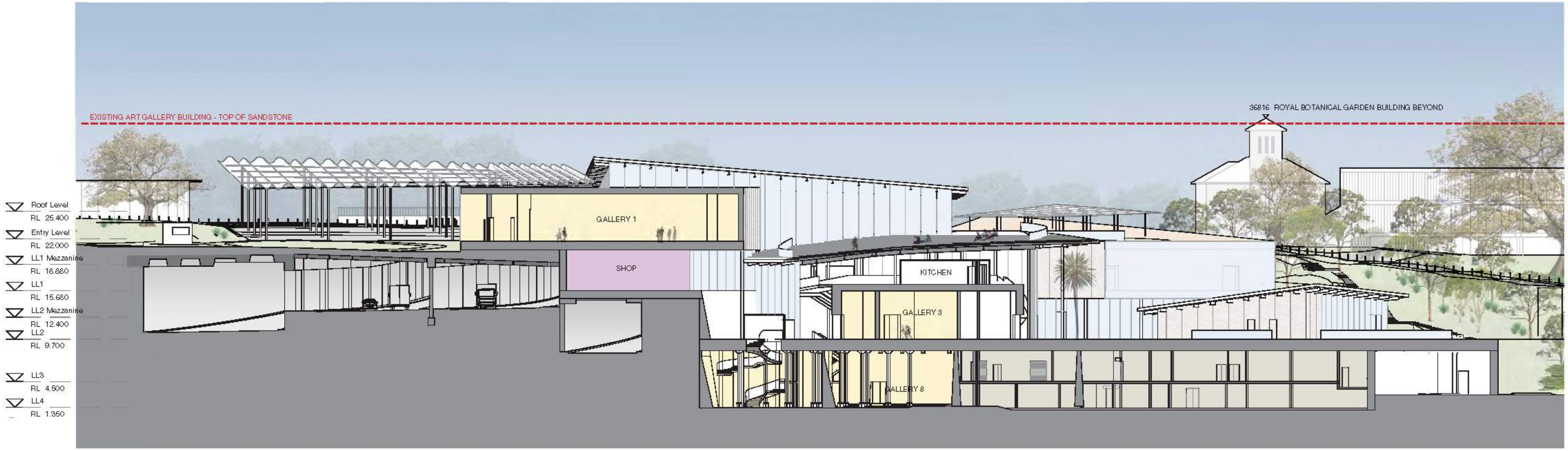
drawing
Sections AA & BB

drawing no.
DA_2000

Revision
D



1 Section CC
Scale: 1 : 250



2 Section DD
Scale: 1 : 250

Copyright:

Revision	Description	Date
A	SSDA DRAFT	04 10 2017
B	SSDA DRAFT	06 10 2017
C	SSDA Issue	19 10 2017
D	SSDA Issue	03 11 2017

Scale: 0 2.5 5 7.5 10
1:250 @ A1
1:500 @ A3

checked LJ/JW/JJ
drawn Architectus
project no 140419
Do not scale drawings.

Client:
ART GALLERY NSW
Art Gallery of NSW
Art Gallery Road
Sydney, NSW, 2000
T (61 2) 9225 1780

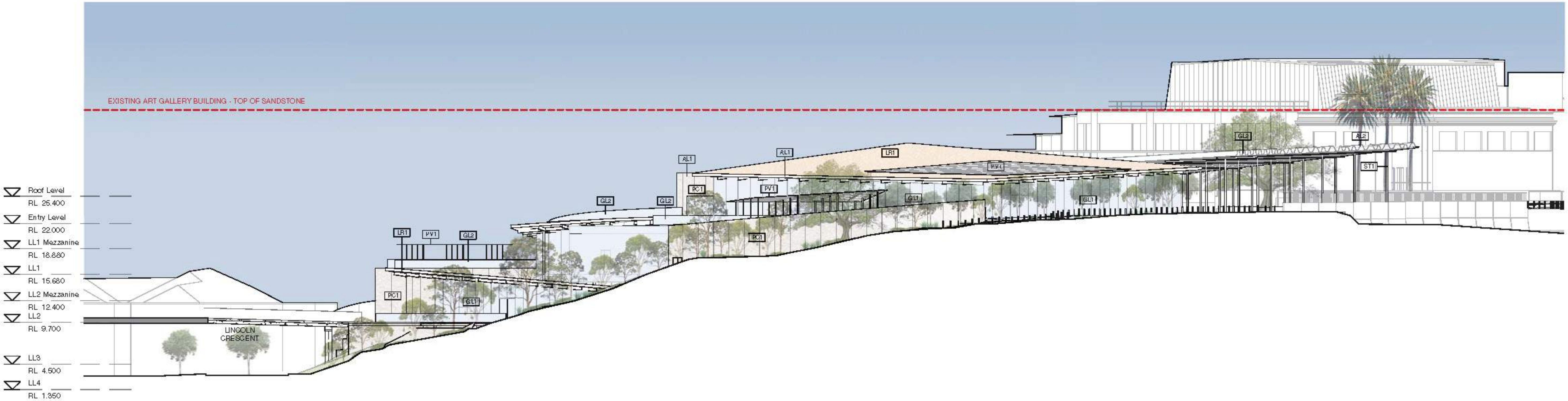
Lead Architect: SANAA
Kazuyo Sejima + Ryue Nishizawa / S A N A A

