CONDITIONS OF APPROVAL

The following conditions have been imposed to ensure that any development activity is carried out in accordance with the plans/documentation and any amendment approved under Part 5 of the Environmental Planning and Assessment Act 1979.

GENERAL CONDITIONS

1. DEVELOPMENT IN ACCORDANCE WITH PLANS AND DOCUMENTATION

1.1. The development must be carried out generally in accordance with the Review of Environmental Factors dated 05 July 2022, and prepared by Architectus Australia Pty Ltd (including accompanying **Appendices B – X**) and generally in accordance with the following plans/documentation as below and by any of the undermentioned conditions:

Title/Name	*Drawing Number/ reference*	*Rev./ Issue*	*Date*	*Prepared by*
Architectural Plans				
REF 2 – Cover Sheet	RPA-ARC-JAC-DRG-REF2-0000	D	17/05/2022	Jacobs
REF 2 – Existing Site Plan	RPA-ARC-JAC-DRG-REF2-3221	G	17/05/2022	Jacobs
REF 2 – Proposed Site Plan	RPA-ARC-JAC-DRG-REF2-3222	I	01/07//2022	Jacobs
REF 2 – Demolition Plan-Level 2	RPA-ARC-JAC-DRG-REF2-3223	I	01/07//2022	Jacobs
REF2 - Demolition Plan - Level 4	RPA-ARC-JAC-DRG-REF2-3224	H	01/07//2022	Jacobs
REF 2 – Proposed Plan-Level 2	RPA-ARC-JAC-DRG-REF2-3225	H	01/07//2022	Jacobs
REF 2- Proposed Plan-Level 4	RPA-ARC-JAC-DRG-REF2-3226	H	01/07//2022	Jacobs
REF 2- Elevation/ Sections	RPA-ARC-JAC-DRG-REF2-3230	G	17/05/2022	Jacobs
REF 2- Section/ Rendering	RPA-ARC-JAC-DRG-REF2-3231	B	17/05/2022	Jacobs
Survey Plan				
Contour & Detail Survey	PR142110-DS-001-A.DWG	A	14/05/2019	RPS
Utilities Investigation	PR142110-UTIL-001-B.dwg	B	14/05/2019	RPS
REF 2- Erosion and Sediment Control Plan	RPA-CIV-TTW-DRG-EW-ZZ-0202	B	31/05/2022	TTW/Jacobs
REF 2- Existing Survey and Services	RPA-CIV-TTW-DRG-EW-XX-0211	B	31/05/2022	TTW/Jacobs
REF 2- Siteworks Plan	RPA-CIV-TTW-DRG-EW-XX-0231	B	31/05/2022	TTW/Jacobs
REF 2- Proposed Change in Levels	RPA-CIV-TTW-DRG-EW-XX-0232	B	31/05/2022	TTW/Jacobs
REF 2- Turning Path Plan	RPA-CIV-TTW-DRG-EW-XX-2040	B	31/05/2022	TTW/Jacobs
Heritage				
Final Heritage Impact Assessment Letter		-	18/05/2022	Heritage 21

Title/Name	*Drawing Number/ reference*	*Rev./ Issue*	*Date*	*Prepared by*
Aboriginal Heritage				
Aboriginal Due Diligence Assessment		FINAL	13/05/2022	Biosis
Construction Management				
Preliminary Construction Management Plan		FINAL	19/06/2022	TSA
Traffic				
Traffic Impact Statement		3.0	02/06/2022	SCT Consulting
Waste				
Waste Management Plan		FINAL	06/06/2022	TSA
Ecology				
Ecological Assessment		FINAL	15/06/2022	Narla
Aboricultural Impact Assessment Report		FINAL	20/05/2022	Martin Peacock Tree Care
Hazardous Building Materials				
Hazardous Building Materials Survey Report		V1F	25/05/2022	Sydney Environmental Group
Acoustic				
Acoustic Assessment Report		AC03	07/06/2022	Arup
Utilities				
Utility Services Report - Hydraulics		E	15/06/2022	Warren Smith
Utility Services Report – Electrical, ICT and Mechanical Utilities + Electrical Plans		B	20/05/2022	Arup
BCA				
BCA Access Report		1	14/06/2022	BMG
Civil Works				
Civil Report		2	31/05/2022	TTW
Geotechnical				
Geotechnical Interpretive Report		A	16/02/2022	Stantec
Contamination				
Targeted Soil Investigations Report			22/06/2022	Stantec

2. APPROVALS

2.1. A Certificate under Section 6.28 of the Environmental Planning and Assessment Act 1979 is to be obtained prior to any work commencing.

2.2. The applicant is to obtain all other necessary approvals required by State and Commonwealth legislation and relevant City of Sydney policies. A copy of this approval and all other approvals is to be kept on site at all times for the duration of works.

3. BUILDING CODE OF AUSTRALIA

3.1. All building work is to be undertaken in accordance with the Building Code of Australia and referenced Australian Standards, including the requirements of AS 1428.1 General Requirements for Access.

4. COMMUNITY CONSULTATION

4.1. Consultation with the community is to be conducted during construction including, but not limited to advance notification of planned activities and expected disruption/effects and construction noise complaints handling procedures.

PRIOR TO COMMENCEMENT OF WORKS

Note: The following Conditions are to be complied with prior to the commencement of works on the subject site.

5. CONSTRUCTION SITE MANAGEMENT

5.1. A Construction Environmental Management Plan (CEMP) is to be prepared prior to the commencement of works and implemented during the undertaking of works. The CEMP is to include, but not be limited to:

(a) Construction noise management measures.

(b) Construction waste management measures.

(c) Construction site management measures (including induction, safety, emergency and incident reporting procedures).

(d) Tree protection measures.

(e) Acoustic and vibration management measures; refer to condition 8 for requirements under a Construction Noise and Vibration Management Plan.

(f) Air quality, odour and dust management measures, including management of site generated odours and impact on adjacent hospital operations.

(g) Construction traffic management measures, refer to condition 9 for requirements under a Construction Traffic and Pedestrian Management Plan.

(h) Restrictions on hours during construction.

(i) Heritage related unexpected finds protocols.

(j) Measures associated with the handling, storage and disposal of hazardous materials.

(k) Measures associated with the handling, storage and disposal of hazardous chemicals.

(l) Consider alternative means of access for construction workers including the use of public transport and potential shuttle bus services to transport workers to and from the nearest train station

(m) Notification to local residents prior to commencement of works

(n) Consider a complaints resolution process to address any issues raised by local residents during construction

6. CONSTRUCTION WASTE MANAGEMENT

6.1. A Construction Waste Management Plan shall be prepared by an appropriately qualified contractor prior to the commencement of works. The Waste Management Plan should be prepared in accordance with Office of Environment and Heritage's "Waste Classification Guidelines (2008)" and the *Protection of the Environment Operations Act 1997*.

6.2. The Construction Waste Management Plan is to include the following requirements and details:

(a) The type and volume of all waste materials (e.g. bricks, concrete, timbers, plasterboard and metals) is to be estimated prior to the commencement of works, with the appropriate destination for each type of waste identified. Waste should be re-used or recycled as much as practicable. Where not practicable, the location of a suitable waste disposal facility is to be identified.

(b) Non-recyclable waste and containers are to be regularly collected and disposed of at a licensed disposal site. Frequency of collection should be identified.

(c) No burning or burying of waste is permitted on the site.

(d) Any bulk garbage bins delivered by authorised waste contractors are to be placed and kept within the property boundary.

6.3. All waste (including hazardous materials) must be stored appropriately on site by the head contractor and disposed of by a licensed waste contractor at a licensed facility which can receive such waste.

7. HAZARDOUS MATERIALS

7.1. All asbestos handling shall be carried out consistent with the current Safework Guidelines.

7.2. An unexpected finds procedure is to be included in an overarching Construction Management Plan (CMP) for the work, if other contamination is encountered which has not been identified during this assessment.

7.3. Waste must be transported by an appropriately licensed transporter and disposed to a facility that is licensed to receive that class of waste.

7.4. Safe Work NSW is to be notified in accordance with the relevant policy prior to work involving asbestos material being undertaken.

7.5. Removal of refrigerant gases for all HVAC equipment is to be undertaken by a qualified HVAC technician prior to removal of HVAC equipment.

7.6. The code of practice, "Code of Practice for the Safe Use of Synthetic Mineral Fibres NOHSC:2006 (1990)]" is be closely adhered to when handling air conditioning, ducting, and insulation material, presumed to contain Synthetic Mineral Fibres.

8. CONSTRUCTION NOISE AND VIBRATION MANAGEMENT PLAN

8.1. A Construction Noise and Vibration Management Plan is to be prepared by an appropriately qualified engineer prior to the commencement of works and implemented during the undertaking of works. The Construction Noise and Vibration Management Plan is to, but not be limited to:

a) Identify feasible acoustic controls or management techniques (use of screens, scheduling of noisy works, notification of adjoining land users, respite periods) when excessive levels may occur.

b) Include the 'mitigation measures' detailed in the Acoustic Assessment prepared by ARUP, dated 7 June 2022, to mitigate potential noise impacts.

8.2. During preparation of the Construction Noise and Vibration Management Plan, consult with the hospital and other sensitive receivers to determine what areas (if any) of the these are particularly noise sensitive, and at what time.

9. CONSTRUCTION TRAFFIC AND PEDESTRIAN MANAGEMENT PLAN

9.1. A Construction Traffic and Pedestrian Management Plan is to be prepared by an appropriately qualified engineer prior to the commencement of works and implemented during the undertaking of works. The Construction Traffic and Pedestrian Management Plan is to be informed by the Traffic Impact Statement prepared by SCT Consulting dated 2 June 2022 and is to include, but not be limited to:

a) Determine the relevant construction traffic flows and assess the predicted road traffic noise levels in accordance with relevant criteria, and include measures to minimise construction vehicle movement outside of sensitive uses

b) Methods to minimise disruption of hospital operations caused by construction

c) Management of loading dock access and schedule of deliveries

d) Emergency department access management

e) construction vehicle movements to and from the site, with consideration given to minimizing disruption to access to the hospital and main loading dock;

f) Determine any required management measures associated with the impact to adjoining roads and parking, including accessible parking within Gloucester Plaza;

g) Arrangements for parking for during construction works, for hospital users and construction workers, including for accessible parking;

h) Determine measures required to ensure access to the hospital and private properties are not adversely affected.

10. CONTAMINATION

10.1. Detailed site investigations must be undertaken in accordance with the Resilience SEPP (previously known as SEPP 55) and the contaminated land planning guidelines, to determine whether the land subject to the proposed activity is contaminated, and if it is found to be contaminated, whether the site is suitable for the proposed use with the contamination or following remediation.

10.2. A Detailed Site Investigation report must be prepared, or reviewed and approved, by a suitably qualified contaminated land specialist (i.e. a Certified Environmental Practitioner) to investigate and assess the category of the contamination in accordance with Resilience SEPP.

10.3. Where remediation is deemed necessary, all remedial works are to be carried out in accordance with a Remediation Action Plan prepared or reviewed and approved by a Certified Environmental Practitioner, which details the necessary remedial work or management required to render the site suitable for the proposed development. All remedial work is to be completed prior to the commencement of relevant works.

11. TREE MANAGEMENT

11.1. No approval is granted for the removal of any trees other than the 4 identified palm trees in Tree group 59. All other trees must be protected throughout the duration of construction works.

11.2. Replacement tree planting must be provided on site for with four (4) new trees. The professional advice of a registered landscape architect or arborist must be sought to inform of the suitability of the species and their placement on site.

11.1. Tree protection measures must be installed in accordance with Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970) prior to the commencement of works.

DURING UNDERTAKING OF WORKS

Note: The following Conditions are to be complied with during the approved construction/the undertaking of works.

12. CONSTRUCTION SITE MANAGEMENT MEASURES

12.1. The worksite should be left tidy and rubbish free each day prior to leaving the site and at the completion of works.

12.2. All hazardous materials or dangerous goods must be stored appropriately on site.

12.3. All materials on-site or being delivered to the site must be wholly contained within the site. The requirements of the *Protection of the Environment Operations Act 1997* are to be complied with when placing/stockpiling loose material or when disposing of waste products or during any other activities likely to pollute drains or watercourses.

12.4. The public way must not be obstructed by any materials, vehicles, refuse, skips or the like, under any circumstances.

12.5. All equipment and machinery should be secured against vandalism outside of working hours.

12.6. All lighting associated with night time works is to be compliant with AS 4282-2019 Control of the obtrusive effects so as to minimize adverse effects of outdoor on nearby residents, notably at St Andrew's College.

12.7. A copy of the approved and certified plans, specifications and documentation shall be kept on site at all times and shall be available for perusal by any officer of Council.

12.8. Any contractor(s) must meet all workplace safety legislation and requirements.

13. ROAD WORKS

13.1. The road and vehicle manoeuvring areas must be properly construction, graded, drained, sealed and line marked including directional arrows with impervious paving material, in accordance with Australian Standard AS2890.1-2004 and the City of Sydney's Public Domain Manual 2021.

14. SERVICES

14.1. All services and utilities in the area of construction must be appropriately disconnected as required. The contractor is required (if necessary) to consult with the various service authorities regarding their requirements for the disconnection of services.

15. AIR QUALITY AND DUST MANAGEMENT

15.1. Dust control is to be undertaken. Specific measures to be implemented include:

(a) During works, as necessary, excavation areas will be wetted down using a water spray to minimise the potential for dust to be generated by the Contractor. A wetting or bonding agent may be used to further bind the soil to minimise asbestos fibre release.

(b) Any asbestos impacted soils must be wetted (but not flooded) prior to and during excavation and movement of the soils. To control dust in significant areas of exposed asbestos contaminated fill, industrial misting fans, placed at the outer extents of remedial/excavation areas, must be utilised by the Contractor.

(c) Dust shall also be controlled by ensuring vehicles leave via the designated (stabilised) site access and all equipment have dust suppressors fitted by the Contractor.

(d) During works, dust screens will be erected around the perimeter of the site by the Contractor. Where significant fugitive emissions are observed from asbestos inspection / treatment pads, these areas shall be wetted and/or covered by the Contractor.

(e) Meteorological conditions shall be monitored and Contractor.

(f) Dust, odour or emission generating work will be stopped or modified where meteorological conditions are adverse (i.e., dry conditions and strong winds towards sensitive receptors).

(g) Implement various methods of control during removal works to ensure dust minimisation, such as wetting of soil with water cart, misting fans and bonding sprays and controlled excavation methods. If the head contractor determines the generation of excess dust, they may order a Stop Works Order, with no time or cost implication to the Principal.

(h) If potentially asbestos containing dust levels exceeds allowable limits or potentially asbestos containing dust is observed during works, the head contractor may issue a Stop Works instruction at no time or cost to the Principal.

15.2. Odour / volatile emission control shall be undertaken. Specific measures to be implemented include:

(a) No odours should be detectable at the site boundary and volatile emissions of other potentially volatile substances shall be controlled. Appropriate actions will be taken by the Contractor to reduce the odours, which may include increasing the amount of covering of excavations / stockpiles; mist sprays; odour suppressants; and maintenance of equipment.

(b) Records of volatile emissions and odours shall be kept by the Contractor. Equipment and machinery will be adequately maintained to minimise exhaust emissions. No materials shall be burnt on the site.

15.3. The following general site management practices shall also be implemented and undertaken:

(a) Spraying of paint and other materials with the potential to become air borne particulates is only to be undertaken on days with still or light wind conditions.

(b) No burning of vegetation or other materials is permitted.

(c) Dust generated during construction activities is to be controlled by regular control measures such as on-site watering.

(d) All necessary maintenance for construction vehicles and equipment is to be undertaken during the construction period.

(e) Excessive use of vehicles and powered construction equipment is to be avoided.

(f) Exposed areas are to be progressively revegetated as soon as practical.

(g) Vehicle wash down areas are to be established to ensure all mud and soil from construction vehicles is not carried onto public roads.

(h) All vehicles involved in any excavation and departing the site with construction materials, spoil or loose matter must have their loads fully covered before entering the public roadway.

(i) Any mud deposited on the road network due to truck movements to and from the site is to be cleaned up immediately.

16. RESTRICTION ON HOURS DURING CONSTRUCTION

16.1. The undertaking of any construction activity on the subject site are permitted to occur within the following hours:

(a) Monday to Friday inclusive: 7.00am to 6.00pm

(b) Saturdays: 7.00am to 1.00pm

(c) No works on Sundays and public holidays.

Additionally, the following construction hours are permitted for specified construction activities:

(d) Saturday – 7am to 8am – for low noise works only including site preparation works.

(e) Monday to Sunday (7 days) – 24 hours/day – where necessary to reduce the impact on staff and patients at the hospital caused by the temporary closure of Gloucester House Drive and Gloucester House Plaza.

17. HERITAGE

17.1. All Aboriginal objects and Places are protected under the NSW National Parks and Wildlife Act 1974. It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by the Office of Environment and Heritage (OEH). Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object the archaeologist will provide further recommendations. These may include notifying the OEH and Aboriginal stakeholders.

17.2. Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity you must:

(a) Immediately cease all work at that location and not further move or disturb the remains

(b) Notify the NSW Police and OEH's Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location

(c) Not recommence work at that location unless authorised in writing by OEH.

17.3. If, during the course of any ground disturbance works suspected archaeological relics, as defined by the Heritage Act 1977 are uncovered, work should cease in that area immediately. The Heritage Division of the Office of Environment and Heritage (Enviroline 131 555) should be notified and works only recommence when an approved management strategy developed.

17.4. In the unlikely event that suspected human skeletal remains are identified, the following procedure for uncovering bones must be followed: Work must cease immediately in the vicinity of the remains and the area must be cordoned off; a qualified forensic or physical anthropologist must determine whether the remains are human or non-human – these specialist consultants can be sought by contacting the OEH Environment Line 131 555. Where it is instantly obvious that the remains are human, the Project Manager should contact the police by phone.

17.5. If the bones are identified as human, a technical specialist must determine the likely ancestry (Aboriginal or non-Aboriginal) and the likely burial context (archaeological or forensic). Where the remains are forensic, the site becomes the jurisdiction of the NSW Coroner. If the remains are archaeological, the OEH must be notified and (for Aboriginal remains) the relevant Aboriginal parties must be notified. A management plan must be prepared in consultation with the registered Aboriginal parties.

18. NOISE AND VIBRATION MANAGEMENT

18.1. The contractor shall operate in accordance with the Construction Noise and Vibration Management Plan as required by Condition 8.

18.2. All works will be in accordance with AS2436-2010: Guide to Noise Control on Construction and Maintenance Sites.

18.3. Building contractors are to implement the requirements of the Office of Environment "Interim Construction Noise Guideline (July 2009)" as far as practicable.

18.4. Construction is to be carried out in accordance with the Building Code of Australia deemed-to-satisfy provisions with respect to noise transmission.

18.5. All reasonable, practicable steps are to be undertaken to reduce noise and vibration from the site.

18.6. Plant and equipment is to be maintained, checked and calibrated in accordance with the appropriate design requirements and to ensure that maximum sound power levels are not exceeded.

18.7. Plant and equipment (where possible) are to be strategically positioned on site to reduce the emission of noise from the site to the surrounding area, users of the site and on-site personnel.

18.8. Unnecessary noise is to be avoided when carrying out manual operations and operating plant.

18.9. Any equipment not used for extended periods is to be switched off.

19. TREE PROTECTION

19.1. All works should be avoided within the TPZ of retained trees;

19.2. Adequate erosion and sediment measures must be in place at all times during construction activity and will follow best practice guidelines (Landcom 2004); and

19.3. In relation to, storage and stockpiling: All storage, stockpile and laydown sites must be positioned away from trees that are to be retained. Appropriate erosion and sediment control should be erected around soil stockpiles to avoid incurring indirect impacts on biodiversity values.

20. CONTAMINATION (UNEXPECTED FINDS)

20.1. Should any new soil contamination information or contaminants be identified during the undertaking of works which have the potential to alter previous conclusions about site contamination, then the Managing Contractor and HI must be immediately notified and works must cease in the location of the contamination.

20.2. Works must not recommence until a suitably qualified contaminated land specialist (i.e. a Certified Environmental Practitioner) has investigated and assessed the category of the contamination in accordance with Hazards and Resilience SEPP (previously known as SEPP 55) and if required prepared a Remediation Action Plan (RAP) which details the necessary remedial work or management required to render the site suitable for the proposed development.

20.3. Following completion of any remediation, a Site Remediation & Validation Report (SRVR) which documents the completeness of the remedial work is to be submitted to HI and the EPA, if required.

20.4. Any contaminated materials or hazardous substances that need to be removed from site are to be classified first and then stored, transported and disposed of in accordance with EPA requirements at an EPA licensed waste facility.

20.5. Asbestos removal and management in NSW is regulated under the Work Health and Safety Act 2011 and Work Health and Safety Regulation 2017. The handling of asbestos work must be carried out in accordance with Safework Australia Code of Practice “How to Manage and Control Asbestos in the Workplace” February 2016, including being undertaken by contractors who hold a current Safework Asbestos or Demolition Licence and any other current Safework Licence required

20.6. If soils are to be disposed offsite during construction, they are required to be disposed in accordance with the waste classification, subject to additional sampling and analysis.

20.7. Construction works should not result in the contamination of the site.

20.8. A spill containment kit will be available at all times. All personnel will be made aware of the location of the kit and trained in its effective deployment.

20.9. The contractor shall develop a procedure for the management of acid sulfate material (ASM) including identification, testing and treatment of ASM encountered during the works and opportunities for reuse of treated ASM within the site.

20.10. Materials will be sourced from licensed quarries and operators. All materials will be certified uncontaminated and environmentally safe.

21. WAYFINDING – GLOUCESTER HOUSE

21.1. Wayfinding signage is to be installed in compliance with Australian Standard 1428.4.2 (2018) (Design for access and mobility, Part 4.2: Means to assist the orientation of people with vision impairment - Wayfinding signs) within the atrium of the Main Hospital on Level 4 directing occupants to use the passenger lift to Level 5 to access the link bridge on Level 5 leading to Gloucester House.

OPERATIONAL CONDITIONS

Note: The following conditions are to be complied with throughout the operation of the proposed development, following Occupation.

22. MAINTENANCE

22.1. Regular and appropriate maintenance of stormwater quality control measures, including any pollutant trap systems, shall be ensured into perpetuity.

23. OTHER REQUIREMENTS

23.1. Works as executed drawings are to be forwarded to Health Infrastructure for information purposes at the completion of the project.

POST CONSTRUCTION CONDITIONS

Note: The following conditions are to be complied with post construction of the proposed development.

24. DILAPIDATION REPORT

24.1. After the undertaking of works, a post dilapidation report is to be prepared for hospital, Council or other assets within the zone of influence of the work.

DETERMINATION

City of Sydney
Town Hall House
456 Kent Street
Sydney NSW 2000

Telephone +61 2 9265 9333
Fax +61 2 9265 9222
council@cityofsydney.nsw.gov.au

GPO Box 1591 Sydney NSW 2001
cityofsydney.nsw.gov.au

ARCHITECTUS GROUP PTY LTD
MLC Centre
Level 18 19 Martin Pl
SYDNEY NSW 2000

PLANNING CERTIFICATE

Under Section 10.7 of the Environmental Planning and Assessment Act, 1979

Applicant:	ARCHITECTUS GROUP PTY LTD
Your reference:	
Address of property:	12 Missenden Road , CAMPERDOWN NSW 2050
Owner:	HEALTH ADMINISTRATION CORPORATION
Description of land:	Lot 1000 DP 1159799
Certificate No.:	2021333011
Certificate Date:	21/07/21
Receipt No:	0177917
Fee:	$80.00
Paid:	21/07/21

Title information and description of land are provided from data supplied by the Valuer General and shown where available.

Issuing Officer
per **Monica Barone**
Chief Executive Officer

CERTIFICATE ENQUIRIES:
Ph: 9265 9333
Fax: 9265 9415

Sydney2030/Green/Global/Connected

PLANNING CERTIFICATE UNDER SECTION 10.7 (2) OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

MATTERS AFFECTING THE LAND AS PRESCRIBED BY SCHEDULE 4 - ENVIRONMENTAL PLANNING & ASSESSMENT REGULATION, 2000, CLAUSES (1) - (2).

DEVELOPMENT CONTROLS

The following information must be read in conjunction with and subject to all other provisions of the environmental planning instruments specified in this certificate.

ZONING

Zone SP2 Infrastructure (Sydney Local Environmental Plan 2012)

1 Objectives of zone
• To provide for infrastructure and related uses.
• To prevent development that is not compatible with or that may detract from the provision of infrastructure.

2 Permitted without consent
Nil

3 Permitted with consent
Horticulture; Roads; Water storage facilities; Water treatment facilities; The purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose.

4 Prohibited
Any development not specified in item 2 or 3

PROPOSED ZONING

This property is not affected by a draft zone.

LOCAL PLANNING CONTROLS

Sydney Local Environmental Plan 2012 (as amended) – Published 14 December 2012 NSW Legislation Website.

Sydney Development Control Plan 2012 (as amended) - (commenced 14.12.2012)

Environmental Plan 2012 (the LEP).

Planning Proposal: Amendment of Sydney Local Environmental Plan 2012 – Open and Creative Planning Reforms

This planning proposal seeks a number of changes to the Sydney Local Environmental Plan 2012 (Sydney LEP 2012), and other relevant LEPs which aim to strengthen the city's cultural and night life and create a more diverse evening economy.

The planning proposal seeks to amend the following instruments: • Sydney Local Environmental Plan (LEP) 2012 • Sydney LEP 2005 • Sydney LEP (Green Square Town Centre) 2013 • Sydney LEP (Green Square Town Centre Stage 2) 2013 • Sydney LEP (Glebe Affordable Housing Project) 2011 • Sydney LEP (Harold Park) 2011 • South Sydney LEP 1998 • South Sydney LEP No. 114 (Southern Industrial and Rosebery/Zetland Planning Districts).

HERITAGE

Conservation Area
(Sydney Local Environmental Plan 2012)
This property has been identified as land within a Heritage Conservation Area.

Item of Environmental Heritage
(Sydney Local Environmental Plan 2012)
This property has been listed as an Item of Environmental Heritage

State Heritage Register (Amendment to Heritage Act, 1977, gazetted 2/4/99)
This property is identified as being of state significance and has been entered on the State Heritage Register. Unless the proposed work is exempt under the Heritage Office Standard Exemptions or is covered by site specific exemptions, an applicant must seek an integrated development approval from Council and as such the proposal will be referred to the Heritage Council. If major changes are proposed the Heritage Council may require the applicant to prepare a conservation management plan in accordance with the NSW Heritage Manual Guidelines. For further information please contact the Heritage Office (02) 9873 8500 or alternatively online www.heritage.nsw.gov.au .

STATE PLANNING INSTRUMENTS

Full copies of State Environmental Planning Policies are available online at www.planning.nsw.gov.au.

State Environmental Planning Policy No. 19 – Bushland in Urban Areas
This is a policy to protect and preserve bushland within certain urban areas, as part of the natural heritage or for recreational, educational and scientific purposes. This policy is designed to protect bushland in public open space zones and reservations, and to ensure that bush preservation is given a high priority when local environmental plans for urban development are prepared.

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
This policy aims to amend the definitions of hazardous and offensive industries; to render ineffective any environmental planning instruments not defining hazardous or offensive as per this policy; to control development of hazardous and offensive industries.

State Environmental Planning Policy No. 55 – Remediation of Land
This policy provides planning controls for the remediation of contaminated land. The policy states that land must not be developed if it is unsuitable for a proposed use because it is contaminated. If the land is unsuitable, remediation must take place before the land is developed. The policy makes remediation permissible across the State, defines when consent is required, requires all remediation to comply with standards, ensures land is investigated if contamination is suspected, and requires councils to be notified of all remediation proposals. To assist councils and developers, the Department, in conjunction with the Environment Protection Authority, has prepared Managing Land Contamination: Planning Guidelines.

State Environmental Planning Policy No. 64 – Advertising and Signage
This policy aims to ensure that signage (including advertising):
Is compatible with the desired amenity and visual character of an area, and
- Provides effective communications in suitable locations, and
- Is of a high quality design and finish.

To this end the policy regulates signage (but not content) under Part 4 of the Act and provides limited time consents for the display of certain advertisements. The policy does not apply to signage that is exempt development under an environmental planning instrument. It does apply to all signage that can be displayed with or without consent and is visible from any public place or reserve, except as provided by the policy.

This policy should be read in conjunction with the Sydney Local Environmental Plan 2005, the City of Sydney Signage and Advertising Structures Development Control Plan 2005 and State Environmental Planning Policy No. 60 where these apply.

State Environmental Planning Policy No. 65 – Design Quality of Residential Apartment Development
This policy aims to improve the design quality of flats of three or more storeys with four or more self contained dwellings. The policy sets out a series of design principles for local councils to consider when assessing development proposals for residential flat development. The policy also creates a role for an independent design review panel and requires the involvement of a qualified designer in the design and approval process.

State Environmental Planning Policy No.70 – Affordable Housing (Revised Schemes) (Gazetted 31.05.02)
The policy identifies that there is a need for affordable housing in the City of Sydney, describes the kinds of households for which affordable housing may be provided and makes a

requirement with respect to the imposition of conditions relating to the provision of affordable housing (provided other requirements under the Act are met).

State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004
This Policy does not apply to land described in Schedule 1 (Environmentally sensitive land), or land that is zoned for industrial purposes, or land to which an interim heritage order made under the *Heritage Act 1997* by the Minister administering that Act applies, or land to which a listing on the State Heritage Register kept under the *Heritage Act 1997* applies.

The Policy aims to encourage the provision of housing (including residential care facilities) that will increase the supply and diversity of residences that meet the needs of seniors or people with a disability, and make efficient use of existing infrastructure and services, and be of good design.

State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004
Aims to ensure consistency in the implementation of the BASIX scheme throughout the State. This Policy achieves its aim by overriding provisions of other environmental planning instruments and development control plans that would otherwise add to, subtract from or modify any obligations arising under the BASIX scheme.

State Environmental Planning Policy (State Significant Precincts) 2005
This Policy aims to identify development of economic, social or environmental significance to the State or regions of the State so as to provide a consistent and comprehensive assessment and decision making process for that development.
NB: This SEPP also contains exempt & complying provisions

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007
This Policy aims to provide for the proper management and development of mineral, petroleum and extractive material resources for the social and economic welfare of the State.

State Environmental Planning Policy (Miscellaneous Consent Provisions) 2007
This Policy aims to ensure that suitable provision is made for ensuring the safety of persons using temporary structures or places of public entertainment.

State Environmental Planning Policy (Infrastructure) 2007
This Policy aims to facilitate the effective delivery of infrastructure across the state.
NB: This SEPP also contains exempt & complying provisions

State Environmental Planning Policy (Exempt and Complying Development Codes) 2008
This Policy Streamlines assessment processes for development that complies with specified development standards. The policy provides exempt and complying development codes that have State-wide application, identifying, in the General Exempt Development Code, types of development that are of minimal environmental impact that may be carried out without the need for development consent; and, in the General Housing Code, types of complying development that may be carried out in accordance with a complying development certificate as defined in the Environmental Planning and Assessment Act 1979.

State Environmental Planning Policy (Affordable Rental Housing) 2009
Establishes a consistent planning regime for the provision of affordable rental housing. The policy provides incentives for new affordable rental housing, facilitates the retention of existing affordable rentals, and expands the role of not-for-profit providers. It also aims to support local centres by providing housing for workers close to places of work, and facilitate development of housing for the homeless and other disadvantaged people. NOTE: Does not apply to land at Green Square or at Ultimo Pyrmont, or on southern employment land.

State Environmental Planning Policy (Urban Renewal) 2010
The aims of this Policy are as follows:
(a) to establish the process for assessing and identifying sites as urban renewal precincts,
(b) to facilitate the orderly and economic development and redevelopment of sites in and around urban renewal precincts,
(c) to facilitate delivery of the objectives of any applicable government State, regional or metropolitan strategies connected with the renewal of urban areas that are accessible by public transport.

State Environmental Planning Policy (State and Regional Development) 2011
The aims of this Policy are as follows:
(a) to identify development that is State significant development,
(b) to identify development that is State significant infrastructure and critical State significant infrastructure,
(c) to confer functions on joint regional planning panels to determine development applications.

State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017
The aims of this Policy are:
(a) to protect the biodiversity values of trees and other vegetation in non-rural areas of the State, and
(b) to preserve the amenity of non-rural areas of the State through the preservation of trees and other vegetation.

State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017
The aim of this Policy is to facilitate the effective delivery of educational establishments and early education and care facilities across the state.

State Environmental Planning Policy (Coastal Management) 2018
The aim of this Policy is to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the Coastal Management Act 2016, including the management objectives for each coastal management area, by:
(a) managing development in the coastal zone and protecting the environmental assets of the coast, and

(b) establishing a framework for land use planning to guide decision-making in the coastal zone, and
(c) mapping the 4 coastal management areas that comprise the NSW coastal zone for the purpose of the definitions in the Coastal Management Act 2016.

Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005
This plan applies to land within the Sydney Harbour Catchment, as shown edged heavy black on the Sydney Harbour Catchment Map, being part of the Sydney Region declared by order published in Gazette No 38 of 7 April 1989 at page 1841.

This plan has the following aims with respect to the Sydney Harbour Catchment:
to ensure that the catchment, foreshores, waterways and islands of Sydney Harbour are recognised, protected and maintained: as outstanding natural asset, and as a public asset of national and heritage significance, for existing and future generations; to ensure a healthy, sustainable environment on land and water; to achieve a high quality urban environment; to ensure a prosperous working waterfront and an effective transport corridor, to encourage a culturally rich and vibrant place for people; to ensure accessibility to and along Sydney Harbour and its foreshores; to ensure the protection, maintenance and rehabilitation of watercourses, wetlands, riparian lands, remnant vegetation and ecological connectivity, to provide a consolidated, simplified and updated legislative framework for future planning.

OTHER MATTERS AFFECTING THE LAND AS PRESCRIBED BY SCHEDULE 4 - E. P. & A. REGULATION, 2000. CLAUSES (2A) - (10)

(2A) Zoning and land use under *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*

This SEPP does not apply to the land.

(3) Complying Development
(1) The extent to which the land is land on which complying development may be carried out under each of the codes for complying development because of the provisions of clauses 1.17A (1) (c) to (e), (2), (3) and (4),1.18(1)(c3) and 1.19 of *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*.

(2) The extent to which complying development may not be carried out on that land because of the provisions of clauses 1.17A (1) (c) to (e), (2), (3) and (4),1.18(1)(c3) and 1.19 of that Policy and the reasons why it may not be carried out under those clauses.

(3) If the council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land, a statement that a restriction applies to the land, but it may not apply to all of the land, and that council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land.

Note: All Exempt and Complying Development Codes: Council does not have sufficient information to ascertain the extent of a land based exclusion on a property. Despite any statement preventing the carrying out of complying development in the Codes listed below, complying development may still be carried out providing the development is not on the land affected by the exclusion and meets the requirements and standards of *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*.

Housing Code, Commercial and Industrial (New Buildings and Additions) Code and Low Rise Housing Diversity Code

Complying development **may not** be carried out on the land under the Housing Code, the Commercial and Industrial (New Buildings and Additions) and the Low Rise Housing Diversity Code if because of the provisions of clause 1.17A, 1.18(1)(c3) & 1.19 (Land-based requirements for exempt and complying development) any of the following statements are **YES**

▪ Clause 1.19(5)d. Land that is significantly contaminated land within the meaning of the Contaminated Land Management Act 1997. (Applies only to the Commercial and Industrial (New Buildings and Additions) Code.	NO
▪ Clause 1.17A(d). Has been identified as a property that comprises, or on which there is, an item that is listed on the State Heritage Register under the *Heritage Act 1977* or that is subject to an interim heritage order under the *Heritage Act 1977*.	**YES**
▪ Clause 1.17A(d) & 1.18(1)(c3). Has been identified as a property that comprises, or on which there is, a heritage item or draft heritage item.	**YES**
▪ Clause 1.17A(c). Has been identified as being within a wilderness area (identified under the *Wilderness Act 1987*.	**NO**
▪ Clause 1.17A(e) & 1.19(1)e or 1.19(5)f. Has been identified as land that is within an environmentally sensitive area or by an environmental planning instrument as being within a buffer area, a river front area, an ecologically sensitive area, environmentally sensitive land or a protected area	**NO**
▪ Clause 1.19(1)a.or 1.19(5)a Has been identified as being within a heritage conservation area or a draft heritage conservation area.	**YES**
▪ Clause 1.19(1)b or 1.19(5)b. Has been identified as being land that is reserved for a public purpose in an environmental planning instrument.	**NO**
▪ Clause 1.19(1)c or 1.19(5)c. Has been identified as being on an Acid Sulfate Soils Map as being Class 1 or Class 2.	**NO**
▪ Clause 1.19(1)d or 1.19(5)e. Has been identified as land that is subject to a biobanking agreement under part 7A of the threatened Species Conservation Act 1995 or a property vegetation plan under the Native Vegetation Act 2003.	**NO**
▪ Clause 1.19(1)f or 1.19(5)g. Has been identified by an environmental planning instrument, a development control plan or a policy adopted by the Council as being or affected by a coastline hazard, a coastal hazard or a coastal erosion hazard.	**NO**
▪ Clause 1.19(1)g or 1.19(5)h. Has been identified as being land in a foreshore area.	**NO**
▪ Clause 1.19(1)h. Has been identified as land that is in the 25 ANEF contour or a higher ANEF contour. (Applies to the Housing Code & Low Rise Housing Diversity Code)	**NO**
▪ Clause 1.19(1)j or 1.19(5)i. Has been identified as unsewered land within a drinking water catchment.	**NO**
▪ Clause 1.19(1)i. Has been identified as land that is declared to be a special area under the Sydney Water Catchment Management Act 1998.	**NO**
▪ Clause 1.19(2) & 1.19(3)c Has been identified as land described or otherwise identified on a map specified in Schedule 5, and ceases to have effect on 31 December 2022. (Applies to the Housing Code & Low Rise Housing Diversity Code)	**NO**

Housing Alterations Code
Complying development under the Housing Alterations Code **may not** be carried out on the land.

Reason why:

Refer to 1.17A & 1.18 (1) (c3) State Environmental Planning Policy (Except and Complying Development Codes) 2008:

clause 1.17A(d) or 1.18 (1) (c3) applies

Commercial and Industrial Alterations Code
Complying development under the Commercial and Industrial Alterations Code **may not** be carried out on the land.

Reason why:

Refer to 1.17A & 1.18 (1) (c3) State Environmental Planning Policy (Except and Complying Development Codes) 2008:

clause 1.17A(d) or 1.18 (1) (c3) applies

Subdivisions Code
Complying development under the Subdivisions Code **may not** be carried out on the land.

Reason why:

Refer to 1.17A & 1.18 (1) (c3) State Environmental Planning Policy (Except and Complying Development Codes) 2008:

clause 1.17A(d) or 1.18 (1) (c3)applies

Rural Housing Code
The Rural Housing Code does not apply to this Local Government Area.

General Development Code
Complying development under the General Development Code **may not** be carried out on the land.

Reason why:

Refer to 1.17A & 1.18 (1) (c3) State Environmental Planning Policy (Except and Complying Development Codes) 2008:

clause 1.17A(d) or 1.18 (1) (c3) applies

Demolition Code
Complying development under the Demolition Code **may not** be carried out on the land.

Reason why:

Refer to 1.17A & 1.18 (1) (c3) State Environmental Planning Policy (Except and Complying Development Codes) 2008:

clause 1.17A(d) or 1.18 (1) (c3) applies

(4B) Annual charges under Local Government Act 1993 for coastal protection services that relate to existing coastal protection works

In relation to a coastal council : The owner (or any previous owner) of the land has not consented in writing to the land being subject to annual charges under section 496B of the Local Government Act 1993 for coastal protection services that relate to existing coastal protection works (within the meaning of section 553B of that Act).

Note. “Existing coastal protection works” are works to reduce the impact of coastal hazards on land (such as seawalls, revetments, groynes and beach nourishment) that existed before the commencement of section 553B of the Local Government Act 1993.

(5) Mine Subsidence District

This land has not been proclaimed to be a mine subsidence district within the meaning of section 15 of the mine subsidence compensation act, 1961.

(6) Road Widening and/or Road Realignment affected by (a) Division 2 of Part 3 of the Roads act 1993 or (c) any resolution of council or other authority.

This land **is not** affected by road widening and/or road realignment under section 25 of the Roads Act, 1993 and/or resolution of Council or any other authority.

(6) Road Widening and/or Road Realignment Affected by (b) any environmental planning instrument.

This land **is not** affected by any road widening or road realignment under any planning instrument.

(7) Council and other public authorities policies on hazard risk restrictions:

(a) The land **is not** affected by a policy adopted by the Council that that restricts the development of the land because of the likelihood of land slip, bushfire, flooding, tidal inundation, subsidence, acid sulphate soils or any other risk; and

(b) The land **is not** affected by a policy adopted by any other public authority and notified to the council for the express purpose of its adoption by that authority being referred to on planning certificate issued by Council, that restricts the development of the land because of the likelihood of land slip, bushfire, flooding, tidal inundation, subsidence, acid sulphate soils or any other risk.

(7A) Flood related development controls information.

(1) If the land or part of the land is within the flood planning area and subject to flood related development controls

Property is within the flood planning area	**YES**
Property is outside the flood planning area	**NO**
Property is within a buffer zone	**NO**

(2) If the land or part of the land is between the flood planning area and the probable maximum flood and subject to flood related development controls

Property is between the flood planning area and probable maximum flood.	**UNKNOWN**
Property is outside the flood planning area and probable maximum flood	**UNKNOWN**
Property is within a buffer zone	**UNKNOWN**

(3) In this clause—
flood planning area has the same meaning as in the Floodplain Development Manual.
Floodplain Development Manual means the *Floodplain Development Manual* (ISBN 0 7347 5476 0) published by the NSW Government in April 2005.
probable maximum flood has the same meaning as in the Floodplain Development Manual.

(8) Land reserved for acquisition

No environmental planning instrument, or proposed environmental planning instrument applying to the land, provides for the acquisition of the land by a public authority, as referred to in section 3.15 of the Act.

(9) Contribution plans

The following Contributions Plans apply to properties within the City of Sydney local government area. Contributions plans marked **YES** may apply to this property:

▪ Central Sydney Development Contributions Plan 2013 – in operation 9th July 2013	**NO**
▪ City of Sydney Development Contributions Plan 2015 – in operation 1st July 2016	**YES**
▪ Redfern Waterloo Authority Contributions Plan 2006 – in operation 16th May 2007 ▪ Redfern Waterloo Authority Affordable Housing Contributions Plan – in operation 16th May 2007	**NO**

Note: An affordable housing contribution may be payable as part of a development application or planning proposal under The City of Sydney Affordable Housing Program (Program) – in operation 1st July 2021

(9A) Biodiversity certified land

The land has not been certified as biodiversity certified land.

(10) Biodiversity Conservation Act 2016

Not Applicable.

(10A) Native vegetation clearing set asides

Not Applicable.

(11) Bush fire prone land

The land has not been identified as Bush fire prone land.

(12) Property vegetation plans

Not Applicable.

(13) Orders under Trees (Disputes Between Neighbours) Act 2006

Council has not been notified of an order which as been made under the *Trees (Disputes Between Neighbours) Act 2006* to carry out work in relation to a tree on the land.

(14) Directions under Part 3A

Not Applicable.

(15) Site compatibility certificates and conditions for seniors housing

(a) The land to which the certificate relates is not subject to a current site compatibility certificate (seniors housing), of which Council is aware, in respect of proposed development on the land.

(b) The land to which the certificate relates is not subject to any condition of consent to a development application granted after 11 October 2007 required by State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004.

(16) Site compatibility certificates for infrastructure, schools or TAFE establishments

The land to which the certificate relates is not subject to a valid site compatibility certificate (infrastructure), of which Council is aware, in respect of proposed development on the land.

(17) Site compatibility certificates and conditions for affordable rental housing

(a) The land to which the certificate relates is not subject to a current site compatibility certificate (affordable rental housing), of which Council is aware, in respect of proposed development on the land.

(b) The land to which the certificate relates is not subject to any terms of a kind referred to in clause 17(1) or 37(1) of State Environmental Planning Policy (Affordable Rental Housing) 2009 that have been imposed as a condition of consent to a development application in respect of the land.

(18) Paper subdivision information

Not Applicable.

(19) Site verification certificates

The land to which the certificate relates is not subject to a valid site verification certificate of which Council is aware.

(20) Loose-fill asbestos insulation

Not Applicable

(21) Affected building notices and building product rectification orders

(1)The land to which the certificate relates is not subject to any affected building notice of which Council is aware.

(2) (a) The land to which the certificate relates is not subject to any building product rectification order of which Council is aware and has not been fully complied with.

(b) The land to which the certificate relates is not subject to any notice of intention to make a building product rectification order of which Council is aware and is outstanding.

(3) In this clause:
affected building notice has the same meaning as in Part 4 of the Building Products (Safety) Act 2017.
building product rectification order has the same meaning as in the Building Products (Safety) Act 2017.

Note. The following matters are prescribed by section 59 (2) of the *Contaminated Land Management Act 1997* as additional matters to be specified in a planning certificate:

(a) The land to which the certificate relates **is not** declared to be **significantly contaminated land** within the meaning of that act as at the date when the certificate is issued.

(b) The land to which the certificate relates **is not** subject to a **management order** within the meaning of that act as at the date when the certificate is issued.

(c) The land to which the certificate relates **is not** the subject of an **approved voluntary management proposal** within the meaning of that act at the date the certificate is issued.

(d) The land to which the certificate relates **is not** the subject of an **ongoing maintenance order** within the meaning of that act as at the date when the certificate is issued.

(e) As at the date when the certificate is issued, Council **has not** identified that a **site audit statement** within the meaning of that act has been received in respect of the land the subject of the certificate.

PLANNING CERTIFICATE SECTION 10.7 (2) INFORMATION:
Information provided in accordance with planning certificate section 10.7 (2) has been taken from council's records and advice from other authorities but council disclaims all liability for any omission or inaccuracy in the information. Specific inquiry should be made where doubt exists.

PLANNING CERTIFICATE UNDER SECTION 10.7 (5) OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

PLANNING CERTIFICATE SECTION 10.7 (5) ADVICE is current as at 12:00 noon two working days prior to the date of issue of this certificate. The following matters have been considered & details provided where information exists: easements in favour of council; parking permit scheme; heritage floor space restrictions; low-rental residential building; foreshore building line; tree preservation order.

Contaminated Land Potential:
Council records do not have sufficient information about the uses (including previous uses) of the land which is the subject of this section 10.7 certificate to confirm that the land has not been used for a purpose which would be likely to have contaminated the land. Parties should make their own enquiries as to whether the land may be contaminated.

Hazard Risk Restriction:
Some City of Sydney Local Environmental Plans incorporate Acid Sulfate soil maps. Development on the land identified in those maps should have regard to the acid sulfate soil clause within the relevant Local Environmental Plan.

Construction Noise and View Loss Advice:
Intending purchasers are advised that the subject property may be affected by construction noise and loss or diminution of views as a result of surrounding development.

Outstanding Notice & Order information
In relation to this property, there **is not** an outstanding Order or Notice of Intention to issue an Order relating to Fire Safety (being an Order or Notice of Intention to issue an Order under Part 2 of Schedule 5 of the Environmental Planning and Assessment Act, 1979). Further information about the Order or Notice of Intention to issue an Order may be obtained by applying for a certificate under clause 41 of Schedule 5 of the Environmental Planning and Assessment Act and Section 735A of the Local Government Act.

In relation to this property, there **is not** an outstanding Order or Notice of Intention to issue an Order (being an Order or Notice of Intention to issue an Order of a type other than relating to fire safety). Further information about the Order or Notice of Intention to issue an Order may be obtained by applying for a certificate under clause 41 of Schedule 5 of the Environmental Planning and Assessment Act and Section 735A of the Local Government Act.

Neighbourhood Parking Policy
Owners and occupiers of this address are **not eligible** to participate in the resident and visitor permit parking schemes.

ADVICE FROM OTHER BODIES

Sydney Ports Corporation Advice
Some land in the City of Sydney located in the vicinity of the White Bay, Glebe Island and Darling Harbour ports may be affected by noise from port operations.

Advice provided in accordance with planning certificate section 10.7 (5) is supplied in good faith. Council accepts no liability for the validity of the advice given. (see section 10.7 (6) of the Environmental Planning and Assessment Act, 1979).