Executive Architect: architectus
Architectus Sydney
Level 18 MLC Centre 19 Martin Place
Sydney NSW 2000
T (61 2) 8252 8400
F (61 2) 8252 8600
sydney@architectus.com.au

project
ART GALLERY OF NSW EXPANSION PROJECT - SYDNEY MODERN

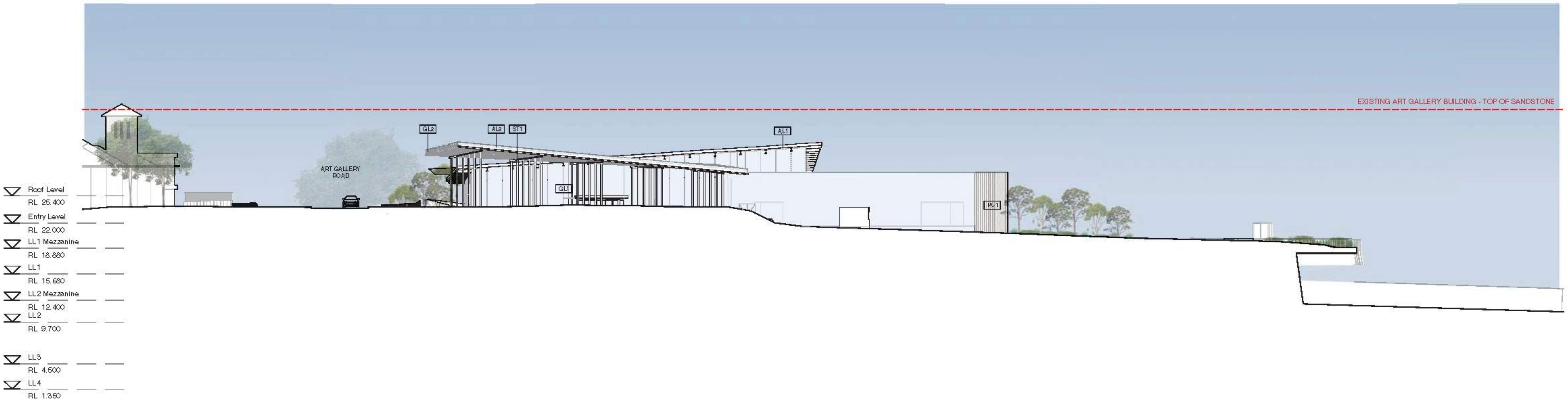
drawing
Sections CC & DD

drawing no. DA_2001
Revision D



1 North Elevation

Scale: 1 : 250



2 South Elevation

Scale: 1 : 250

MATERIALS LEGEND

AL1	ALUMINIUM	GL1	GLASS	PV1	PHOTOVOLTAIC PANEL
AL2	ALUMINIUM SPECIAL	GL2	GLASS BALUSTRADE	ST1	PAINTED STEEL
AL3	ALUMINIUM	LR1	LANDSCAPE ROOF	PC1	POLISHED PRECAST CONCRETE PANEL

Revision	Description	Date
A	SSDA DRAFT	06.10.2017
B	SSDA Issue	19.10.2017
C	SSDA Issue	03.11.2017

Scale: 1:250 @ A1, 1:500 @ A3 (0, 2.5, 5, 7.5, 10)

checked LJ/JW/JJ

drawn Architectus

project no 140419

Do not scale drawings.

Client:
ART GALLERY NSW
Art Gallery of NSW
Art Gallery Road
Sydney, NSW, 2000
T (61 2) 9225 1780

Lead Architect: SANAA
Kazuyo Sejima + Ryue Nishizawa / S A N A A
SANAA JIMUSHO LTD.
Tokyo, 3698
1-5-27 Tatsumi, Koto-ku, Tokyo
Japan 135-0053
T +81.3.5534.1780
sanaa@sanaa.co.jp
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Executive Architect: architectus
Architectus Sydney
Level 18 MLC Centre 19 Martin Place
Sydney NSW 2000
T (61 2) 8252 8400
F (61 2) 8252 8600
sydney@architectus.com.au
ABN 11 098 489 448

project
ART GALLERY OF NSW EXPANSION PROJECT - SYDNEY MODERN

drawing
North & South Elevations

drawing no. DA_3000

Revision C