Planning certificate section 10.7 (2), local planning controls are available are available online at www.cityofsydney.nsw.gov.au

General Enquiries:
Telephone: 02 9265 9333

Town Hall House
Level 2
Town Hall House
456 Kent Street
Sydney
8am – 6pm Monday - Friday

State planning controls are available online at www.legislation.nsw.gov.au

Where planning certificate section 10.7 (5) matters are supplied, complete details are available by writing to:
Chief Executive Officer
City of Sydney
G.P.O. Box 1591
Sydney NSW 2000

End of Document

City of Sydney
Town Hall House
456 Kent Street
Sydney NSW 2000

Telephone +61 2 9265 9333
Fax +61 2 9265 9222
council@cityofsydney.nsw.gov.au

GPO Box 1591 Sydney NSW 2001
cityofsydney.nsw.gov.au

ARCHITECTUS GROUP PTY LTD
MLC Centre
Level 18 19 Martin Pl
SYDNEY NSW 2000

PLANNING CERTIFICATE

Under Section 10.7 of the Environmental Planning and Assessment Act, 1979

Applicant:	ARCHITECTUS GROUP PTY LTD
Your reference:	
Address of property:	12A Missenden Road , CAMPERDOWN NSW 2050
Owner:	UNIVERSITY of SYDNEY
Description of land:	Lot 1001 DP 1159799
Certificate No.:	2021333012
Certificate Date:	21/07/21
Receipt No:	0177917
Fee:	$80.00
Paid:	21/07/21

Title information and description of land are provided from data supplied by the Valuer General and shown where available.

Issuing Officer
per **Monica Barone**
Chief Executive Officer

CERTIFICATE ENQUIRIES:
Ph: 9265 9333
Fax: 9265 9415

Sydney2030/Green/Global/Connected

PLANNING CERTIFICATE UNDER SECTION 10.7 (2) OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

MATTERS AFFECTING THE LAND AS PRESCRIBED BY SCHEDULE 4 - ENVIRONMENTAL PLANNING & ASSESSMENT REGULATION, 2000, CLAUSES (1) - (2).

DEVELOPMENT CONTROLS

The following information must be read in conjunction with and subject to all other provisions of the environmental planning instruments specified in this certificate.

ZONING

Zone SP2 Infrastructure (Sydney Local Environmental Plan 2012)

1 Objectives of zone
• To provide for infrastructure and related uses.
• To prevent development that is not compatible with or that may detract from the provision of infrastructure.

2 Permitted without consent
Nil

3 Permitted with consent
Horticulture; Roads; Water storage facilities; Water treatment facilities; The purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose.

4 Prohibited
Any development not specified in item 2 or 3

PROPOSED ZONING

This property is not affected by a draft zone.

LOCAL PLANNING CONTROLS

Sydney Local Environmental Plan 2012 (as amended) – Published 14 December 2012 NSW Legislation Website.

Sydney Development Control Plan 2012 (as amended) - (commenced 14.12.2012)

Environmental Plan 2012 (the LEP).

Planning Proposal: Amendment of Sydney Local Environmental Plan 2012 – Open and Creative Planning Reforms

This planning proposal seeks a number of changes to the Sydney Local Environmental Plan 2012 (Sydney LEP 2012), and other relevant LEPs which aim to strengthen the city's cultural and night life and create a more diverse evening economy.

The planning proposal seeks to amend the following instruments: • Sydney Local Environmental Plan (LEP) 2012 • Sydney LEP 2005 • Sydney LEP (Green Square Town Centre) 2013 • Sydney LEP (Green Square Town Centre Stage 2) 2013 • Sydney LEP (Glebe Affordable Housing Project) 2011 • Sydney LEP (Harold Park) 2011 • South Sydney LEP 1998 • South Sydney LEP No. 114 (Southern Industrial and Rosebery/Zetland Planning Districts).

HERITAGE

Conservation Area
(Sydney Local Environmental Plan 2012)
This property has been identified as land within a Heritage Conservation Area.

Item of Environmental Heritage
(Sydney Local Environmental Plan 2012)
This property has been listed as an Item of Environmental Heritage

State Heritage Register (Amendment to Heritage Act, 1977, gazetted 2/4/99)
This property is identified as being of state significance and has been entered on the State Heritage Register. Unless the proposed work is exempt under the Heritage Office Standard Exemptions or is covered by site specific exemptions, an applicant must seek an integrated development approval from Council and as such the proposal will be referred to the Heritage Council. If major changes are proposed the Heritage Council may require the applicant to prepare a conservation management plan in accordance with the NSW Heritage Manual Guidelines. For further information please contact the Heritage Office (02) 9873 8500 or alternatively online www.heritage.nsw.gov.au .

STATE PLANNING INSTRUMENTS

Full copies of State Environmental Planning Policies are available online at www.planning.nsw.gov.au.

State Environmental Planning Policy No. 19 – Bushland in Urban Areas
This is a policy to protect and preserve bushland within certain urban areas, as part of the natural heritage or for recreational, educational and scientific purposes. This policy is designed to protect bushland in public open space zones and reservations, and to ensure that bush preservation is given a high priority when local environmental plans for urban development are prepared.

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
This policy aims to amend the definitions of hazardous and offensive industries; to render ineffective any environmental planning instruments not defining hazardous or offensive as per this policy; to control development of hazardous and offensive industries.

State Environmental Planning Policy No. 55 – Remediation of Land
This policy provides planning controls for the remediation of contaminated land. The policy states that land must not be developed if it is unsuitable for a proposed use because it is contaminated. If the land is unsuitable, remediation must take place before the land is developed. The policy makes remediation permissible across the State, defines when consent is required, requires all remediation to comply with standards, ensures land is investigated if contamination is suspected, and requires councils to be notified of all remediation proposals. To assist councils and developers, the Department, in conjunction with the Environment Protection Authority, has prepared Managing Land Contamination: Planning Guidelines.

State Environmental Planning Policy No. 64 – Advertising and Signage
This policy aims to ensure that signage (including advertising):
Is compatible with the desired amenity and visual character of an area, and
- Provides effective communications in suitable locations, and
- Is of a high quality design and finish.

To this end the policy regulates signage (but not content) under Part 4 of the Act and provides limited time consents for the display of certain advertisements. The policy does not apply to signage that is exempt development under an environmental planning instrument. It does apply to all signage that can be displayed with or without consent and is visible from any public place or reserve, except as provided by the policy.

This policy should be read in conjunction with the Sydney Local Environmental Plan 2005, the City of Sydney Signage and Advertising Structures Development Control Plan 2005 and State Environmental Planning Policy No. 60 where these apply.

State Environmental Planning Policy No. 65 – Design Quality of Residential Apartment Development
This policy aims to improve the design quality of flats of three or more storeys with four or more self contained dwellings. The policy sets out a series of design principles for local councils to consider when assessing development proposals for residential flat development. The policy also creates a role for an independent design review panel and requires the involvement of a qualified designer in the design and approval process.

State Environmental Planning Policy No.70 – Affordable Housing (Revised Schemes) (Gazetted 31.05.02)
The policy identifies that there is a need for affordable housing in the City of Sydney, describes the kinds of households for which affordable housing may be provided and makes a

requirement with respect to the imposition of conditions relating to the provision of affordable housing (provided other requirements under the Act are met).

State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004
This Policy does not apply to land described in Schedule 1 (Environmentally sensitive land), or land that is zoned for industrial purposes, or land to which an interim heritage order made under the *Heritage Act 1997* by the Minister administering that Act applies, or land to which a listing on the State Heritage Register kept under the *Heritage Act 1997* applies.

The Policy aims to encourage the provision of housing (including residential care facilities) that will increase the supply and diversity of residences that meet the needs of seniors or people with a disability, and make efficient use of existing infrastructure and services, and be of good design.

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This Policy aims to provide for the proper management and development of mineral, petroleum and extractive material resources for the social and economic welfare of the State.

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NB: This SEPP also contains exempt & complying provisions

State Environmental Planning Policy (Exempt and Complying Development Codes) 2008
This Policy Streamlines assessment processes for development that complies with specified development standards. The policy provides exempt and complying development codes that have State-wide application, identifying, in the General Exempt Development Code, types of development that are of minimal environmental impact that may be carried out without the need for development consent; and, in the General Housing Code, types of complying development that may be carried out in accordance with a complying development certificate as defined in the Environmental Planning and Assessment Act 1979.

State Environmental Planning Policy (Affordable Rental Housing) 2009
Establishes a consistent planning regime for the provision of affordable rental housing. The policy provides incentives for new affordable rental housing, facilitates the retention of existing affordable rentals, and expands the role of not-for-profit providers. It also aims to support local centres by providing housing for workers close to places of work, and facilitate development of housing for the homeless and other disadvantaged people. NOTE: Does not apply to land at Green Square or at Ultimo Pyrmont, or on southern employment land.

State Environmental Planning Policy (Urban Renewal) 2010
The aims of this Policy are as follows:
(a) to establish the process for assessing and identifying sites as urban renewal precincts,
(b) to facilitate the orderly and economic development and redevelopment of sites in and around urban renewal precincts,
(c) to facilitate delivery of the objectives of any applicable government State, regional or metropolitan strategies connected with the renewal of urban areas that are accessible by public transport.

State Environmental Planning Policy (State and Regional Development) 2011
The aims of this Policy are as follows:
(a) to identify development that is State significant development,
(b) to identify development that is State significant infrastructure and critical State significant infrastructure,
(c) to confer functions on joint regional planning panels to determine development applications.

State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017
The aims of this Policy are:
(a) to protect the biodiversity values of trees and other vegetation in non-rural areas of the State, and
(b) to preserve the amenity of non-rural areas of the State through the preservation of trees and other vegetation.

State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017
The aim of this Policy is to facilitate the effective delivery of educational establishments and early education and care facilities across the state.

State Environmental Planning Policy (Coastal Management) 2018
The aim of this Policy is to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the Coastal Management Act 2016, including the management objectives for each coastal management area, by:
(a) managing development in the coastal zone and protecting the environmental assets of the coast, and

(b) establishing a framework for land use planning to guide decision-making in the coastal zone, and
(c) mapping the 4 coastal management areas that comprise the NSW coastal zone for the purpose of the definitions in the Coastal Management Act 2016.

Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005
This plan applies to land within the Sydney Harbour Catchment, as shown edged heavy black on the Sydney Harbour Catchment Map, being part of the Sydney Region declared by order published in Gazette No 38 of 7 April 1989 at page 1841.

This plan has the following aims with respect to the Sydney Harbour Catchment:
to ensure that the catchment, foreshores, waterways and islands of Sydney Harbour are recognised, protected and maintained: as outstanding natural asset, and as a public asset of national and heritage significance, for existing and future generations; to ensure a healthy, sustainable environment on land and water; to achieve a high quality urban environment; to ensure a prosperous working waterfront and an effective transport corridor, to encourage a culturally rich and vibrant place for people; to ensure accessibility to and along Sydney Harbour and its foreshores; to ensure the protection, maintenance and rehabilitation of watercourses, wetlands, riparian lands, remnant vegetation and ecological connectivity, to provide a consolidated, simplified and updated legislative framework for future planning.

OTHER MATTERS AFFECTING THE LAND AS PRESCRIBED BY SCHEDULE 4 - E. P. & A. REGULATION, 2000. CLAUSES (2A) - (10)

(2A) Zoning and land use under *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*

This SEPP does not apply to the land.

(3) Complying Development
(1) The extent to which the land is land on which complying development may be carried out under each of the codes for complying development because of the provisions of clauses 1.17A (1) (c) to (e), (2), (3) and (4),1.18(1)(c3) and 1.19 of *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*.

(2) The extent to which complying development may not be carried out on that land because of the provisions of clauses 1.17A (1) (c) to (e), (2), (3) and (4),1.18(1)(c3) and 1.19 of that Policy and the reasons why it may not be carried out under those clauses.

(3) If the council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land, a statement that a restriction applies to the land, but it may not apply to all of the land, and that council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land.

Note: All Exempt and Complying Development Codes: Council does not have sufficient information to ascertain the extent of a land based exclusion on a property. Despite any statement preventing the carrying out of complying development in the Codes listed below, complying development may still be carried out providing the development is not on the land affected by the exclusion and meets the requirements and standards of *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*.

Housing Code, Commercial and Industrial (New Buildings and Additions) Code and Low Rise Housing Diversity Code

Complying development **may not** be carried out on the land under the Housing Code, the Commercial and Industrial (New Buildings and Additions) and the Low Rise Housing Diversity Code if because of the provisions of clause 1.17A, 1.18(1)(c3) & 1.19 (Land-based requirements for exempt and complying development) any of the following statements are **YES**

▪ Clause 1.19(5)d. Land that is significantly contaminated land within the meaning of the Contaminated Land Management Act 1997. (Applies only to the Commercial and Industrial (New Buildings and Additions) Code.	NO
▪ Clause 1.17A(d). Has been identified as a property that comprises, or on which there is, an item that is listed on the State Heritage Register under the *Heritage Act 1977* or that is subject to an interim heritage order under the *Heritage Act 1977*.	**YES**
▪ Clause 1.17A(d) & 1.18(1)(c3). Has been identified as a property that comprises, or on which there is, a heritage item or draft heritage item.	**YES**
▪ Clause 1.17A(c). Has been identified as being within a wilderness area (identified under the *Wilderness Act 1987*.	**NO**
▪ Clause 1.17A(e) & 1.19(1)e or 1.19(5)f. Has been identified as land that is within an environmentally sensitive area or by an environmental planning instrument as being within a buffer area, a river front area, an ecologically sensitive area, environmentally sensitive land or a protected area	**NO**
▪ Clause 1.19(1)a.or 1.19(5)a Has been identified as being within a heritage conservation area or a draft heritage conservation area.	**YES**
▪ Clause 1.19(1)b or 1.19(5)b. Has been identified as being land that is reserved for a public purpose in an environmental planning instrument.	**NO**
▪ Clause 1.19(1)c or 1.19(5)c. Has been identified as being on an Acid Sulfate Soils Map as being Class 1 or Class 2.	**NO**
▪ Clause 1.19(1)d or 1.19(5)e. Has been identified as land that is subject to a biobanking agreement under part 7A of the threatened Species Conservation Act 1995 or a property vegetation plan under the Native Vegetation Act 2003.	**NO**
▪ Clause 1.19(1)f or 1.19(5)g. Has been identified by an environmental planning instrument, a development control plan or a policy adopted by the Council as being or affected by a coastline hazard, a coastal hazard or a coastal erosion hazard.	**NO**
▪ Clause 1.19(1)g or 1.19(5)h. Has been identified as being land in a foreshore area.	**NO**
▪ Clause 1.19(1)h. Has been identified as land that is in the 25 ANEF contour or a higher ANEF contour. (Applies to the Housing Code & Low Rise Housing Diversity Code)	**NO**
▪ Clause 1.19(1)j or 1.19(5)i. Has been identified as unsewered land within a drinking water catchment.	**NO**
▪ Clause 1.19(1)i. Has been identified as land that is declared to be a special area under the Sydney Water Catchment Management Act 1998.	**NO**
▪ Clause 1.19(2) & 1.19(3)c Has been identified as land described or otherwise identified on a map specified in Schedule 5, and ceases to have effect on 31 December 2022. (Applies to the Housing Code & Low Rise Housing Diversity Code)	**NO**

Housing Alterations Code
Complying development under the Housing Alterations Code **may not** be carried out on the land.

Reason why:

Refer to 1.17A & 1.18 (1) (c3) State Environmental Planning Policy (Except and Complying Development Codes) 2008:

clause 1.17A(d) or 1.18 (1) (c3) applies

Commercial and Industrial Alterations Code
Complying development under the Commercial and Industrial Alterations Code **may not** be carried out on the land.

Reason why:

Refer to 1.17A & 1.18 (1) (c3) State Environmental Planning Policy (Except and Complying Development Codes) 2008:

clause 1.17A(d) or 1.18 (1) (c3) applies

Subdivisions Code
Complying development under the Subdivisions Code **may not** be carried out on the land.

Reason why:

Refer to 1.17A & 1.18 (1) (c3) State Environmental Planning Policy (Except and Complying Development Codes) 2008:

clause 1.17A(d) or 1.18 (1) (c3)applies

Rural Housing Code
The Rural Housing Code does not apply to this Local Government Area.

General Development Code
Complying development under the General Development Code **may not** be carried out on the land.

Reason why:

Refer to 1.17A & 1.18 (1) (c3) State Environmental Planning Policy (Except and Complying Development Codes) 2008:

clause 1.17A(d) or 1.18 (1) (c3) applies

Demolition Code
Complying development under the Demolition Code **may not** be carried out on the land.

Reason why:

Refer to 1.17A & 1.18 (1) (c3) State Environmental Planning Policy (Except and Complying Development Codes) 2008:

clause 1.17A(d) or 1.18 (1) (c3) applies

(4B) Annual charges under Local Government Act 1993 for coastal protection services that relate to existing coastal protection works

In relation to a coastal council : The owner (or any previous owner) of the land has not consented in writing to the land being subject to annual charges under section 496B of the Local Government Act 1993 for coastal protection services that relate to existing coastal protection works (within the meaning of section 553B of that Act).

Note. "Existing coastal protection works" are works to reduce the impact of coastal hazards on land (such as seawalls, revetments, groynes and beach nourishment) that existed before the commencement of section 553B of the Local Government Act 1993.

(5) Mine Subsidence District

This land has not been proclaimed to be a mine subsidence district within the meaning of section 15 of the mine subsidence compensation act, 1961.

(6) Road Widening and/or Road Realignment affected by (a) Division 2 of Part 3 of the Roads act 1993 or (c) any resolution of council or other authority.

This land **is not** affected by road widening and/or road realignment under section 25 of the Roads Act, 1993 and/or resolution of Council or any other authority.

(6) Road Widening and/or Road Realignment Affected by (b) any environmental planning instrument.

This land **is not** affected by any road widening or road realignment under any planning instrument.

(7) Council and other public authorities policies on hazard risk restrictions:

(a) The land **is not** affected by a policy adopted by the Council that that restricts the development of the land because of the likelihood of land slip, bushfire, flooding, tidal inundation, subsidence, acid sulphate soils or any other risk; and

(b) The land **is not** affected by a policy adopted by any other public authority and notified to the council for the express purpose of its adoption by that authority being referred to on planning certificate issued by Council, that restricts the development of the land because of the likelihood of land slip, bushfire, flooding, tidal inundation, subsidence, acid sulphate soils or any other risk.

(7A) Flood related development controls information.

(1) If the land or part of the land is within the flood planning area and subject to flood related development controls

Property is within the flood planning area	**YES**
Property is outside the flood planning area	**NO**
Property is within a buffer zone	**NO**

(2) If the land or part of the land is between the flood planning area and the probable maximum flood and subject to flood related development controls

Property is between the flood planning area and probable maximum flood.	**UNKNOWN**
Property is outside the flood planning area and probable maximum flood	**UNKNOWN**
Property is within a buffer zone	**UNKNOWN**

(3) In this clause—
flood planning area has the same meaning as in the Floodplain Development Manual.
Floodplain Development Manual means the *Floodplain Development Manual* (ISBN 0 7347 5476 0) published by the NSW Government in April 2005.
probable maximum flood has the same meaning as in the Floodplain Development Manual.

(8) Land reserved for acquisition

No environmental planning instrument, or proposed environmental planning instrument applying to the land, provides for the acquisition of the land by a public authority, as referred to in section 3.15 of the Act.

(9) Contribution plans

The following Contributions Plans apply to properties within the City of Sydney local government area. Contributions plans marked **YES** may apply to this property:

▪ Central Sydney Development Contributions Plan 2013 – in operation 9th July 2013	**NO**
▪ City of Sydney Development Contributions Plan 2015 – in operation 1st July 2016	**YES**
▪ Redfern Waterloo Authority Contributions Plan 2006 – in operation 16th May 2007 ▪ Redfern Waterloo Authority Affordable Housing Contributions Plan – in operation 16th May 2007	**NO**

Note: An affordable housing contribution may be payable as part of a development application or planning proposal under The City of Sydney Affordable Housing Program (Program) – in operation 1st July 2021

(9A) Biodiversity certified land

The land has not been certified as biodiversity certified land.

(10) Biodiversity Conservation Act 2016

Not Applicable.

(10A) Native vegetation clearing set asides

Not Applicable.

(11) Bush fire prone land

The land has not been identified as Bush fire prone land.

(12) Property vegetation plans

Not Applicable.

(13) Orders under Trees (Disputes Between Neighbours) Act 2006

Council has not been notified of an order which as been made under the *Trees (Disputes Between Neighbours) Act 2006* to carry out work in relation to a tree on the land.

(14) Directions under Part 3A

Not Applicable.

(15) Site compatibility certificates and conditions for seniors housing

(a) The land to which the certificate relates is not subject to a current site compatibility certificate (seniors housing), of which Council is aware, in respect of proposed development on the land.

(b) The land to which the certificate relates is not subject to any condition of consent to a development application granted after 11 October 2007 required by State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004.

(16) Site compatibility certificates for infrastructure, schools or TAFE establishments

The land to which the certificate relates is not subject to a valid site compatibility certificate (infrastructure), of which Council is aware, in respect of proposed development on the land.

(17) Site compatibility certificates and conditions for affordable rental housing

(a) The land to which the certificate relates is not subject to a current site compatibility certificate (affordable rental housing), of which Council is aware, in respect of proposed development on the land.

(b) The land to which the certificate relates is not subject to any terms of a kind referred to in clause 17(1) or 37(1) of State Environmental Planning Policy (Affordable Rental Housing) 2009 that have been imposed as a condition of consent to a development application in respect of the land.

(18) Paper subdivision information

Not Applicable.

(19) Site verification certificates

The land to which the certificate relates is not subject to a valid site verification certificate of which Council is aware.

(20) Loose-fill asbestos insulation

Not Applicable

(21) Affected building notices and building product rectification orders

(1)The land to which the certificate relates is not subject to any affected building notice of which Council is aware.

(2) (a) The land to which the certificate relates is not subject to any building product rectification order of which Council is aware and has not been fully complied with.

(b) The land to which the certificate relates is not subject to any notice of intention to make a building product rectification order of which Council is aware and is outstanding.

(3) In this clause:
affected building notice has the same meaning as in Part 4 of the Building Products (Safety) Act 2017.
building product rectification order has the same meaning as in the Building Products (Safety) Act 2017.

Note. The following matters are prescribed by section 59 (2) of the *Contaminated Land Management Act 1997* as additional matters to be specified in a planning certificate:

(a) The land to which the certificate relates **is not** declared to be **significantly contaminated land** within the meaning of that act as at the date when the certificate is issued.

(b) The land to which the certificate relates **is not** subject to a **management order** within the meaning of that act as at the date when the certificate is issued.

(c) The land to which the certificate relates **is not** the subject of an **approved voluntary management proposal** within the meaning of that act at the date the certificate is issued.

(d) The land to which the certificate relates **is not** the subject of an **ongoing maintenance order** within the meaning of that act as at the date when the certificate is issued.

(e) As at the date when the certificate is issued, Council **has not** identified that a **site audit statement** within the meaning of that act has been received in respect of the land the subject of the certificate.

PLANNING CERTIFICATE SECTION 10.7 (2) INFORMATION:
Information provided in accordance with planning certificate section 10.7 (2) has been taken from council's records and advice from other authorities but council disclaims all liability for any omission or inaccuracy in the information. Specific inquiry should be made where doubt exists.

PLANNING CERTIFICATE UNDER SECTION 10.7 (5) OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

PLANNING CERTIFICATE SECTION 10.7 (5) ADVICE is current as at 12:00 noon two working days prior to the date of issue of this certificate. The following matters have been considered & details provided where information exists: easements in favour of council; parking permit scheme; heritage floor space restrictions; low-rental residential building; foreshore building line; tree preservation order.

Contaminated Land Potential:
Council records do not have sufficient information about the uses (including previous uses) of the land which is the subject of this section 10.7 certificate to confirm that the land has not been used for a purpose which would be likely to have contaminated the land. Parties should make their own enquiries as to whether the land may be contaminated.

Hazard Risk Restriction:
Some City of Sydney Local Environmental Plans incorporate Acid Sulfate soil maps. Development on the land identified in those maps should have regard to the acid sulfate soil clause within the relevant Local Environmental Plan.

Construction Noise and View Loss Advice:
Intending purchasers are advised that the subject property may be affected by construction noise and loss or diminution of views as a result of surrounding development.

Outstanding Notice & Order information
In relation to this property, there **is not** an outstanding Order or Notice of Intention to issue an Order relating to Fire Safety (being an Order or Notice of Intention to issue an Order under Part 2 of Schedule 5 of the Environmental Planning and Assessment Act, 1979). Further information about the Order or Notice of Intention to issue an Order may be obtained by applying for a certificate under clause 41 of Schedule 5 of the Environmental Planning and Assessment Act and Section 735A of the Local Government Act.

In relation to this property, there **is not** an outstanding Order or Notice of Intention to issue an Order (being an Order or Notice of Intention to issue an Order of a type other than relating to fire safety). Further information about the Order or Notice of Intention to issue an Order may be obtained by applying for a certificate under clause 41 of Schedule 5 of the Environmental Planning and Assessment Act and Section 735A of the Local Government Act.

Neighbourhood Parking Policy
Owners and occupiers of this address are **not eligible** to participate in the resident and visitor permit parking schemes.

ADVICE FROM OTHER BODIES

Sydney Ports Corporation Advice
Some land in the City of Sydney located in the vicinity of the White Bay, Glebe Island and Darling Harbour ports may be affected by noise from port operations.

Advice provided in accordance with planning certificate section 10.7 (5) is supplied in good faith. Council accepts no liability for the validity of the advice given. (see section 10.7 (6) of the Environmental Planning and Assessment Act, 1979).

Planning certificate section 10.7 (2), local planning controls are available are available online at www.cityofsydney.nsw.gov.au

General Enquiries:
Telephone: 02 9265 9333

Town Hall House
Level 2
Town Hall House
456 Kent Street
Sydney
8am – 6pm Monday - Friday

State planning controls are available online at www.legislation.nsw.gov.au

Where planning certificate section 10.7 (5) matters are supplied, complete details are available by writing to:
Chief Executive Officer
City of Sydney
G.P.O. Box 1591
Sydney NSW 2000

End of Document

IMPORTANT NOTES

PROJECT DATUMS

The data contained in this electronic file is based on Map Grid of Australia (MGA) Coordinates and on Australian Height Datum (AHD) levels. The project coordinate system is plane based (ground distances). The MGA and AHD datum point is PM 53458 (E=331493.066, N=6248561.497 (ACC B/2), RL 22.427 (ACC LB/L2)) located at the corner of Mallet Street and Fowler Street.

PROJECT SITE BOUNDARIES

The site boundaries of the RPA Campus have been determined from title dimensions from deposited survey plans on public record and from observations to cadastral survey marks in the field.

The project site boundaries are contained within CAD layer "BOUNDARY_RPA"

These boundaries are suitable for master planning over the site. However, when improvements are planned within 0.2m of these boundaries, a formal boundary survey should be undertaken over the relevant boundary to confirm the exact locations of site boundaries.

PROJECT SITE EASEMENTS AND SECOND SCHEDULE INTERESTS

This plan shows the locations of the easements, rights and leases that exist within the project properties.

This information is contained within CAD layer "BOUNDARY_EASEMENT". There are additional proposed easements and rights that are not officially registered against the Certificates of Titles of the subject properties. These are contained within the CAD layer "BOUNDARY_EASEMENT_PROPOSED".

There are commercial leases registered to the subject Certificates of Title that are not shown on this plan.

This information is correct at 28 March 2019.

DIGITAL CADASTRAL DATABASE (DCDB) INFORMATION

The cadastral boundaries of adjoining properties has been derived from the state DCDB. The information is shown for plan context only and is of unknown completeness, quality or accuracy.

VIEW ASSOCIATED 3D CAD FILES AND INFORMATION

This project mapping has been designed to be viewed in multiple CAD layers and multiple CAD files. The CAD files will allow interrogation of the information independent of scale restrictions (including near title dimensions).The digital CAD files are generally in 3D and consequently queries of features and dimensions between points may produce slope distances rather than horizontal distances.

CONTOURS

The major contour interval on this plan is 1.0m, minor interval is 0.25m. Contours are a calculated indication of landform only. Spot Reduced Levels (RLs), or 3D levels on surveyed features should be used in preference to contours.

BUILDING INFORMATION

Only the footprints of all buildings on the subject site have been located. The footprint has been located at ground level only and may differ at other levels. No other building information has been located (eg roof ridges and gutters).

SIGNIFICANT SITE VEGETATION

Only significant trees on the subject site with a trunk diameter of 0.3 or greater has been surveyed. Smaller trees and shrubs exist on site. No tree tags have been placed.

NOTES TO ACCOMPANY DATA

Any electronic file is provided without warranty and should only be used in conjunction with the supplied PDF copy of this plan. These notes are an integral part of the digital data file and should be read with the data file and must not be removed from the data file.

For reasons of plan presentation, not all of the information can be shown on this plan. Please refer to accompanying digital data for all survey information and attributes.

SOURCE DATA FILE

The data in this file has been extracted from 12d file: P:\PR142110 - RPA Hospital, Missenden Road, Camperdown\03 RPS Data\01 Survey\03 Tasks\03 Detail\01 12d\PR142110 RPA Hospital Detail

EASEMENT AND LEASE DESIGNATIONS

(A) RIGHT OF CARRIAGEWAY 9.15, 10 AND VARIABLE WIDTH VIDE AJ433492

(B) EASEMENT FOR ELECTRICITY PURPOSES VIDE AJ433492

(C) EASEMENT FOR ELECTRICITY PURPOSES LIMITED IN HEIGHT TO RL 40.6 AND LIMITED IN DEPTH TO RL 34.8 VIDE AJ433492

(D) RIGHT OF ACCESS 10.06 AND 11.3 WIDE AND VARIABLE VIDE DP 1179349

(E) **PROPOSED** EASEMENT FOR ELECTRICITY AND OTHER PURPOSES 2 WIDE, 3 WIDE , 4.5 WIDE AND VARIABLE WIDTH AS SHOWN ON DP 1229537

(F) EASEMENT FOR SERVICES 10.06 WIDE AND VARIABLE VIDE DP1179349

(G) EASEMENT FOR WATERMAIN 7.62,6.86,6.705, 5.955 WIDE AND VARIABLE VIDE P463314

(H) EASEMENT FOR SEWERAGE 1.83 WIDE VIDE P463315

(J) LEASE OF SUBSTATION No, 7591 VIDE 7931835

(K) RIGHT OF WAY AND EASEMENT FOR ELECTRICITY PURPOSES 5.92, WIDE (LEVEL FOUR - DUNBLANE STREET LEVEL) VIDE 7931835

(L) RIGHT OF CARRIAGEWAY 3 WIDE VIDE 2570856

(M) EASEMENT FOR SERVICES AND RIGHT OF CARRIAGEWAY 6.095 WIDE VIDE DP 1159799

(N) EASEMENT FOR ELECTRICITY PURPOSES VIDE 2824279

(O) RIGHT OF WAY VIDE 2824279

(P) LEASE OF SUBSTATION NO'S 1863, 4740, 7327 VIDE 2824279

(Q) **PROPOSED** EASEMENT FOR SERVICES 2.5 WIDE SHOWN ON DP269321

(R) **PROPOSED** RIGHT OF WAY 4 WIDE AS SHOWN ON DP 1229537

(S) EASEMENT GRANTED BY RELEASE DATED 17-12-1895 TO THE BOARD OF WATER SUPPLY AND SEWERAGE VIDE BK 569 No. 888

(T) EXCEPTING LAND BELOW A DEPTH FROM THE SURFACE OF 20 METRES BY THE CROWN GRANT

(U) LEASE OF SUBSTATION No.547663 VIDE AJ216509

(X) LEASE OF SUBSTATION No.1308 VIDE P144039

(Y) RIGHT OF WAY AND EASEMENT FOR ELECTRICITY PURPOSES 2.48 WIDE VIDE P144039

(Z) RIGHT OF WAY 2.9 WIDE VIDE P144039

SS1 SUBSTATION PREMISES No.S47663 - WHOLLY ENCLOSED BY WALLS VIDE AJ216509

SS2 **PROPOSED** SUBSTATION No.63081 SHOWN ON DP 1229537

SS3 **PROPOSED** SUBSTATION No. 7757 SHOWN ON DP 1229537

SS4 **PROPOSED** SUBSTATION No. 3811 SHOWN ON DP 1229537

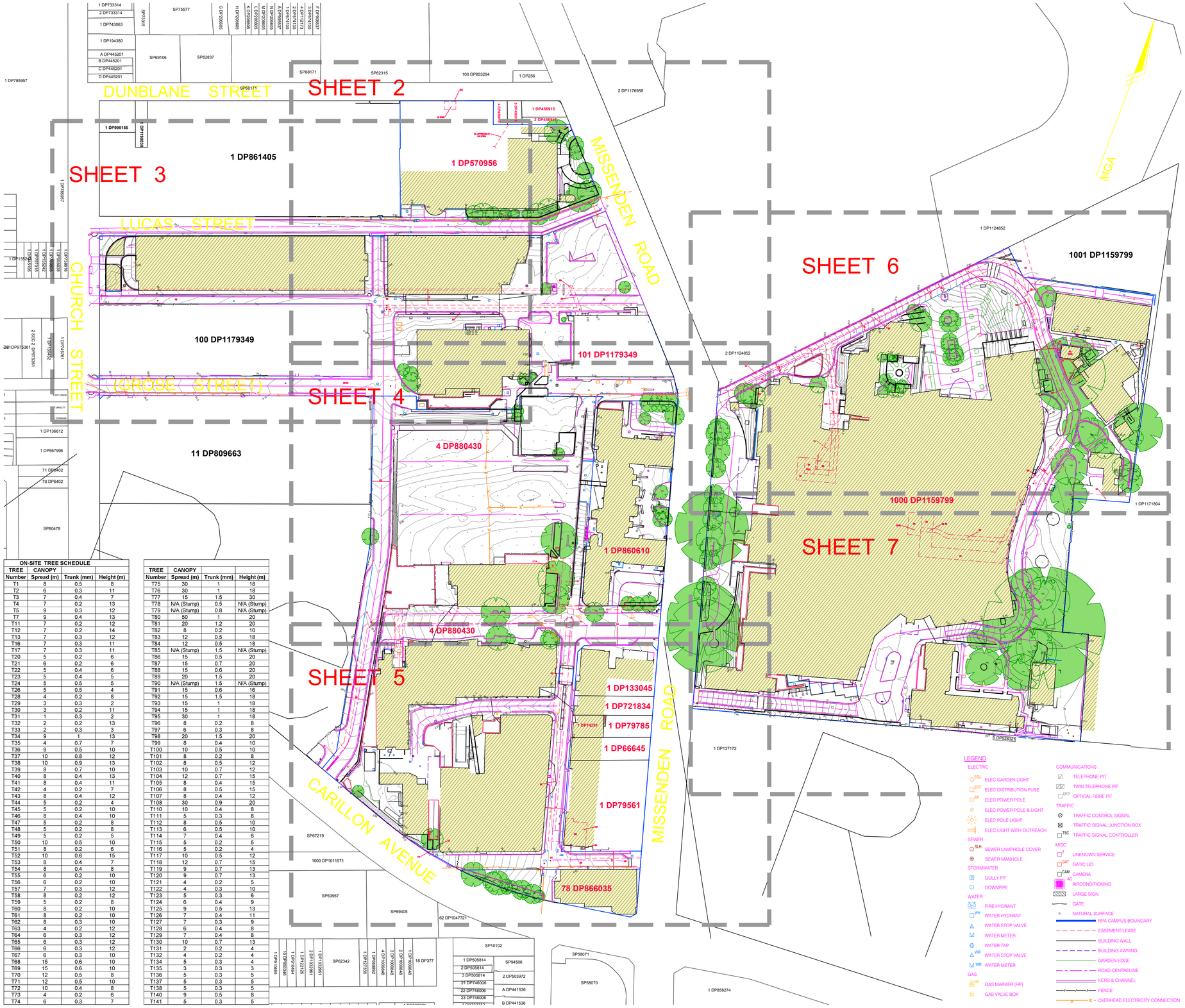
SS5 SUBSTATION PREMISES No. 1308 VIDE P144039

SS6 SUBSTATION PREMISES No. 7591 "DUNBLANE MISSENDEN No.2" (LEVEL FOUR - DUNBLANE STREET LEVEL)

SS7 SUBSTATION PREMISES No.1863 VIDE 2824279

SS8 SUBSTATION PREMISES No. 4740 VIDE 2824279

SS9 SUBSTATION PREMISES No. 7327 VIDE 2824279



ON-SITE TREE SCHEDULE

TREE Number	CANOPY Spread (m)	Trunk (mm)	Height (m)
T1	8	0.5	8
T2	6	0.3	11
T3	7	0.4	7
T4	7	0.2	13
T5	9	0.3	12
T7	9	0.4	13
T11	7	0.2	12
T12	7	0.2	14
T13	7	0.3	12
T16	7	0.3	11
T17	7	0.3	11
T20	5	0.2	6
T21	6	0.2	6
T22	5	0.4	6
T23	5	0.4	5
T24	5	0.5	5
T26	5	0.5	4
T28	4	0.2	8
T29	3	0.3	2
T30	3	0.2	11
T31	1	0.3	2
T32	2	0.2	13
T33	2	0.3	3
T34	9	1	13
T35	4	0.7	7
T36	9	0.5	10
T37	10	0.8	12
T38	10	0.9	13
T39	8	0.7	10
T40	8	0.4	13
T41	8	0.4	11
T42	4	0.2	7
T43	8	0.4	12
T44	5	0.2	4
T45	5	0.2	10
T46	8	0.4	10
T47	5	0.2	8
T48	5	0.2	8
T49	5	0.2	5
T50	10	0.5	10
T51	8	0.2	6
T52	10	0.6	15
T53	8	0.4	7
T54	8	0.4	8
T55	6	0.2	10
T56	6	0.2	10
T57	7	0.3	12
T58	8	0.2	12
T59	5	0.2	8
T60	8	0.2	10
T61	8	0.2	10
T62	8	0.3	10
T63	4	0.2	12
T64	6	0.3	12
T65	6	0.3	12
T66	6	0.3	12
T67	6	0.3	10
T68	15	0.6	10
T69	15	0.6	10
T70	12	0.5	8
T71	12	0.5	10
T72	10	0.4	8
T73	4	0.2	6
T74	6	0.3	7

TREE Number	CANOPY Spread (m)	Trunk (mm)	Height (m)
T75	30	1	18
T76	30	1	18
T77	15	1.5	30
T78	N/A (Stump)	0.5	N/A (Stump)
T79	N/A (Stump)	0.8	N/A (Stump)
T80	50	1	20
T81	20	1.2	20
T82	8	0.2	10
T83	12	0.5	18
T84	12	0.5	18
T85	N/A (Stump)	1.5	N/A (Stump)
T86	15	0.5	20
T87	15	0.7	20
T88	15	0.6	20
T89	20	1.5	20
T90	N/A (Stump)	1.5	N/A (Stump)
T91	15	0.6	16
T92	15	1.5	18
T93	15	1	18
T94	15	1	18
T95	30	1	18
T96	8	0.2	8
T97	6	0.3	8
T98	20	1.5	20
T99	8	0.4	10
T100	10	0.5	10
T101	8	0.2	8
T102	8	0.5	12
T103	10	0.7	12
T104	12	0.7	15
T105	8	0.4	15
T106	8	0.5	15
T107	8	0.4	12
T108	30	0.9	20
T110	10	0.4	8
T111	5	0.3	8
T112	8	0.5	10
T113	6	0.5	10
T114	7	0.4	6
T115	5	0.2	5
T116	5	0.2	4
T117	10	0.5	12
T118	12	0.7	15
T119	9	0.7	13
T120	9	0.7	13
T121	4	0.2	5
T122	4	0.3	10
T123	5	0.3	6
T124	6	0.4	9
T125	9	0.5	13
T126	7	0.4	11
T127	7	0.3	9
T128	6	0.4	8
T129	7	0.4	8
T130	10	0.7	13
T131	2	0.2	4
T132	4	0.2	4
T134	5	0.3	4
T135	3	0.3	3
T136	5	0.3	5
T137	5	0.3	5
T138	5	0.3	5
T140	9	0.5	8
T141	5	0.3	5

LEGEND

ELECTRIC
- EGL ELEC GARDEN LIGHT
- EFP ELEC DISTRIBUTION FUSE
- EP ELEC POWER POLE
- ELEC POWER POLE & LIGHT
- ELEC POLE LIGHT
- ELEC LIGHT WITH OUTREACH

SEWER
- SLH SEWER LAMPHOLE COVER
- SEWER MANHOLE

STORMWATER
- GULLY PIT
- DOWNPIPE

WATER
- FIRE HYDRANT
- WH WATER HYDRANT
- WATER STOP VALVE
- WATER METER
- WATER TAP
- WR WATER STOP VALVE
- WR WATER METER

GAS
- HP GAS MARKER (HP)
- GAS VALVE BOX

COMMUNICATIONS
- TELEPHONE PIT
- TWIN TELEPHONE PIT
- OPT OPTICAL FIBRE PIT

TRAFFIC
- TRAFFIC CONTROL SIGNAL
- TRAFFIC SIGNAL JUNCTION BOX
- TSC TRAFFIC SIGNAL CONTROLLER

MISC
- UNKNOWN SERVICE
- GAT GATIC LID
- CAM CAMERA
- AC AIRCONDITIONING
- LARGE SIGN
- GATE
- NATURAL SURFACE
- RPA CAMPUS BOUNDARY
- EASEMENT/LEASE
- BUILDING WALL
- BUILDING AWNING
- GARDEN EDGE
- ROAD CENTRELINE
- KERB & CHANNEL
- FENCE
- E OVERHEAD ELECTRICITY CONNECTION

REVISIONS					
A	04.04.2019	INITIAL PLAN	JMJ	DAA	GE
No.	DATE	REVISION DETAILS	DRAWN	CHK	APP

HORIZ. SCALE: 1:1000 @ A1 | VERT. SCALE: @ A1

COORDINATES: MGA | DATUM: AHD

ORIGIN: PM53458 | ORIGIN: PM53458

20 10 0 20 40 60

SCALE IN METRES AT ORIGINAL REDUCTION RATIO

NOTES

CLIENT: ..\02 XRefs\LOGO.jpg

SURVEY:	NF	DATE OF SURVEY:	21.03.2019
DRAWN:	JMJ	DATE OF PLAN:	04.04.2019
CHECKED:	DAA	DATE LAST SAVED:	22.08.2019
APPROVED:	GE	DATE APPROVED:	04.04.2019

TITLE

CONTOUR & DETAIL SURVEY
RPA HOSPITAL, MISSENDEN ROAD, CAMPERDOWN

DRAWING No PR142110-DS-001-A.DWG

JOB No PR142110

ISSUE A

SHEET 1 OF 7 SHEETS

SIZE A1

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PUBLIC UTILITY LEGEND

E ELEC
- CABLE JUNCTION BOX (PEJB)
- CABLE MANHOLE (PEMH)
- GARDEN LIGHT (PLGN)
- DISTRIBUTION FUSE POINT
- POLE - LIGHT (PLPL)
- POLE - POWER (PPPL)
- POLE - POWER & LIGHT (PPLP)
- POWER SERVICE PILLAR - UNDERGROUND (PEUP)
- TRANSFORMER CABINET CENTRE (PETC)
- LIGHT WITH OUTREACH (LI)
- EY — HOUSE CONNECTION (EY) (DIA UNK)
- EY 100 — HOUSE CONNECTION (EY) (DIA)
- ED — CONDUIT (ED) (DIA UNK)
- ED 100 — CONDUIT (ED) (DIA)
- EU — LINE-UNDERGROUND (EU) (DIA UNK)
- EU 100 — LINE-UNDERGROUND (EU) (DIA)
- UL — LINE-MINOR TRANSMISSION (UL) (DIA UNK)
- UL 150 — LINE-MINOR TRANSMISSION (UL) (DIA)

E TCS
- TRAFFIC CONTROL SIGNAL (PSGL)
- TRAFFIC SIGNAL CONTROLLER (PSCL)
- TRAFFIC SIGNAL DETECTOR (PSDR)
- TRAFFIC SIGNAL JUNCTION BOX (PSJX)
- TRAFFIC LIGHT WITH OUTREACH (TO)
- TRAFFIC SIGNAL DETECTOR (SD)

E COMMS (COMMUNICATIONS
- TELEPHONE DISTRIBUTION PILLAR (PTDP)
- ABOVE GROUND JOINING POST (PTJP)
- OPTICAL FIBRE JUNCTION BOX (POFJ)
- OPTICAL FIBRE PIT (POFP)
- STD 1.1 m BY 1.1 m MAIN PIT (PTMP)
- TELEPHONE BOX POINT (PTBX)
- TELEPHONE POLE (PTPL)
- TELEPHONE SINGLE CONCRETE PIT (PTSP)
- TELEPHONE TRIPLE CONCRETE PIT (PT3P)
- TELEPHONE TWIN CONCRETE PIT (PTTP)
- OU — OPTICAL FIBRE-UNDERGROUND (OU) (DIA UNK)
- OU 150 — OPTICAL FIBRE-UNDERGROUND (OU) (DIA)
- T — TELEPHONE LINE (TN) (DIA UNK)
- T 100 — TELEPHONE LINE (TN) (DIA)
- TD — TELEPHONE CONDUIT (TD) (DIA UNK)
- TD 16 — TELEPHONE CONDUIT (TD) (DIA)
- TELEPHONE SUMP (TS)

E GAS
- MANHOLE COVER (PGHL)
- METER (PGMR)
- PIPELINE MARKER (PGPM)
- PIPELINE MARKER - HIGH PRESSURE (PGHM)
- VALVE BOX (PGAS)
- VENT PIPE (PGVP)
- TEST POINT (PGTP)
- HA — ETHANE PIPELINE (HA) (DIA UNK)
- HA 150 — ETHANE PIPELINE (HA) (DIA)
- DG — HOUSE CONNECTION (DG) (DIA UNK)
- DG 150 — HOUSE CONNECTION (DG) (DIA)
- HG — MAIN-HIGH PRESSURE PIPELINE (HG) (DIA UNK)
- HG 150 — MAIN-HIGH PRESSURE PIPELINE (HG) (DIA)
- LG — MAIN-LOW PRESSURE (LG) (DIA UNK)
- LG 100 — MAIN-LOW PRESSURE (LG) (DIA)

E WATR
- AIR VALVE (PWAV)
- EARTH TERMINAL (PWET)
- FIRE HYDRANT (PWFB)
- HYDRANT (PWHY)
- METER (PWMR)
- STOP VALVE (PWSV)
- TAP (PWTP)
- WY — HOUSE CONNECTION (WY) (DIA UNK)
- WY 150 — HOUSE CONNECTION (WY) (DIA)
- WM — MAIN (WM) (DIA UNK)
- M 150 — MAIN (WM) (DIA)

E SWER
- MANHOLE COVER (PSMH)
- VENT PIPE (PSVP)
- LAMPHOLE (PSLH)
- S (A) — MAIN (SM) (DIA UNK)
- 150 — MAIN (SM) (DIA)
- SY — HOUSE CONNECTION (SY)
- SY 16 — HOUSE CONNECTION (SY) (DIA)

E DRAIN (STORMWATER)
- DRAINAGE JUNCTION MANHOLE (PDJM)
- GULLY PIT POINT (PGUL)
- INLET TO SUMP (PILT)
- INVERT OF PIPE (PINV)
- TOP OF CONCRETE JUNCTION BOX (PJBX)
- SUBSOIL DRAIN FLUSH POINT (PSFP)
- KERB INLET (KI)
- BOX CULVERT
- DP — DRAINAGE PIT (DP)
- DRAINAGE BOX (DX)
- DRAINAGE PIPE (UU) (DIA UNK)
- 150 — DRAINAGE PIPE (UU) (DIA)

E CULT (CULTURAL)
- SIGN POST (PSIN)
- BOLLARD (AC)
- FLOOR LEVEL
- CORNER OF BUILDING
- PARKING METER (PKME)

E MISC
- GATIC COVER LID (PGAT)
- AS5488 QUALITY LEVEL A
- UNIDENTIFIED POLE (PPOL)
- UNIDENTIFIED SERVICE (PUSR)
- UNIDENTIFIED SERVICE (UP)

SUI QUALITY CLASSIFICATION
- (A) — QUALITY LEVEL A
- (B) — QUALITY LEVEL B
- (C) — QUALITY LEVEL C
- (D) — QUALITY LEVEL D

UTILITY LEGEND

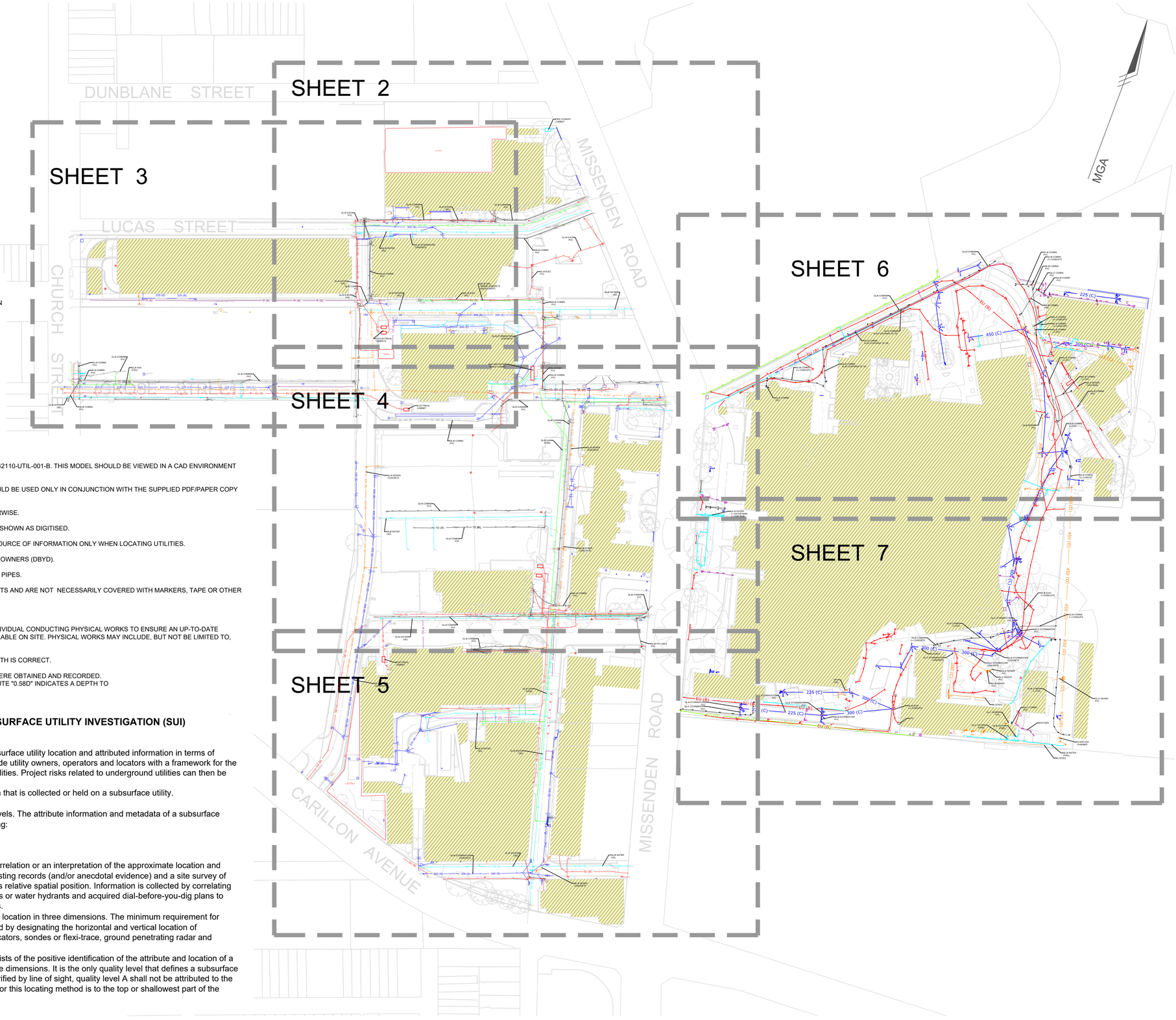
ELECTRICITY (AUSGRID):
AC ASBESTOS CEMENT
GI GALVANISED IRON
PVC POLYVINYL CHLORIDE

GAS (JEMENA):
NB NOMINAL BORE (CAST IRON MAN)
PE POLYETHYLENE

RMS:
GI GALVANISED IRON
HD HEAVY DUTY
PVC POLYVINYL CHLORIDE

TELSTRA & OPTUS:
AC ASBESTOS CEMENT
CONC. CONCRETE
EW EARTHENWARE
GI GALVANISED IRON
PVC POLYVINYL CHLORIDE

WATER (SYDNEY WATER):
CICL CAST IRON CEMENT LINED
DICL DUCTILE IRON CEMENT LINED
GI GALVANISED IRON
PVC POLYVINYL CHLORIDE
VC VITRIFIED CLAY
SCLIBL STEEL CEMENT LINED INTERNAL BITUMEN LINED
FOW FULL OF WATER
FOD FULL OF DIRT
UTO UNABLE TO OPEN
NA NOT ACCESSIBLE
EOT END OF TRACE
UTT UNABLE TO TRACE
NPV NO PIPES VISIBLE
EOS END OF SCOPE



DISCLAIMER:

THIS SURVEY MODEL INCLUDES INFORMATION DESCRIBING THE LOCATION OF SUBTERRANEAN FEATURES WHICH WERE PURPORTED TO EXIST AT THE TIME OF SURVEY.

THIS INFORMATION WAS COMPILED FROM A COMBINATION OF FIELD TECHNIQUES AND AVAILABLE DATA FROM COOPERATING UTILITY AUTHORITIES. WHILST ALL CARE HAS BEEN TAKEN IN THE PREPARATION OF THIS SURVEY MODEL, RPS CANNOT GUARANTEE THAT THE SURVEY MODEL IS WITHOUT FLAW OR OMISSIONS. RPS CANNOT TAKE RESPONSIBILITY OF ANY KIND WHATSOEVER FOR ANY LOSS, DAMAGE OR OTHER CONSEQUENCES WHICH MAY ARISE FROM ANY PERSON RELYING ON ANY THING STATED ON THIS PLAN.

IN PARTICULAR, IT IS RECOMMENDED THAT USERS SATISFY THEMSELVES AS TO THE LOCATION OF SUBTERRANEAN FEATURES SUCH AS UTILITIES WHICH MAY OR MAY NOT BE SHOWN ON THE PLAN.

NOTES:

1. THIS PLAN SHOWS A REPRESENTATION OF A 3D UTILITY MODEL PR142110-UTIL-001-B. THIS MODEL SHOULD BE VIEWED IN A CAD ENVIRONMENT TO INTERPRET THE 3D INFORMATION.
2. ANY ELECTRONIC FILE IS PROVIDED WITHOUT WARRANTY AND SHOULD BE USED ONLY IN CONJUNCTION WITH THE SUPPLIED PDF/PAPER COPY OF THIS PLAN.
3. ALL UTILITIES (EXCEPT GAS) ARE CLASS QL-B UNLESS NOTED OTHERWISE.
4. ALL GAS UTILITIES ARE CLASS QL-C UNLESS NOTED OTHERWISE OR SHOWN AS DIGITISED.
5. RPS UTILITY LOCATION USE DIAL BEFORE YOU DIG (DBYD) AS ONE SOURCE OF INFORMATION ONLY WHEN LOCATING UTILITIES.
6. UTILITY INFORMATION AND CONFIGURATION SUPPLIED FROM ASSET OWNERS (DBYD).
7. SINGLE STRINGS MAY REPRESENT MULTIPLE CABLES, CONDUITS OR PIPES.
8. ELECTRICITY CABLES ARE NOT NECESSARILY ENCLOSED IN CONDUITS AND ARE NOT NECESSARILY COVERED WITH MARKERS, TAPE OR OTHER INDICATORS OF THEIR PRESENCE.
9. NOT ALL HOUSE CONNECTIONS HAVE BEEN LOCATED.
10. IT REMAINS THE RESPONSIBILITY OF THE COMPANY AND/OR THE INDIVIDUAL CONDUCTING PHYSICAL WORKS TO ENSURE AN UP-TO-DATE VERSION OF DIAL BEFORE YOU DIG PLANS IS CONSULTED AND AVAILABLE ON SITE. PHYSICAL WORKS MAY INCLUDE, BUT NOT BE LIMITED TO, EXCAVATING, BORING (HORIZONTAL AND VERTICAL), AND DRILLING.
11. ALL UTILITIES NEED TO BE POTHOLED TO VERIFY LOCATION AND DEPTH IS CORRECT.
12. WHERE POSSIBLE IN THE FIELD, DEPTHS TO INDIVIDUAL SERVICES WERE OBTAINED AND RECORDED. THE DEPTH IS SHOWN AS TEXTURAL NOTATION. HENCE, THE ATTRIBUTE "0.58D" INDICATES A DEPTH TO THE UTILITY OF 580mm.

NOTE ON AS 5488-2013 CLASSIFICATION OF SUBSURFACE UTILITY INVESTIGATION (SUI)

Quality Levels

This Standard provides a framework for the classification of subsurface utility location and attributed information in terms of specified quality levels. The objective of this Standard is to provide utility owners, operators and locators with a framework for the consistent classification of information concerning subsurface utilities. Project risks related to underground utilities can then be properly managed.

A quality level describes the amount and accuracy of information that is collected or held on a subsurface utility.

There are four quality levels: D, C, B and A

Quality Level D (QL-D) is the lowest of these four quality levels. The attribute information and metadata of a subsurface utility can be compiled from any, or a combination of, the following:

(a) Existing records;
(b) Cursory site inspection;
(c) Anecdotal evidence

Quality Level C (QL-C) is described as a surface feature correlation or an interpretation of the approximate location and attributes of a subsurface utility asset using a combination of existing records (and/or anecdotal evidence) and a site survey of visible evidence. The minimum requirement for Quality Level C is relative spatial position. Information is collected by correlating the survey of visible utility surface features such as marker plates or water hydrants and acquired dial-before-you-dig plans to "draw" a string which shows the approximate position of services.

Quality Level B (QL-B) provides relative subsurface feature location in three dimensions. The minimum requirement for Quality Level B is relative spatial position. Information is collected by designating the horizontal and vertical location of underground utilities by using electromagnetic pipe and cable locators, sondes or flexi-trace, ground penetrating radar and acoustic pulse equipment.

Quality Level A (QL-A) is the highest quality level and consists of the positive identification of the attribute and location of a subsurface utility at a point to an absolute spatial position in three dimensions. It is the only quality level that defines a subsurface utility as 'validated'. Where the whole line segment cannot be verified by line of sight, quality level A shall not be attributed to the line segment between validated points. The vertical information for this locating method is to the top or shallowest part of the located service.

REVISIONS

No.	DATE	REVISION DETAILS	DRAWN	CHK	APP
B	17.09.2019	UTILITIES MODEL WEST OF MISSENDEN ROAD UPADATED	AF	TB / SP	TC
A	14.05.2019	INITIAL PLAN	JMJ	NF	TC

HORIZ. SCALE: 1:1000 @ A1
VERT. SCALE: N/A @ A1
COORDINATES: MGA
DATUM: AHD
ORIGIN: PM53458
ORIGIN: PM53458
20 10 0 20 40 60
SCALE IN METRES AT ORIGINAL REDUCTION RATIO

NOTES
SOME LEVELS ARE NOT INDICATED ON THE PDF. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH CAD FILE.

CLIENT: NSW GOVERNMENT Health

SURVEY:	NF	DATE OF SURVEY:	24.04.2019
DRAWN:	JMJ	DATE OF PLAN:	14.05.2019
CHECKED:	NF	DATE LAST SAVED:	18.09.2019
APPROVED:	TC	DATE APPROVED:	14.05.2019

TITLE
UTILITIES INVESTIGATION
RPA HOSPITAL, MISSENDEN ROAD, CAMPERDOWN

DRAWING No PR142110-UTIL-001-B.dwg

JOB No PR142110
ISSUE B
SHEET 1 OF 7 SHEETS
SIZE A1

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SP68171

SP62315

100 DP853294

1 DP256

2 DP1176958

DUNBLANE STREET

4 DP456915

3 DP456915

1 DP456915

2 DP456915

FIRE HYDRANT CABINET

MGA

NO ACCESS

1 DP570956

1 DP861405

QL-B ELEC PVC

QL-B COMMS PVC

QL-B ELEC PVC

QL-B COMMS PVC

LUCAS STREET

QL-B WATER DICL

QL-B STORMWATER CONCRETE

QL-B ELEC PVC

QL-B COMMS PVC

ADJOINS SHEET 3

QL-B ELEC PVC

QL-B COMMS PVC

QL-B ELEC PVC

QL-B WATER CICL

QL-B ELEC PVC

QL-B GAS (INSIDE CONCRETE ENCASEMENT)

QL-B COMMS PVC

QL-B WATER CICL

2 x ELECTRICAL CABINETS

QL-B STORMWATER CONCRETE

HOSPITAL ROAD

MISSENDEN ROAD

ADJOINS SHEET 6

ADJOINS SHEET 4

100 DP1179349

101 DP1179349

2 DP1124852

REVISIONS					
No.	DATE	REVISION DETAILS	DRAWN	CHK	APP
B	17.09.2019	UTILITIES MODEL WEST OF MISSENDEN ROAD UPADATED	AF	TB / SP	TC
A	14.05.2019	INITIAL PLAN	JMJ	NF	TC

HORIZ. SCALE: 1:300 @ A1

VERT. SCALE: N/A @ A1

COORDINATES: MGA

DATUM: AHD

ORIGIN: PM53458

ORIGIN: PM53458

6 3 0 6 12 18

SCALE IN METRES AT ORIGINAL REDUCTION RATIO

NOTES

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CLIENT: NSW GOVERNMENT Health

SURVEY:	NF	DATE OF SURVEY:	24.04.2019
DRAWN:	JMJ	DATE OF PLAN:	14.05.2019
CHECKED:	NF	DATE LAST SAVED:	18.09.2019
APPROVED:	TC	DATE APPROVED:	14.05.2019

TITLE

UTILITIES INVESTIGATION
RPA HOSPITAL, MISSENDEN ROAD, CAMPERDOWN

DRAWING No: PR142110-UTIL-001-B.dwg

JOB No: PR142110

ISSUE: B

SHEET 2 OF 7 SHEETS

SIZE: A1

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ADJOINS SHEET 2

ADJOINS SHEET 2

1 DP995185

1 DP1190838

1 DP861405

1 DP570956

NO ACCESS

1 DP785957

MGA

CHURCH STREET

1 DP738616

1 DP995838

QL-B ELEC PVC

QL-B COMMS PVC

QL-B ELEC PVC

QL-B COMMS PVC

LUCAS STREET

BITUMEN FOOTPATH

QL-B WATER DICL

QL-B STORMWATER CONCRETE

QL-B COMMS PVC

QL-B ELEC PVC

QL-B COMMS PVC

QL-B ELEC PVC

QL-B WATER CICL

QL-B ELEC PVC

QL-B GAS (INSIDE CONCRETE ENCASEMENT)

CONCRETE FOOTPATH

UNKNOWN SERVICE - POSSIBLE OLD GAS LINE

INSPECTION OUTLET

NO ACCESS TO EXTENTS (FENCED OFF)

SPRIAL ROAD

2 x ELECTRICAL CABINETS

QL-B STORMWATER CONCRETE

NO ACCESS - SERVICE TANKS

GARDEN

GAS AND WATER MAINS CABINET

1 DP745761

QL-B COMMS PVC

QL-B COMMS PVC

QL-B GAS STEEL

QL-B COMMS PVC

(GROSE STREET)

CONCRETE FOOTPATH

100 DP1179349

6 DP1109039

7 DP63277

1 DP995045

QL-B WATER DICL

QL-B COMMS PVC

11 DP809663

ELECTRICAL CABINET

NOT ACCESSIBLE

STAIRS

ADJOINS SHEET 4

ADJOINS SHEET 4

REVISIONS					
B	17.09.2019	UTILITIES MODEL WEST OF MISSENDEN ROAD UPADATED	AF	TB / SP	TC
A	14.05.2019	INITIAL PLAN	JMJ	NF	TC
No.	DATE	REVISION DETAILS	DRAWN	CHK	APP

HORIZ. SCALE: 1:300 @ A1

VERT. SCALE: N/A @ A1

COORDINATES: MGA

DATUM: AHD

ORIGIN: PM53458

ORIGIN: PM53458

6 3 0 6 12 18

SCALE IN METRES AT ORIGINAL REDUCTION RATIO

NOTES

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CLIENT: NSW GOVERNMENT Health

SURVEY:	NF	DATE OF SURVEY:	24.04.2019
DRAWN:	JMJ	DATE OF PLAN:	14.05.2019
CHECKED:	NF	DATE LAST SAVED:	18.09.2019
APPROVED:	TC	DATE APPROVED:	14.05.2019

TITLE

UTILITIES INVESTIGATION
RPA HOSPITAL, MISSENDEN ROAD, CAMPERDOWN

DRAWING No: PR142110-UTIL-001-B.dwg

JOB No: PR142110

ISSUE: B

SHEET 3 OF 7 SHEETS

SIZE: A1

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ADJOINS SHEET 3

ADJOINS SHEET 2

ADJOINS SHEET 6

ADJOINS SHEET 7

ADJOINS SHEET 5

100 DP1179349

11 DP809663

12 DP809663

4 DP880430

4 DP880430

101 DP1179349

1 DP860610

2 DP1124852

GAS AND WATER MAINS CABINET

QL-B ELEC PVC

QL-B COMMS PVC

ELECTRICAL CABINET

QL-B COMMS PVC

QL-B COMMS PVC

QL-B COMMS PVC

QL-B GAS STEEL

QL-B SEWER CONCRETE

QL-B SEWER CONCRETE

QL-B COMMS PVC

QL-B WATER CICL

QL-B COMMS PVC

QL-B SEWER CONCRETE

QL-B COMMS PVC

QL-B COMMS PVC

QL-B WATER CICL

QL-B COMMS PVC

QL-B ITS CABLE PVC

QL-B WATER
1 x WATER MAIN
2 x FIRE MAIN

MGA

(HOSPITAL ROAD)

(SUSAN STREET)

MISSENDEN ROAD

REVISIONS					
No.	DATE	REVISION DETAILS	DRAWN	CHK	APP
B	17.09.2019	UTILITIES MODEL WEST OF MISSENDEN ROAD UPADATED	AF	TB / SP	TC
A	14.05.2019	INITIAL PLAN	JMJ	NF	TC

HORIZ. SCALE: 1:300 @ A1
VERT. SCALE: N/A @ A1
COORDINATES: MGA
DATUM: AHD
ORIGIN: PM53458
ORIGIN: PM53458

6 3 0 6 12 18
SCALE IN METRES AT ORIGINAL REDUCTION RATIO

NOTES

SOME LEVELS ARE NOT INDICATED ON THE PDF. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH CAD FILE.

CLIENT: NSW GOVERNMENT Health

SURVEY:	NF	DATE OF SURVEY:	24.04.2019
DRAWN:	JMJ	DATE OF PLAN:	14.05.2019
CHECKED:	NF	DATE LAST SAVED:	18.09.2019
APPROVED:	TC	DATE APPROVED:	14.05.2019

TITLE

UTILITIES INVESTIGATION
RPA HOSPITAL, MISSENDEN ROAD, CAMPERDOWN

DRAWING No: PR142110-UTIL-001-B.dwg

JOB No: PR142110

ISSUE: B

SHEET 4 OF 7 SHEETS

SIZE: A1

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ADJOINS SHEET 4

ADJOINS SHEET 7

QL-B WATER CICL

4 DP880430

QL-B COMMS PVC

QL-B ITS CABLE PVC

ELECTRICAL CABINET

QL-B SEWER CONCRETE

QL-B GAS STEEL

1 DP133045

1 DP721834

1 DP74291

1 DP116729

1 DP79785

1 DP66645

QL-B WATER CICL

QL-B WATER CICL

1 DP79561

QL-B STORMWATER CONCRETE

QL-B WATER CICL

QL-B WATER CICL

QL-B SEWER CONCRETE

78 DP866035

QL-B STORMWATER PVC

QL-C STORMWATER PVC

12 DP809663

1 DP137172

SP67219

1000 DP1011571

SP63957

SP69405

62 DP1047721

MGA

(HOSPITAL ROAD)

(SUSAN STREET)

(BROWN STREET)

MISSENDEN ROAD

CARILLON AVENUE

GLOUCHESTER

GRASS

CONCRETE FOOTPATH

BRICK FOOTPATH

BITUMEN FOOTPATH

BITUMEN

CONCRETE SLAB

RAISED CONCRETE

HEAVILY VEGETATED

LARGE AWNING

NOT ACCESSIBLE

NO ACCESS MATERIAL CONTAINERS

GARDEN

REVISIONS					
No.	DATE	REVISION DETAILS	DRAWN	CHK	APP
B	17.09.2019	UTILITIES MODEL WEST OF MISSENDEN ROAD UPADATED	AF	TB / SP	TC
A	14.05.2019	INITIAL PLAN	JMJ	NF	TC

HORIZ. SCALE: 1:300 @ A1

VERT. SCALE: N/A @ A1

COORDINATES: MGA

DATUM: AHD

ORIGIN: PM53458

ORIGIN: PM53458

6 3 0 6 12 18

SCALE IN METRES AT ORIGINAL REDUCTION RATIO

NOTES

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CLIENT: NSW GOVERNMENT Health

SURVEY:	NF	DATE OF SURVEY:	24.04.2019
DRAWN:	JMJ	DATE OF PLAN:	14.05.2019
CHECKED:	NF	DATE LAST SAVED:	18.09.2019
APPROVED:	TC	DATE APPROVED:	14.05.2019

TITLE

UTILITIES INVESTIGATION
RPA HOSPITAL, MISSENDEN ROAD, CAMPERDOWN

DRAWING No: PR142110-UTIL-001-B.dwg

JOB No: PR142110

ISSUE: B

SHEET 5 OF 7 SHEETS

SIZE: A1

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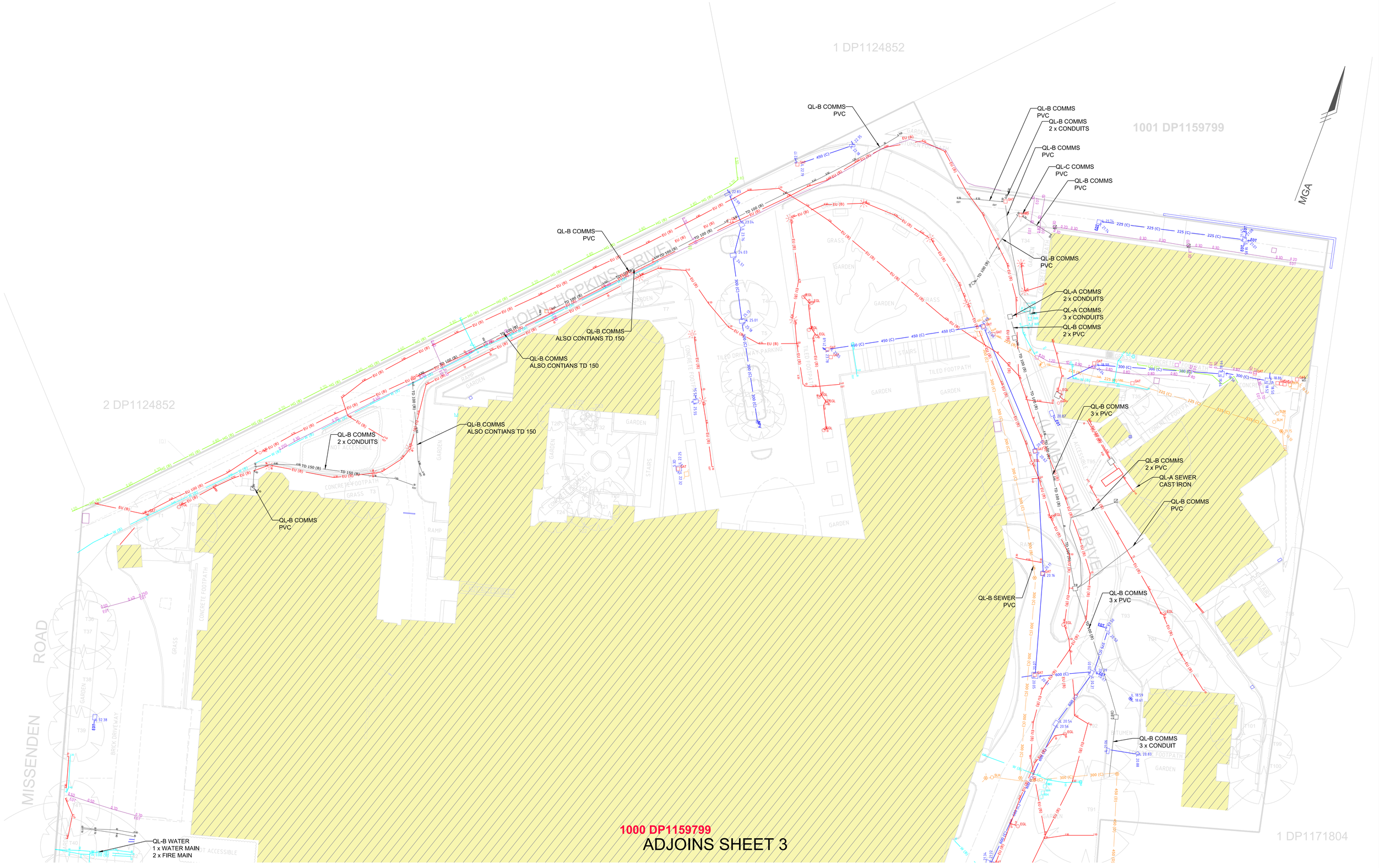
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REVISIONS					
No.	DATE	REVISION DETAILS	DRAWN	CHK	APP
B	17.09.2019	UTILITIES MODEL WEST OF MISSENDEN ROAD UPADATED	AF	TB / SP	TC
A	14.05.2019	INITIAL PLAN	JMJ	NF	TC

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VERT. SCALE: N/A @ A1
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APPROVED:	TC	DATE APPROVED:	14.05.2019

TITLE
UTILITIES INVESTIGATION
RPA HOSPITAL, MISSENDEN ROAD, CAMPERDOWN

DRAWING No PR142110-UTIL-001-B.dwg

JOB No PR142110
ISSUE B
SHEET 6 OF 7 SHEETS
SIZE A1

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ADJOINS SHEET 2

1000 DP1159799

1 DP1171804

1 DP137172

1 DP528321

MGA

QL-B WATER
1 x WATER MAIN
2 x FIRE MAIN

QL-B ELEC
3 x CONDUITS

QL-C STORMWATER
PVC

QL-B COMMS
3 x CONDUITS

QL-B COMMS
3 x PVC

QL-C STORMWATER
PVC

QL-B COMMS
4 x CONDUITS

BLOCKED
QL-C STORMWATER
CONCRETE

QL-B STORMWATER
CONCRETE

QL-C STORMWATER
CONCRETE

QL-C SEWER
PVC

QL-C SEWER
PVC

QL-B SEWER
PVC

NPV
FOD

QL-B COMMS
4 x PVC

QL-C SEWER
PVC

BLOCKED

QL-C STORMWATER
PVC

QL-B STORMWATER
PVC

QL-C STORMWATER
PVC

QL-B STORMWATER
PVC

QL-B ELEC
3 x CONDUITS

UTO

QL-C COMMS
PVC

QL-C SEWER
PVC

QL-C WATER
STEEL

QL-B WATER
STEEL

OXYGEN

OVERFLOW
CHAMBER

QL-B WATER
STEEL
BLOCKED

REVISIONS					
B	17.09.2019	UTILITIES MODEL WEST OF MISSENDEN ROAD UPADATED	AF	TB / SP	TC
A	14.05.2019	INITIAL PLAN	JMJ	NF	TC
No.	DATE	REVISION DETAILS	DRAWN	CHK	APP

HORIZ. SCALE: 1:300 @ A1
VERT. SCALE: N/A @ A1
COORDINATES: MGA
DATUM: AHD
ORIGIN: PM53458
ORIGIN: PM53458
6 3 0 6 12 18
SCALE IN METRES AT ORIGINAL REDUCTION RATIO

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CLIENT: NSW GOVERNMENT Health

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DRAWN:	JMJ	DATE OF PLAN:	14.05.2019
CHECKED:	NF	DATE LAST SAVED:	18.09.2019
APPROVED:	TC	DATE APPROVED:	14.05.2019

TITLE
UTILITIES INVESTIGATION
RPA HOSPITAL, MISSENDEN ROAD, CAMPERDOWN

DRAWING No PR142110-UTIL-001-B.dwg

JOB No PR142110

ISSUE B

SHEET 7 OF 7 SHEETS

SIZE A1

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ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT
EARLY WORKS - REF2 PACKAGE

ARCHITECTURAL DRAWING LIST - REF2	
Sheet Number	Sheet Name
REF2-0000	REF2 - COVER SHEET
REF2-3221	REF2 - EXISTING SITE PLAN
REF2-3222	REF2 - SITE PLAN
REF2-3223	REF2 - DEMOLITION PLAN - LEVEL 2
REF2-3224	REF2 - DEMOLITION PLAN - LEVEL 4
REF2-3225	REF2 - PROPOSED PLAN - LEVEL 2
REF2-3226	REF2 - PROPOSED PLAN - LEVEL 4
REF2-3230	REF2 - ELEVATION / SECTIONS
REF2-3231	REF2 - SECTION / RENDERING

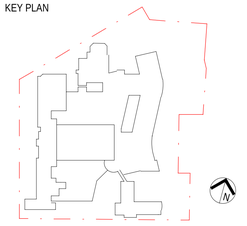


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REV	DATE	AMENDMENT
D	17/05/22	REF#2 FINAL ISSUE
C	04/05/22	REF#2 UPDATED DRAFT ISSUE
B	28/04/22	REF#2 UPDATED DRAFT ISSUE FOR COMMENT
A	27/04/22	REF#2 UPDATED DRAFT ISSUE

KEY PLAN



PROJECT MANAGER

TSA

CLIENT

Health Sydney Local Health District

Health Infrastructure

ARCHITECT

Jacobs

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Fax: +61 2 9928 2510
Web: jacobs.com

PROJECT
ROYAL PRINCE ALFRED HOSPITAL
REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - COVER SHEET

STATUS
FINAL

DRAWN	DESIGNED
BL	RR/MR
CHECKED	APPROVED
RR/MR	CY

SCALE @ B1

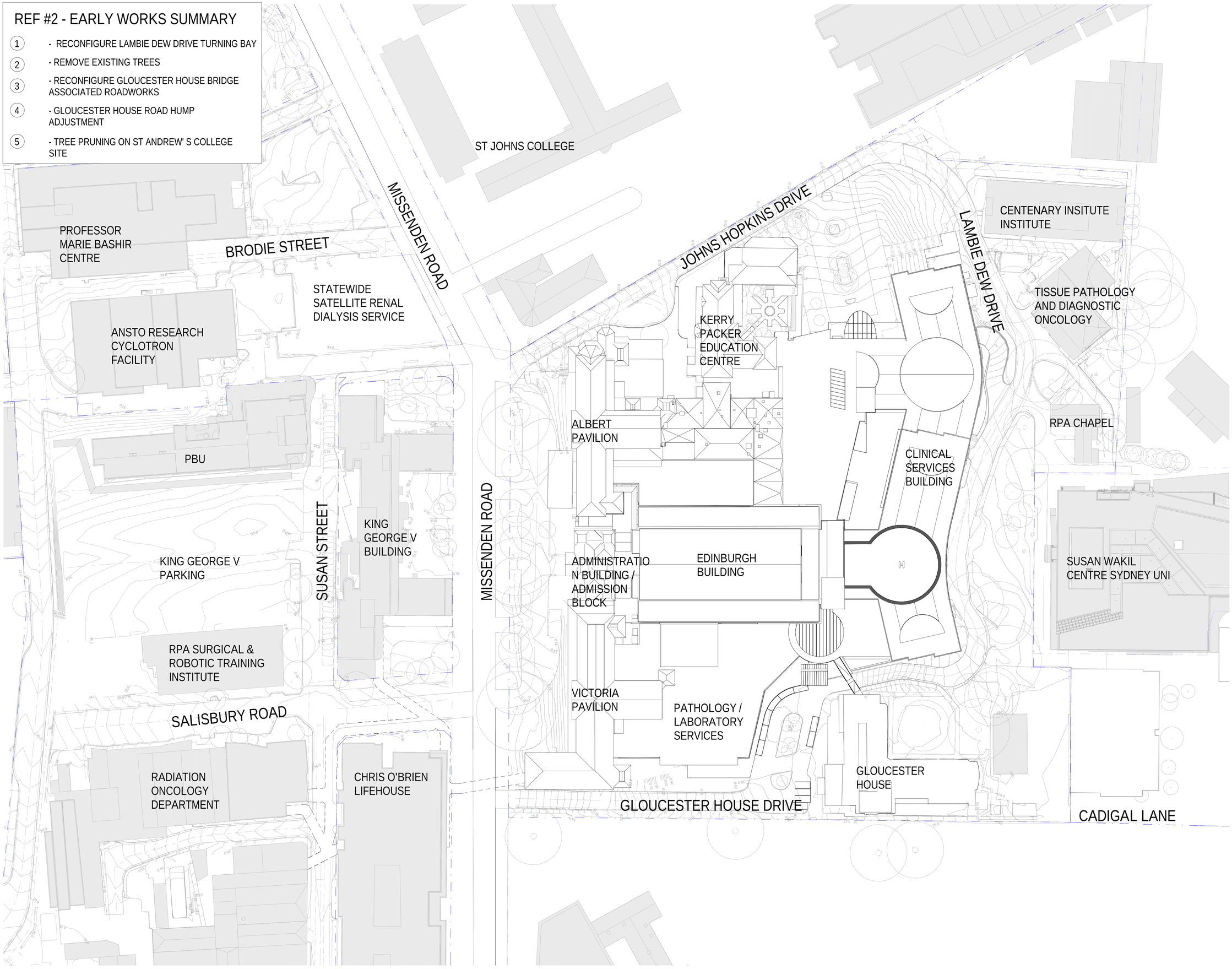
DRAWING NO.
RPA-ARC-JAC-DRG-REF2-0000

REVISION
D

BIM 360://AU-IA021700-RPA-Hospital/IA251300-MAIN.rvt
17/05/2022 4:28:33 PM

REF #2 - EARLY WORKS SUMMARY

1. - RECONFIGURE LAMBIE DEW DRIVE TURNING BAY
2. - REMOVE EXISTING TREES
3. - RECONFIGURE GLOUCESTER HOUSE BRIDGE ASSOCIATED ROADWORKS
4. - GLOUCESTER HOUSE ROAD HUMP ADJUSTMENT
5. - TREE PRUNING ON ST ANDREW' S COLLEGE SITE



NOTES

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LEGEND

- ROAD / SERVICES RE-CONFIGURATION *REFER RELEVANT SERVICES DRAWINGS*
- REFURBISHMENT / RE-CONFIGURATION
- DEMOLITION
- TREES TO BE REMOVED
- TREES TO BE TRIMMED

REV	DATE	AMENDMENT
G	17/05/22	REF#2 FINAL ISSUE
F	04/05/22	REF#2 UPDATED DRAFT ISSUE
E	28/04/22	REF#2 UPDATED DRAFT ISSUE FOR COMMENT
D	27/04/22	REF#2 UPDATED DRAFT ISSUE
C	18/03/22	REF#2 DRAFT ISSUE
B	03/03/22	REVISED DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT
A	21/02/22	DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT

KEY PLAN

PROJECT MANAGER

TSA

CLIENT

NSW GOVERNMENT Health Sydney Local Health District

NSW GOVERNMENT Health Infrastructure

ARCHITECT

Jacobs

Level 7, 177 Pacific Highway,
North Sydney, NSW, 2060
Tel: +61 2 9928 2100
Fax: +61 2 9928 2510
Web: jacobs.com

PROJECT
ROYAL PRINCE ALFRED HOSPITAL
REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - EXISTING SITE PLAN

STATUS
FINAL

DRAWN	DESIGNED
RR	RR/MR
CHECKED	APPROVED
VH	CY

SCALE @ B1
1 : 500

DRAWING NO.
RPA-ARC-JAC-DRG-REF2-3221

REVISION
G

BIM 360://AU-IA021700-RPA-Hospital/IA251300-MAIN.rvt
17/05/2022 4:30:02 PM

REF2 - WORKS SUMMARY

1. RECONFIGURE LAMBIE DEW DRIVE TURNING BAY
2. REMOVE EXISTING TREES
3. RECONFIGURE GLOUCESTER HOUSE BRIDGE AND ASSOCIATED ROADWORKS
4. GLOUCESTER HOUSE ROAD HUMP ADJUSTMENT
5. TREE PRUNING ON ST ANDREW' S COLLEGE SITE

ST JOHNS COLLEGE
MISSENDEN ROAD
JOHNS HOPKINS DRIVE
LAMBIE DEW DRIVE
BRODIE STREET
PROFESSOR MARIE BASHIR CENTRE
STATEWIDE SATELLITE RENAL DIALYSIS SERVICE
ANSTO RESEARCH CYCLOTRON FACILITY
PBU
KERRY PACKER EDUCATION CENTRE
CENTENARY INSTITUTE
TISSUE PATHOLOGY AND DIAGNOSTIC ONCOLOGY
ALBERT PAVILION
CLINICAL SERVICES BUILDING
RPA CHAPEL
SUSAN STREET
KING GEORGE V BUILDING
KING GEORGE V PARKING
ADMINISTRATION BUILDING / ADMISSION BLOCK
EDINBURGH BUILDING
SUSAN WAKIL CENTRE SYDNEY UNI
RPA SURGICAL & ROBOTIC TRAINING INSTITUTE
SALISBURY ROAD
VICTORIA PAVILION
PATHOLOGY / LABORATORY SERVICES
GLOUCESTER HOUSE
RADIATION ONCOLOGY DEPARTMENT
CHRIS O'BRIEN LIFEHOUSE
GLOUCESTER HOUSE DRIVE
CADIGAL LANE

NEW PAVEMENT FOR VEHICLE TURNING AND PEDESTRIAN PAVEMENT- REFER CIVIL
STOP LINE & TRAFFIC SIGNAL.
STOP LINE & TRAFFIC SIGNAL.
3 HOWEA FORSTERIANA TO BE RETAINED, REMOVE 4
TRIM EXISTING TREE TO HEIGHT OF PROPOSED TRUCK MOVEMENTS - CONSULT WITH ARBORIST.
RELOCATE EXISTING STORMWATER PITS AND EXTEND APPROACH RAMP TO SUIT
TRAFFIC ISLAND AND LANDSCAPING TO BE RE-CONFIGURED

1 2 3 4 5

NOTES

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LEGEND

- ROAD / SERVICES RE-CONFIGURATION *REFER RELEVANT SERVICES DRAWINGS*
- REFURBISHMENT / RE-CONFIGURATION
- DEMOLITION
- TREES TO BE REMOVED
- TREES TO BE TRIMMED

REV	DATE	AMENDMENT
I	01/07/22	REF#2 FINAL ISSUE
H	19/05/22	REF#2 FINAL ISSUE
G	17/05/22	REF#2 FINAL ISSUE
F	04/05/22	REF#2 UPDATED DRAFT ISSUE
E	28/04/22	REF#2 UPDATED DRAFT ISSUE FOR COMMENT
D	27/04/22	REF#2 UPDATED DRAFT ISSUE
C	18/03/22	REF#2 DRAFT ISSUE
B	03/03/22	REVISED DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT
A	21/02/22	DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT

KEY PLAN

PROJECT MANAGER

TSA

CLIENT
NSW GOVERNMENT Health Sydney Local Health District
NSW GOVERNMENT Health Infrastructure

ARCHITECT
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PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - PROPOSED SITE PLAN

STATUS
FINAL

DRAWN	DESIGNED
RR	RR/MR
CHECKED	APPROVED
VH	CY

SCALE @ B1
1 : 500

DRAWING NO.
RPA-ARC-JAC-DRG-REF2-3222

REVISION
I

BIM 360://AU-IA021700-RPA-Hospital/IA251300-MAIN.rvt
01/07/2022 09:52:20

REF2 - WORKS SUMMARY

1. RECONFIGURE LAMBIE DEW DRIVE TURNING BAY
2. REMOVE EXISTING TREES
3. RECONFIGURE GLOUCESTER HOUSE BRIDGE AND ASSOCIATED ROADWORKS
4. GLOUCESTER HOUSE ROAD HUMP ADJUSTMENT
5. TREE PRUNING ON ST ANDREW' S COLLEGE SITE

CHARLES PERKINS CENTRE
CHARLES PERKINS AUDITORIUM
CENTENARY INSTITUTE
JOHNS HOPKINS DRIVE
LAMBIE DEW DRIVE
STAIR 1
CARPARK
EDUCATION CENTRE
CMTU
BIOMEDICAL
ALBERT PAVILION
AUTOPSY FACILITY
AV
WASTE
FOOD SERVICES
LINEN
SDU
TSSU
CHANGE
CLEANERS
FINISHING KITCHEN
ADMINISTRATION BUILDING / ADMISSION BLOCK
MISSENDEN ROAD
VICTORIA PAVILION
MELANOMA DIAGNOSTIC CENTER
STRATEGIC RELATION AND COMMUNICATION DEPARTMENT
GLOUCESTER HOUSE DRIVE
CADIGAL LANE
SUSAN WAKIL CENTRE SYDNEY UNI

T46 -CAMELLIA SASANQUA - PROTECT EXISTING TREES T46 AND T128 UNDER CONSTRUCTION WORKS

T128 - CAMELLIA JAPONICA

1 - AREA FOR NEW PAVEMENT FOR TURNING

G59 - GROUP OF 7 HOWEA FORSTERIANA

2 - TREES TO BE REMOVED

3 - TRAFFIC ISLAND AND LANDSCAPING TO BE RE-CONFIGURED

3 - DEMOLISH ASSOCIATED PAVING, KERBS AND ROADWORKS

4 -RELOCATE EXISTING STORMWATER PITS AND EXTEND APPROACH RAMP TO SUIT

5 -TRIM EXISTING TREE TO HEIGHT OF PROPOSED TRUCK MOVEMENTS - CONSULT WITH ARBORIST.

NOTES

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LEGEND

- ROAD / SERVICES RE-CONFIGURATION *REFER RELEVANT SERVICES DRAWINGS*
- REFURBISHMENT / RE-CONFIGURATION
- DEMOLITION
- TREES TO BE REMOVED
- TREES TO BE TRIMMED

REV	DATE	AMENDMENT
I	01/07/22	REF#2 FINAL ISSUE
H	17/05/22	REF#2 FINAL ISSUE
G	04/05/22	REF#2 UPDATED DRAFT ISSUE
F	28/04/22	REF#2 UPDATED DRAFT ISSUE FOR COMMENT
E	27/04/22	REF#2 UPDATED DRAFT ISSUE
D	08/04/22	ISSUE FOR INFORMATION
C	18/03/22	REF#2 DRAFT ISSUE
B	03/03/22	REVISED DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT
A	21/02/22	DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT

KEY PLAN

PROJECT MANAGER

TSA

CLIENT

NSW GOVERNMENT Health Sydney Local Health District

NSW GOVERNMENT Health Infrastructure

ARCHITECT

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PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - DEMOLITION PLAN - LEVEL 2

STATUS
FINAL

DRAWN	DESIGNED
RR	RR/MR
CHECKED	APPROVED
VH	CY

SCALE @ B1
1 : 500

DRAWING NO.
RPA-ARC-JAC-DRG-REF2-3223

REVISION
I

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01/07/2022 09:57:42

REF2 - WORKS SUMMARY

1. RECONFIGURE LAMBIE DEW DRIVE TURNING BAY
2. REMOVE EXISTING TREES
3. RECONFIGURE GLOUCESTER HOUSE BRIDGE AND ASSOCIATED ROADWORKS
4. GLOUCESTER HOUSE ROAD HUMP ADJUSTMENT
5. TREE PRUNING ON ST ANDREW' S COLLEGE SITE

3 - CAREFULLY REMOVE BOTTOM PORTION OF LEVEL 4 LINK BRIDGE & RECONFIGURE - REFER ELEVATIONS/SECTIONS

G59 - GROUP OF 7 HOWEA FORSTERIANA

2

5 - TRIM EXISTING TREE TO HEIGHT OF PROPOSED TRUCK MOVEMENTS - CONSULT WITH ARBORIST.

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  REFER RELEVANT SERVICES DRAWINGS
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- DEMOLITION
- TREES TO BE REMOVED
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F	04/05/22	REF#2 UPDATED DRAFT ISSUE
E	28/04/22	REF#2 UPDATED DRAFT ISSUE FOR COMMENT
D	27/04/22	REF#2 UPDATED DRAFT ISSUE
C	18/03/22	REF#2 DRAFT ISSUE
B	03/03/22	REVISED DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT
A	21/02/22	DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT

KEY PLAN

PROJECT MANAGER

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Sydney Local Health District

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Infrastructure

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PROJECT
ROYAL PRINCE ALFRED HOSPITAL
REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - DEMOLITION PLAN - LEVEL 4

STATUS
FINAL

DRAWN	DESIGNED
RR	RR/MR
CHECKED	APPROVED
VH	CY

SCALE @ B1
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DRAWING NO.
RPA-ARC-JAC-DRG-REF2-3224

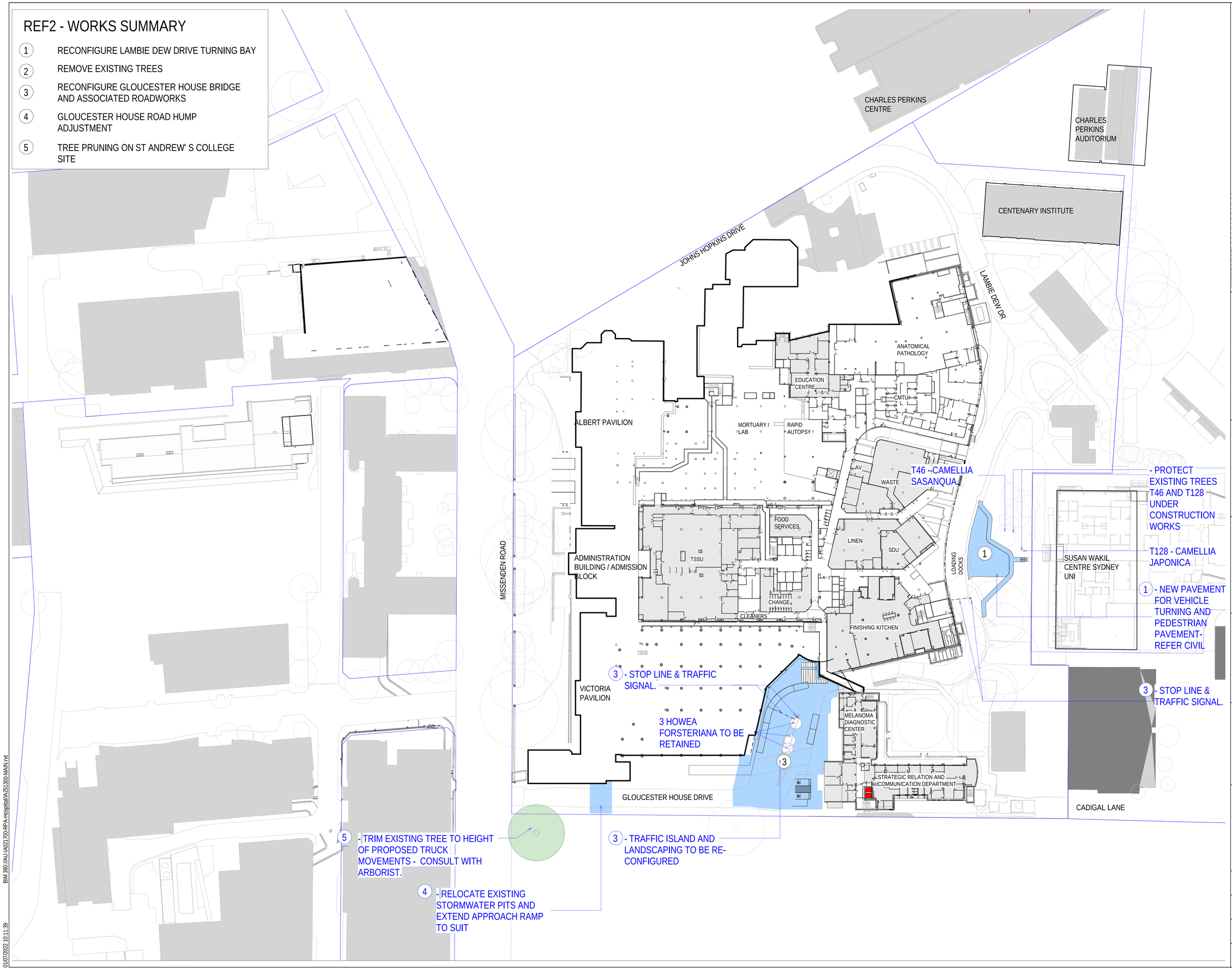
REVISION
H

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REF2 - WORKS SUMMARY

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2. REMOVE EXISTING TREES
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4. GLOUCESTER HOUSE ROAD HUMP ADJUSTMENT
5. TREE PRUNING ON ST ANDREW' S COLLEGE SITE



NOTES

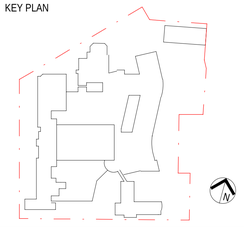
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PROJECT
ROYAL PRINCE ALFRED HOSPITAL
REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - PROPOSED PLAN - LEVEL 2

STATUS
FINAL

DRAWN	DESIGNED
RR	RR/MR
CHECKED	APPROVED
VH	CY

SCALE @ B1
1 : 500

DRAWING NO.
RPA-ARC-JAC-DRG-REF2-3225

REVISION
H

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01/07/2022 10:11:39

REF2 - WORKS SUMMARY

1. RECONFIGURE LAMBIE DEW DRIVE TURNING BAY
2. REMOVE EXISTING TREES
3. RECONFIGURE GLOUCESTER HOUSE BRIDGE AND ASSOCIATED ROADWORKS
4. GLOUCESTER HOUSE ROAD HUMP ADJUSTMENT
5. TREE PRUNING ON ST ANDREW' S COLLEGE SITE

LAMBIE DEW DRIVE

3 - RECONFIGURE GLOUCESTER HOUSE BRIDGE - REFER SECTIONS & ELEVATIONS

3 HOWEA FORSTERIANA TO BE RETAINED

5 - TRIM EXISTING TREE TO HEIGHT OF PROPOSED TRUCK MOVEMENTS - CONSULT WITH ARBORIST.

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- REFURBISHMENT / RE-CONFIGURATION
- DEMOLITION
- TREES TO BE REMOVED
- TREES TO BE TRIMMED

REV	DATE	AMENDMENT
H	01/07/22	REF#2 FINAL ISSUE
G	17/05/22	REF#2 FINAL ISSUE
F	04/05/22	REF#2 UPDATED DRAFT ISSUE
E	28/04/22	REF#2 UPDATED DRAFT ISSUE FOR COMMENT
D	27/04/22	REF#2 UPDATED DRAFT ISSUE
C	18/03/22	REF#2 DRAFT ISSUE
B	03/03/22	REVISED DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT
A	21/02/22	DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT

KEY PLAN

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PROJECT
ROYAL PRINCE ALFRED HOSPITAL
REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - PROPOSED PLAN - LEVEL 4

STATUS
FINAL

DRAWN	DESIGNED
RR	RR/MR
CHECKED	APPROVED
VH	CY

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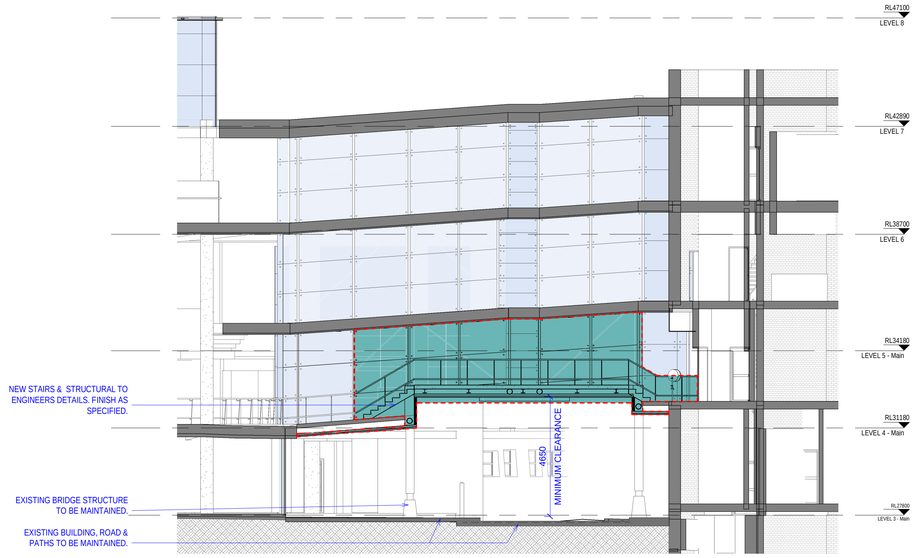
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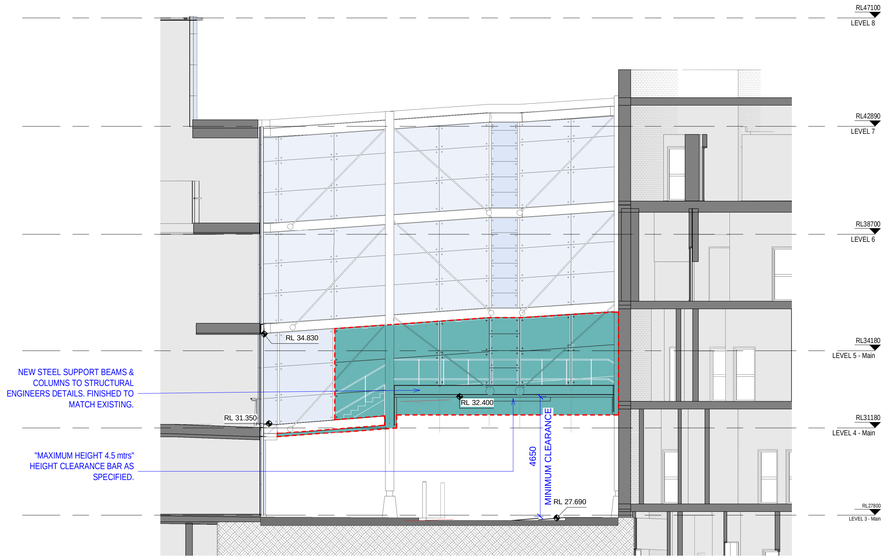
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REF2 - WORKS SUMMARY

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5. TREE PRUNING ON ST ANDREW' S COLLEGE SITE



2 GHB_REF2_PROPOSED SECTION
1 : 100



4 GLOUCESTER HOUSE BRIDGE LINK - PROPOSED EAST ELEVATIO
1 : 100



3 GLOUCESTER HOUSE LINK BRIDGE RENDERING

NOTES

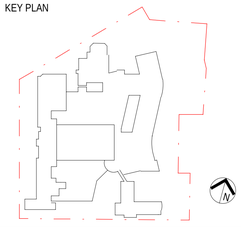
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LEGEND

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- REFURBISHMENT / RE-CONFIGURATION
- DEMOLITION
- TREES TO BE REMOVED
- TREES TO BE TRIMMED

REV	DATE	AMENDMENT
H	19/05/22	REF#2 FINAL ISSUE
G	17/05/22	REF#2 FINAL ISSUE
F	04/05/22	REF#2 UPDATED DRAFT ISSUE
E	28/04/22	REF#2 UPDATED DRAFT ISSUE FOR COMMENT
D	27/04/22	REF#2 UPDATED DRAFT ISSUE
C	18/03/22	REF#2 DRAFT ISSUE
B	03/03/22	REVISED DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT
A	21/02/22	DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT

KEY PLAN



PROJECT MANAGER

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Sydney Local Health District

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PROJECT
ROYAL PRINCE ALFRED HOSPITAL
REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - ELEVATION / SECTIONS

STATUS
FINAL

DRAWN	DESIGNED
NZ	RR/MR
CHECKED	APPROVED
VH	CY

SCALE @ B1
As indicated

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RPA-ARC-JAC-DRG-REF2-3230

REVISION
H

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19/05/2022 2:24:12 PM

REF #2 - EARLY WORKS SUMMARY

1. - RECONFIGURE LAMBIE DEW DRIVE TURNING BAY
2. - REMOVE EXISTING TREES
3. - RECONFIGURE GLOUCESTER HOUSE BRIDGE ASSOCIATED ROADWORKS
4. - GLOUCESTER HOUSE ROAD HUMP ADJUSTMENT
5. - TREE PRUNING ON ST ANDREW' S COLLEGE SITE



1 GLOUCESTER HOUSE BRIDGE LINK - SECTION / ELEVATION
1 : 100



2 GLOUCESTER HOUSE LINK BRIDGE RENDERING

NOTES

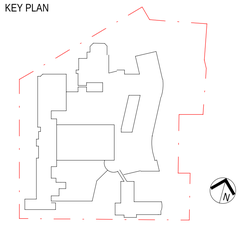
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REV	DATE	AMENDMENT
B	17/05/22	REF#2 FINAL ISSUE
A	04/05/22	REF#2 UPDATED DRAFT ISSUE

KEY PLAN



PROJECT MANAGER

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PROJECT
ROYAL PRINCE ALFRED HOSPITAL
REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - SECTION / RENDERING

STATUS
FINAL

DRAWN	DESIGNED
BL	MR
CHECKED	APPROVED
RR/MR	CY

SCALE @ B1
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REVISION
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STATEMENT OF HERITAGE IMPACT

Proposed REF Package #2

Royal Prince Alfred Hospital

Camperdown



Job No. 9277
June 2022

Heritage 21
CULTURAL BUILT HERITAGE IN THE 21ST CENTURY

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Heritage Impact Statements	Conservation Management Plans	On-site Conservation Architects
Photographic Archival Recordings	Interpretation Strategies	Expert Heritage Advice
Fabric Analyses	Heritage Approvals & Reports	Schedules of Conservation Work

TABLE OF CONTENTS

1.0 INTRODUCTION 4

1.1 BACKGROUND 4
1.2 SITE IDENTIFICATION 4
1.3 HERITAGE CONTEXT 5
1.4 PURPOSE 11
1.5 METHODOLOGY 11
1.6 AUTHORS 11
1.7 LIMITATIONS 11
1.8 COPYRIGHT 12

2.0 HISTORICAL CONTEXT 13

2.1 LOCAL HISTORY 13
2.2 SITE SPECIFIC HISTORY 16

3.0 PHYSICAL EVIDENCE 23

3.1 THE SETTING 23
3.2 PHYSICAL DESCRIPTION 23
3.3 CONDITION AND INTEGRITY 23
3.4 IMAGES 24

4.0 HERITAGE SIGNIFICANCE 26

4.1 ESTABLISHED SIGNIFICANCE 26

5.0 WORKS PROPOSED 32

5.1 PROPOSAL DESCRIPTION 32
5.2 DRAWINGS 32

6.0 ASSESSMENT OF HERITAGE IMPACT 40

6.1 HERITAGE MANAGEMENT FRAMEWORK 40
6.2 HERITAGE IMPACT ASSESSMENT 44

7.0 CONCLUSION & RECOMMENDATIONS 47

7.1 IMPACT SUMMARY 47
7.2 MITIGATION MEASURES 47
7.3 GENERAL CONCLUSION 48

8.0 SOURCES 49

Acknowledgement of Country

Heritage 21 wishes to acknowledge the Traditional Owners of country throughout Australia and recognise their continuing connection to land, waters and community. We pay our respects to them and their cultures; and to elders both past and present.

Cover page: Subject site at 12 Missenden Road, from Missenden Road looking to front façade. (Source: Heritage 21, 24.04.2020)

The following Table forms part of the quality management control undertaken by Heritage 21 regarding the monitoring of its intellectual property as issued.

Issue	Description	Date	Written by	Reviewed by	Issued by
1	Draft report (D1) issued for comment.	10.03.2022	EM	-	EM
2	Draft report (D2) issued for comment.	3.05.2022	EM	-	EM
3	Report Issued (RI) to Client.	18.05.2022	EM	-	EM
4	Report issued (RI2) to Client.	23.06.2022	EM	-	EM

1.0 INTRODUCTION

1.1 Background

This Statement of Heritage Impact ('SOHI' or 'report') has been prepared on behalf of Health Infrastructure in the context an early works Review of Environmental Factors (REF) Package Number 2 for approval by Health Infrastructure.

1.2 Site Identification

The site is located at 12 Missenden Road in Camperdown which falls within the boundaries of City of Sydney Local Government Area and comprises Lot 1000 DP 1159799. As depicted in Figure 1 below, the site fronts onto Missenden Road and is part of a larger complex of buildings that are enclosed within the area of Missenden Street, John Hopkins Drive, Lambie Dew Drive and Gloucester House Drive. The complex is adjacent to Sydney University. The setting and topography of the site will be more fully described in Section 3.0 below.



Figure 1. Aerial view of the site, which is outlined in red (Source: NSW Land and Property Information, 'SIX Maps', n.d., http://maps.six.nsw.gov.au/, annotated by Heritage 21).

The proposed works are limited to Lambie Dew Drive (Rear Gardens – Precinct 4) and Gloucester House (Building 88). The location of these items are depicted in Figure 2.

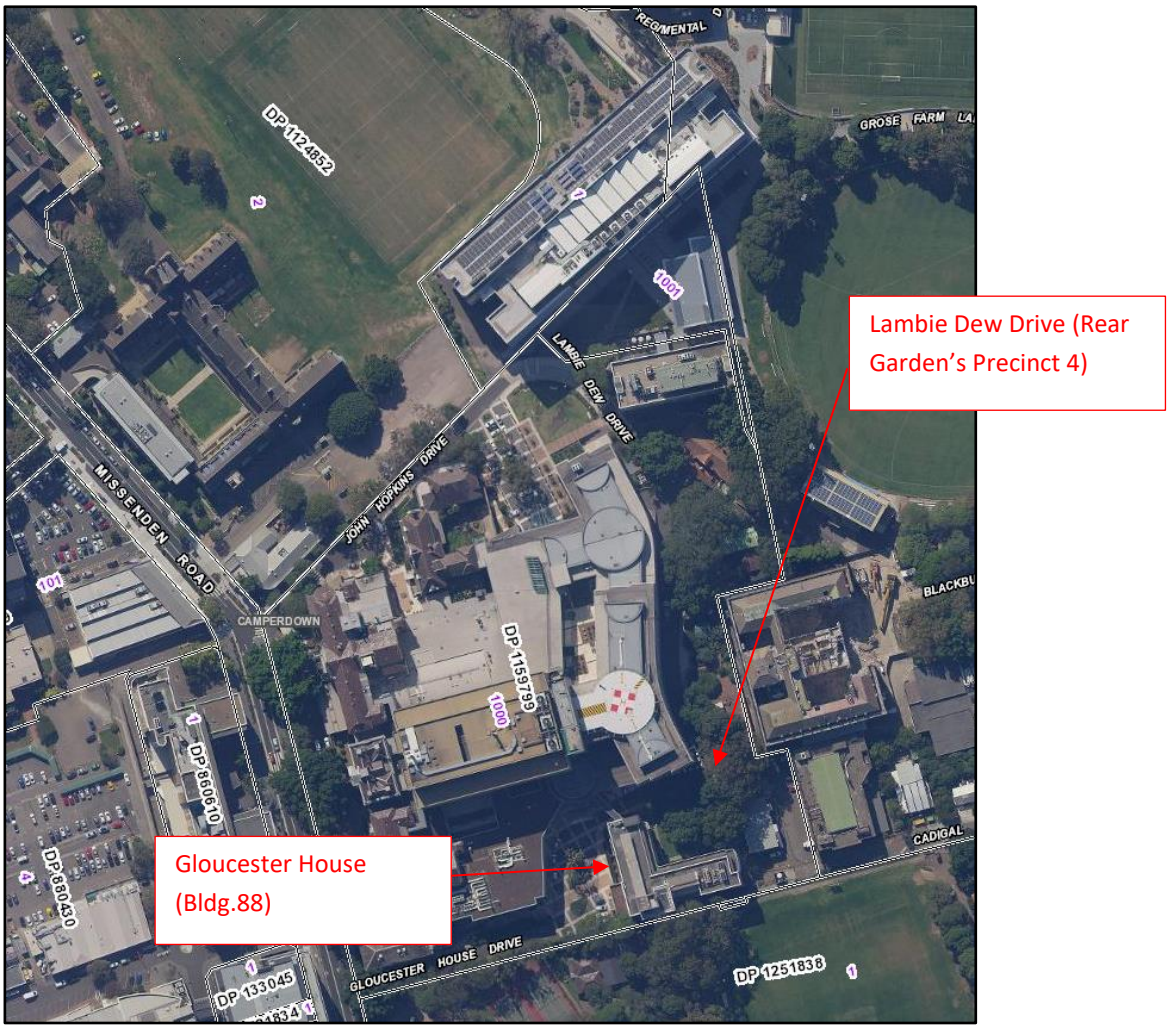


Figure 2. Aerial view of the eastern campus (Source: NSW Land and Property Information, 'SIX Maps', n.d., http://maps.six.nsw.gov.au/, annotated by Heritage 21).

1.3 Heritage Context

1.3.1 Heritage Listings

The subject site contains several heritage items listed under Schedule 5 of the Sydney Local Environmental Plan ('SLEP') 2012. The subject site also contains several items listed on the NSW State Heritage Register, the NSW Health s.170 Register, the National Trust Register, the Royal Australian Institute of Architects Register of Significant Architect in NSW and the Former Register of the National Estate.[1]

[1] The Register of the National Estate ceased as a statutory heritage list in 2007; however it continues to exist as an inventory of Australian heritage places.

The details of the listings follow:

Statutory List – Legislative Requirements			
Sydney Local Environmental Plan 2012			
Item/HCA Name	**Address**	**Significance**	**Item Number**
Royal Prince Alfred Hospital group including buildings and their interiors, trees and grounds	Missenden Road	State	I68
University of Sydney Heritage Conservation Area	-	Local	C5
State Heritage Register			
Item Name		**Address**	**Item No.**
Royal Prince Alfred Hospital Admission Block		Missenden Road, Camperdown	00830
Royal Prince Alfred Hospital – Victoria & Albert Pavilions		Missenden Road	00829
S.170 Register			
Item Name		**Address**	
1936 Nurses' Home		10 Missenden Road (East Side)	
Admission Block		10 Missenden Road (East Side)	
Albert and Victoria Pavilion		10 Missenden Road (East Side)	
D Block and Gloucester House Drive		10 Missenden Road (East Side)	
Fairfax Institute of Pathology		10 Missenden Road (East Side)	
Gloucester House		10 Missenden Road (East Side)	
Gloucester House Lawn Gardens		10 Missenden Road (East Side)	
Immunology Building		10 Missenden Road (East Side)	
John Hopkins Drive		10 Missenden Road (East Side)	
King George V Gardens		10 Missenden Road (East Side)	
Missenden Rd - Main Front Garden		10 Missenden Road (East Side)	
Morgue and Chapel		10 Missenden Road (East Side)	
Psychiatry/Anaesthetics Block		10 Missenden Road (East Side)	
Resident Medical Officers' Quarters		10 Missenden Road (East Side)	
Salisbury Street		10 Missenden Road (East Side)	
Schlink Block Courtyard		10 Missenden Road (East Side)	
The Quadrangle		10 Missenden Road (East Side)	
The Rear Gardens		10 Missenden Road (East Side)	
Two Original Wings to 1876 Hospital		10 Missenden Road (East Side)	
University Boundary		10 Missenden Road (East Side)	
Non Statutory List			
National Trust Register – National Trust of NSW			
Item Name		**Address**	

Victoria and Albert Pavilions	Missenden Road
Administration Block RPA	Missenden Road
Former Nurses Home	Missenden Road
Gloucester House	Missenden Road
Original Wings to 1876 Hospital	Missenden Road
RPA Hospital Precinct	Missenden Road

Former Register of the National Estate[2]**-**		
Item Name	**Address**	**Item No.**
Royal Prince Alfred Hospital	Missenden Road, Camperdown	2354
RAIA Register of Significant Architecture in NSW		
Item Name	**Address**	**Item No.**
Gloucester House	Gloucester House Drive off Missenden Road	4700709

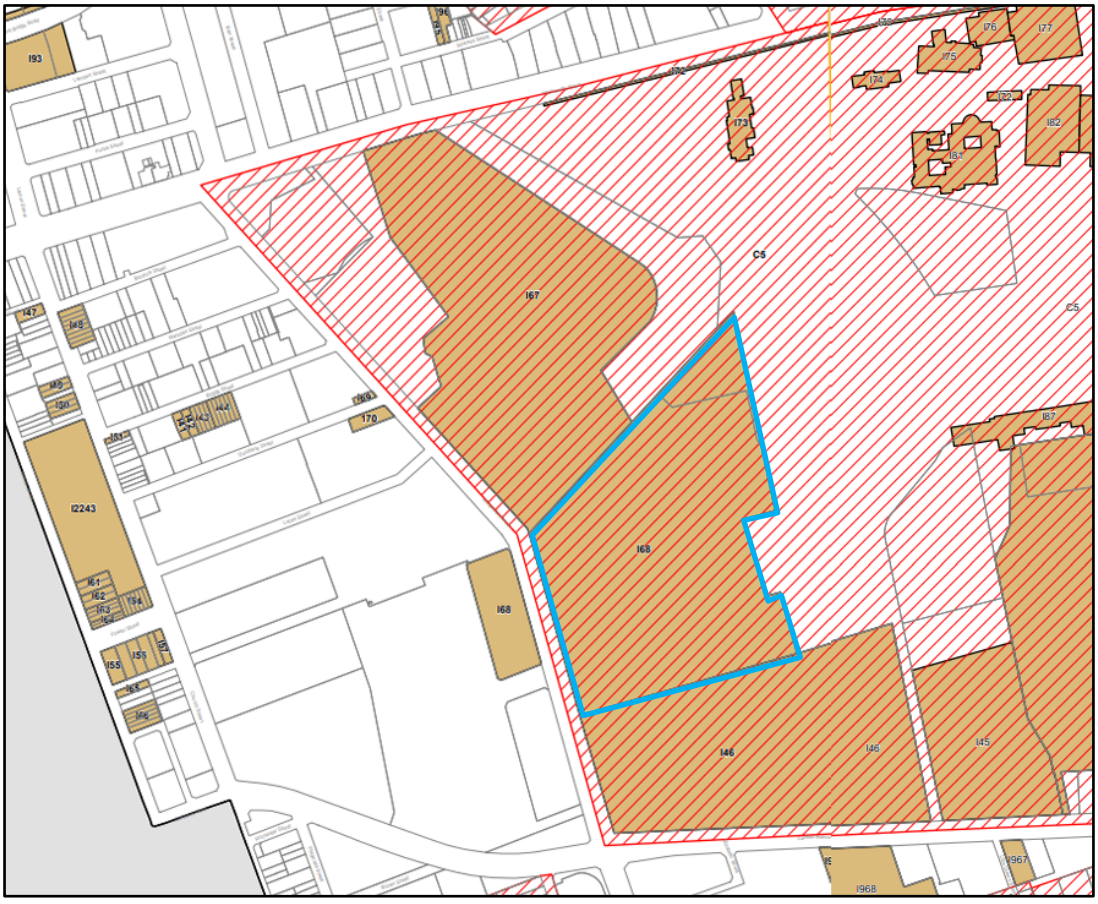


Figure 3. Combined Heritage map HER_002 and HER_009 of SLEP 2012 showing the location of subject site outlined in blue, heritage items are in brown and heritage conservation areas are cross hatched red. (Source: City of Sydney Council, 'Sydney Local Environmental Plan', 2012, annotated by Heritage 21).

[2] The Register of the National Estate ceased as a statutory heritage list in 2007; however it continues to exist as an inventory of Australian heritage places.

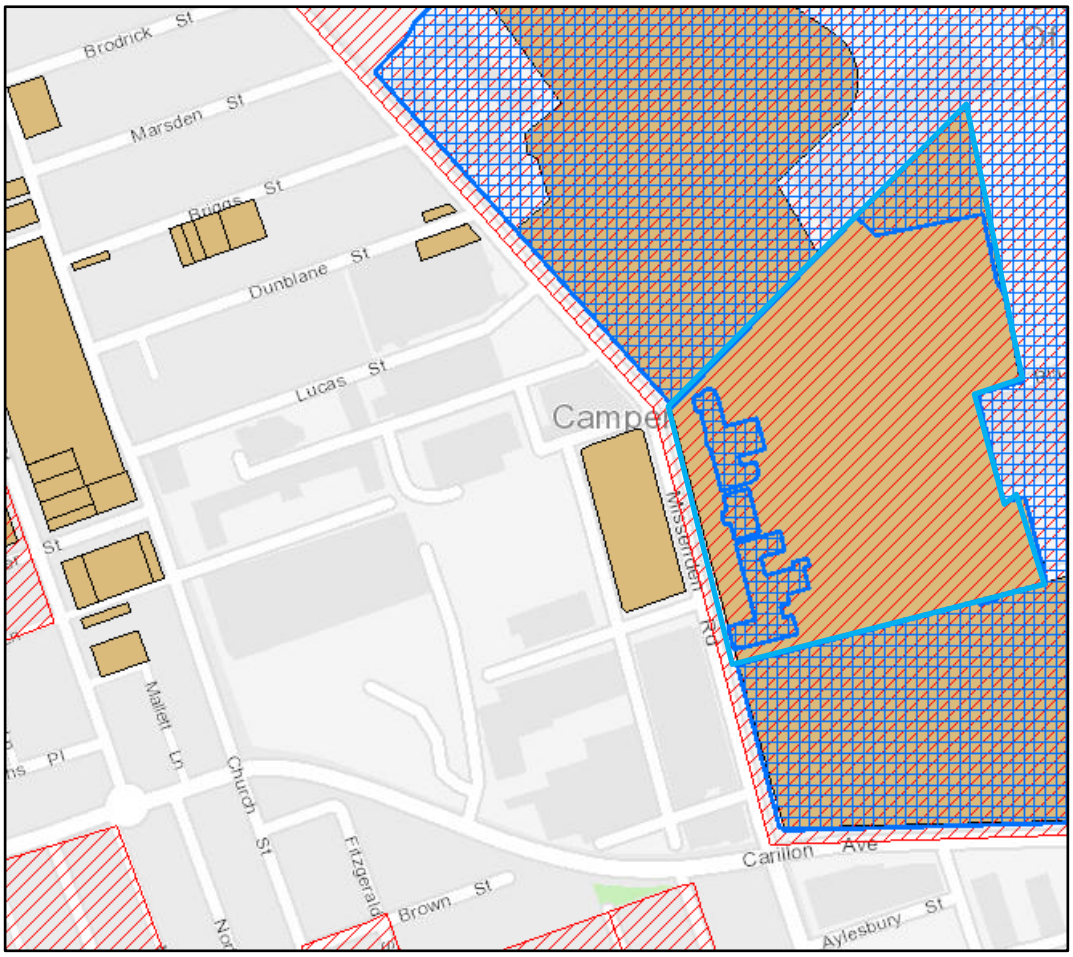


Figure 4. NSW ePlanning map. The location of subject site outlined in light blue, locally listed heritage items are in brown, heritage conservation areas are cross hatched red, and state listed heritage items are outlined in blue. (Source: ePlanning Spatial Viewer, https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address, annotated by Heritage 21).

1.3.2 Heritage Conservation Areas

As depicted in Figure 3 above, the subject site **is** located within the boundaries of the University of Sydney Heritage Conservation Area ('HCA'), listed under Schedule 5 of the SLEP 2012.

- Contributory Item – the property makes an important and significant contribution to the character and heritage significance of the HCA.
- Neutral Item – the property does not contribute nor detract from the character and heritage significance of the HCA.
- Detracting Item – the property is intrusive to the character and heritage significance of the HCA.

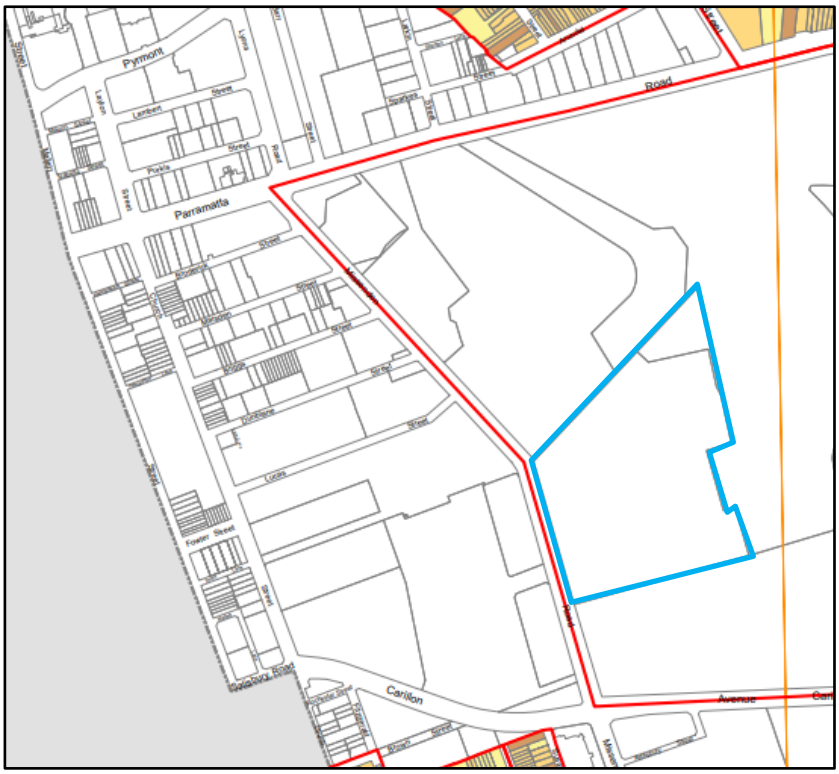


Figure 5. Sydney of City Building Contributions Map 2, the subject site is outlined in blue (Source: Sydney DCP 2012, https://www.cityofsydney.nsw.gov.au/development-control-plans/sydney-dcp-2012, annotated by Heritage 21).

The subject site is a core part of the University of Sydney Heritage Conservation Area. While the Royal Prince Alfred Hospital contains, contributory, neutral and detracting elements, Heritage 21 believes that the subject site is overall, a contributory item within the HCA.

1.3.3 Heritage Items in the Vicinity

As depicted in Figure 3 above, the subject site is situated within the general vicinity of the following heritage items and HCA listed under Schedule 5 of the SLEP 2012. The details of the listings follow:

Item/HCA Name	Address	Significance	Item Number
St Andrew's College, University of Sydney including main building and interior, quadrangle and grounds	19 Carillon Avenue, Camperdown	Local	I46
Women's College group, University of Sydney including building interiors and grounds	15 Carillon Avenue, Camperdown	State	I45
St John's College, University of Sydney including main	8A Missenden Road, Camperdown	Local	I67

building and interior, quadrangle, gate lodge and interior, fence and gate and grounds			
Alfred Hotel including interior	51-55 Missenden Road, Camperdown	Local	I70
Shop and residence including interiors	49 and 49A Missenden Road, Camperdown	Local	I69
Terrace group including shop front alterations and interiors	89–91 Fowler Street, Camperdown	Local	I57
Terrace group including interiors	2–14 Fowler Street, Camperdown	Local	I54
Former Bonds Industries complex including building interiors, Electricity Substation No 181, Chesty Bond Mural and former commercial building facade (at 97–99 Church Street) for "Bonds Cafeteria"	64-106 Mallet Street, Camperdown	Local	I2243
Bligh and Camperdown Terrace Heritage Conservation Area	Newtown	Local	C38

As depicted in Figure 4 above, the subject site is situated within the general vicinity of the following heritage items listed on the State Heritage Register. The details of the listings follow:

Item Name	Address	Significance	Item Number
The University of Sydney, University Colleges, and Victoria Park	Cnr of Parramatta and City Roads, Camperdown	State	01974

Among the above heritage items in the vicinity listed above, proposed works would be in visual catchment of Item 01974 (The University of Sydney, University Colleges and Victoria Park). Accordingly, the discussion in the Section 6.0 of this SOHI of the potential heritage impact of the proposal on heritage items in the vicinity is limited to item 01974.

1.4 Purpose

The subject site contains multiple heritage items listed under Schedule 5 of the SLEP 2012 and listed on the NSW State Heritage Register. The subject site is also located in the University of Sydney Heritage Conservation area. Additionally, the subject site is also located in the vicinity of several heritage items listed under Schedule 5 of the SLEP 2012, and on the State Heritage Register. This report has been prepared in the context of a Review of Environmental Factors for approval.

1.5 Methodology

The methodology used in this SOHI is consistent with *Statements of Heritage Impact* (1996) and *Assessing Heritage Significance* (2001) and *Standard Exemptions from Works Requiring Heritage Council Approval* (2009), published by the Heritage Division of the NSW Office of Environment and Heritage and has been prepared in accordance with the principles contained in the most recent edition of *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* 2013 ('Burra Charter').

1.6 Authors

This Statement of Heritage Impact ('SOHI' or 'report') has been prepared by Emily McSkimming, and overseen by Paul Rappoport, of Heritage 21, Heritage Consultants.

1.7 Limitations

- This SOHI is based upon an assessment of the heritage issues only and does not purport to have reviewed or in any way endorsed decisions or proposals of a planning or compliance nature. It is assumed that compliance with non-heritage aspects of Council's planning instruments, the BCA and any issues related to services, contamination, structural integrity, legal matters or any other non-heritage matter is assessed by others.
- This SOHI essentially relies on secondary sources. Primary research has not necessarily been included in this report, other than the general assessment of the physical evidence on site.
- It is beyond the scope of this report to address Indigenous associations with the subject site.
- It is beyond the scope of this report to locate or assess potential or known archaeological sub-surface deposits on the subject site or elsewhere.
- It is beyond the scope of this report to assess items of movable heritage.
- Heritage 21 has only assessed aspects of the subject site that were visually apparent and not blocked or closed or to which access was not given or was barred, obstructed or unsafe on the day of the arranged inspection.

1.8 Copyright

Heritage 21 holds copyright for this report. Any reference to or copying of the report or information contained in it must be referenced and acknowledged, stating the full name and date of the report as well as Heritage 21's authorship.

2.0 HISTORICAL CONTEXT

2.1 Local History

The following has been extracted from the Significance Assessment Report by Heritage 21, dated April 2019:

2.1.1 Indigenous Occupation

The traditional owners of the Sydney City region are the Gadigal people. Their land south of Port Jackson stretches from South Head to Petersham. The word Eora simply means "here" or "from this place". Local Aboriginal people used the word to describe to the British where they came from and so the word was then used to define the Aboriginal people themselves.[3]

2.1.2 The Grose Farm

The site of Royal Prince Alfred Hospital was initially part of a 30-acre lease to Captain James Foveaux made by Governor Grose in 1794. The lease adjoined one belonging to Governor Grose. Both areas were to be farmed.



Figure 6. West view of Sydney from Grose Farm. (Source: Lycett, Joseph. (1819). West view of Sydney taken from Grose's farm, New South Wales, 1819 Retrieved January 22, 2019, from http://nla.gov.au/nla.obj-134642562)

A track, which was named Missenden Road, possibly after the village of the same named in Buckinghamshire, connected the two routes. The name was in use by the 1850s, possibly earlier.

The alignment of the western boundary of the two leases followed the alignment of the original track, later Missenden Road. This track was in place before the leases (i.e pre-1794) and its path probably followed the line of a slight ridge, between two water courses. An 1841 subdivision plan indicates a proposed road following the track.

[3] Sydney City Council, *Barani: Indigenous History of Sydney City.* Retrieved from: *ht*tp://www.cityofsydney.nsw.gov.au/barani/themes/theme1.htm,



Figure 7. Image of Grose Farm from Toll Gate. (Source: Terry, Frederick Charles, 1826-1869 (1869). Grose Farm from Toll Gate, ca. 1862-1869 / watercolour by F. C. Terry.)

In 1801, the female Orphan School was granted 500 acres of land, known as the Grose Farm, between Parramatta Road and King Street. Foveaux's lease was not part of this grant, however the land did form part of the area known, in the early nineteenth century, as the Grose Farm.

2.1.3 University Paddock

Following the establishment of Sydney University and the granting of the 150 acres of Grose Farm for University grounds in 1855, the area became known as the 'University Paddock'.

The government resumed the property and it was dedicated, by Act of Parliament, to be the site of the Prince Alfred Hospital. In addition, two to three acres were reserved for "the erection of a medical school by the University in conjunction with the hospital"[4]. The actual position of the reserved ground was not established. The southern portion of Foveaux's lease, a parcel of ten acres was granted to St. Andrew's College in 1873.

The first site plan for the Hospital shows the boundaries to be St. John's Roman Catholic College, Missenden Road, the Creek, which separated the University proper and St Andrew's Presbyterian College. The greater portion of Foveaux's lease and part of Grose's initial lease were combined to form the Hospital grounds. The lane which formed the boundary with St. John's may have related to an earlier division within the Grose Farm. The creek bed formed a natural boundary to the rear of the hospital site.

2.1.4 Camperdown

The 500 acres which formed the Camperdown Estate were granted to William Bligh by Governor King in 1806.

A number of industries were located in the area during the 1840s, including a brick kiln and a stone quarry. Later a boiling down works, a tannery and Fowlers pottery were established adjacent to

[4] Ibid p261

Paramatta Road. The surrounding area, which became known as Camperdown after Bligh's estate, developed as working-class housing, with a high proportion of Irish residents.

In the 1850s, subdivisions such as Rochester and Dunblane occurred. Part of the remnant of these subdivisions survives in the street pattern within the hospital grounds, in particular the area around Rochester Street.

Camperdown was established as a municipality in 1861.The small dwelling houses and unrateable areas such as the university grounds, hospital, park and cemetery meant that the municipality did not generate a large income. The unhealthy financial position of the council resulted in the municipality going into receivership in the 1890s and subsequently being incorporated, in 1909, into the City of Sydney as a ward.

The hospital began to expand into the residential area in the mid-1930s with the construction of the outpatients building. Additional land was purchased in 1947. Until the construction of the Queen Mary Nurses home in 1956 the expansion of the hospital had largely been confined to the sites fronting Missenden Road. Additional lots on Lucas Street were purchased in 1956 and one of the corner hotels, the Grose Farm was demolished.

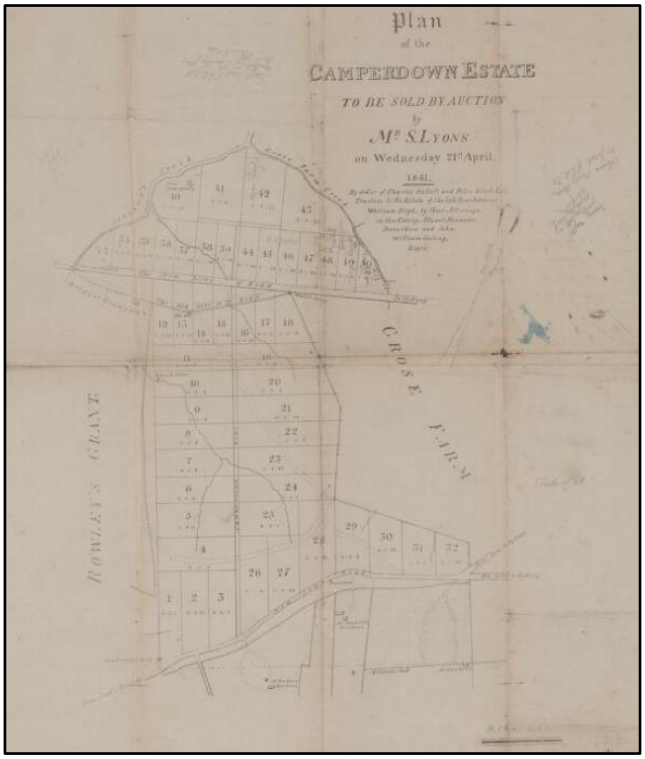


Figure 8. Plan of Camperdown Estate, 1841 (Source: Clint, Raphael & Bligh, William & Donaldson, Stuart Alexander & Gosling, J. W & Hallett, Charles & Lyons, S & Slade, Felix. (1841). Plan of the Camperdown Estate Retrieved February 1, 2019, from http://nla.gov.au/nla.obj-229972365)

2.1.5 Missenden Road and Carillon Avenue

A scheme for the extension of Carillon Avenue was proposed in 1950. Sydney City Council required that the hospital contribute towards the proposal by purchasing the land required. The plans for the extension were prepared in 1964 and for the next twenty years the hospital, with funding provided by the health commission, purchased the necessary land.



Figure 9. *Carillon Avenue bypass. View showing road paving work in progress for the building of the extension to Carillon Avenue from Missenden Road to Salisbury Road. (Source: CRS 422/2/311. File 051/051429. City of Sydney Image Library. City of Sydney Archives)*



Figure 10. *Carillon Avenue & Missenden Road. Looking West across the intersection of Carillon Ave and Missenden Road from the RPA Building at 100 Carillon Avenue. (Source: SRC15726. File 045/045730. City of Sydney Image Library. City of Sydney Archives)*

The demolitions required to create the Carillon Avenue were undertaken in 1983. In 1987, Council indicated that that the hospital would be required to meet the cost of the construction of a new main road. The Dept. of Main Roads had no objection to the proposal but would not provide funding as Missenden Road was not a main road and therefore under the jurisdiction of the local Council.

2.2 Site Specific History

2.2.1 The establishment of the hospital

On the 12th of March 1868 an attempt to assassinate H.R.H Prince Alfred, the Duke of Edinburgh, was made at a charity picnic at Clontarf beach. Two of the founder members of the hospital, Sir William Manning and Sir Alfred Stephen, were present during the assassination attempt. The Prince was taken to Government House and the bullet extracted.



Figure 11. Image of the attempted assassination attempt (Source: Calvert, Samuel. (1868). Attempted assassination of H.R.H. the Duke of Edinburgh at Clontarf, N.S.W Retrieved February 1, 2019, from http://nla.gov.au/nla.obj-136065850)

The Lord Major convened a public meeting 'of indignation' in Hyde Park on the 20th of March 1868. Prominent citizens of Sydney, including John Fairfax, Alfred Roberts and Sir William Manning were involved in the establishment of the Memorial fund. The following resolutions were adopted:

> *"I) That this meeting regards with the deepest interest the steady progress of His Royal Highness, the Duke of Edinburgh, towards recovery from the dangerous wound inflicted by an assassin during his sojourn in Sydney and determines that a substantial and permanent monument shall be erected in commemoration of the heartfelt gratitude of the inhabitants of NSW for the preservation of His Royal Highness.*
>
> *II) That this meeting is of opinion that the form of memorial most appropriate to the object in view, and best calculated to represent the feelings of the community, will be a hospital for the relief of the sick and maimed, possessing all modern appliances necessary for the effective treatment of disease and the comfort of inmates, including a ward for convalescents until suitable accommodation is provided for such.*
>
> *III) That, in the opinion of this meeting, the proposed edifice should be erected upon the site of the present main front building of the Sydney Infirmary, and named Prince Alfred Hospital ".*[5]

A committee was established, charged with the responsibility of raising funds, by public subscription, for the erection of hospital buildings.

Since 1875, the Senate of the University of Sydney had been exploring avenues for the establishment of a School of Medicine. After rejection by the Sydney Infirmary, the Prince Alfred Memorial Fund Committee approached the University with the objective of erecting a hospital on university land. The preferred site was the 11 acres of Grose Farm, adjacent to the University that had been set aside for

[5] Inaugural Address, Sixth Annual Reunion, RPAH 16-21 September 1935

the building of a Wesleyan college. In 1871, the senate agreed to make the land available for a general hospital, provided that a medical school was established in conjunction with the hospital.



Figure 12. Image of PRAH grounds, prior to construction of the two pavilions. Note original landscape including terraced lawns, and original rear additions to the Admissions Building. (Source: Sir Edward Knox family papers: photographs of Royal Prince Alfred Hospital *and floods at Bourke, Windsor and Grafton, 1880-1893 / Edward Knox. Photographs taken by Charles Bayliss. IE1055485.FL1055543. Retrieved from: http://digital.sl.nsw.gov.au/delivery/DeliveryManagerServlet?dps_pid=FL1055543&embedded=true&toolbar=false)*

In 1873 the Prince Alfred Hospital Incorporation Act was passed by the New South Wales parliament. This legislation established the administration of the hospital, by a Board of Directors. Additional funds from the government, were required to complete the building program. A small gardener's cottage was built in that year but permission to build the hospital wards and the additional funding were not forthcoming until 1876. In 1874 the plans for the hospital were published and in 1876 the foundation stone was laid by Sir Hercules Robinson. The terracing and other landscaping works were commenced prior to the construction of the hospital buildings.

The construction of two pavilion ward blocks and central administration and kitchen blocks, as well as the isolation huts, morgue and laundry were undertaken between 1876 and 1882. The Operating Block was not completed until 1887. Additional legislation was required to allow operations to be performed at the Hospital. The construction of the Operations Block appears to have been delayed until this approval was obtained.



Figure 13. View of Pavilions towards Sydney University (Source: Grimes, F. S & Fairfax Corporation. (1932). Royal Prince Alfred Hospital during its Golden Jubilee, Sydney, New South Wales, 27 September 1932 Retrieved January 31, 2019, from http://nla.gov.au/nla. *obj-159936097)*

In September 1882 the partially completed hospital opened, with accommodation for 146 patients. The 1874 plans were for 356 beds however due to funding constraints only two of the proposed four large ward pavilions were built.

The sketches of the proposal show the two pavilions facing Missenden Road, however the two rear pavilions were constructed first. The slope of the land permitting the construction of additional wards in the basements. By 1887 these basement wards and operating block had been completed, bring the number of beds to 224.

Prince Alfred Hospital, however, had some initial advantages over Sydney Infirmary. The concern about the unhygienic conditions at Sydney during the 1870s led planners for Prince Alfred to insist on adequate water and sewerage facilities and these were incorporated into the new building.

The following has been extracted from the Royal Prince Alfred Conservation Management Plan[6]

2.2.2 Period of Landscaping

The following history has been extracted from the Conservation Management Plan prepared by Heritage Group, State Projects, NSW Public Works in May 1997 for the Royal Prince Alfred Hospital:

1876-1907 Curatorship of Charles Moore, Royal Botanic Gardens

In 1868 suggestions had been made at the Horticultural Society that a few Pinus insignis (Pinus

[6] Heritage Group State Projects. 'Royal Prince Alfred Hospital Conservation Management Plan'. State Projects, Department of Public Works & Service. 1997.

radiata) and Cupressus macrocarpa would add a great deal to the Hospital's beauty. Photographic and documentary evidence confirm that Pinus insignis was planted and Cupressus sp. (cypress). Trees at the front of the Hospital included Norfolk Island pines (Araucaria heterophylla), natives, possibly silky oaks (Grevillea robusta) and brushbox (Lophostemon confertus), poplars (Populus nigra), cypress and pines(Pinus radiata).

Pines, camphor laurels, eucalypts, Illawarra Flame trees, Norfolk Island pines, Hoop pines, Bunyah pines, stone pines, pepper trees, figs, poplars, palms and possibly brush box, plane trees and coral trees fonned the basis of the planting to the side a rear boundaries of the Hospital. The flower beds were fonned with perennials and annuals and cannas appear in some later photographs. Agaves, cordylines and succulents in pots were distributed around the Hospital gardens at changes in ground level. The mortuary was planted with Ficus pumilo and surrounded with vegetation. Other plants possibly planted during this period were Magnolia grandiflora, New Zealand flax, strelitzias, clivias and Yuccas.

Some of these plantings have survived. The camphor laurels, figs and possibly the lemon scented gums, brushbox and some of the palms in the gardens to the rear of the Hospital are from this period. Pots, although not those from the original landscape scheme, planted with agaves were still present in photos in the early 1970s. These have now disappeared.

1907-1936 Curatorship of the Royal Botanic Gardens

The major changes made during this period took place at the front of the Hospital. All the plants were removed, the front wall was modified and the existing bollards put in place. Replanting was undertaken with cordylines, strelitzias, palms, New Zealand flax and possibly macrozamias and umbrella trees. Some photographs suggest that a low hedge was planted immediately behind the low stone wall.

An aerial photograph from 1931 suggests that the planting in the front had been rationalised and consisted chiefly of two species of palm planted alternatively, with a large group directly in front of the Administrative Block. It also appears that the brushbox between St John's College and the Hospital were planted during this period.
It would be reasonable to predict that, due to their popularity at this time, roses and dahlias would have been planted at the Hospital. Views of the grounds to the rear of the buildings indicate that a variety of palms were the preferred specimen plantings.

1937-1954 Professor Waterhouse

Many modifications were made during this period under the direction of Professor Waterhouse. During this period the jacarandas and camellias were added to the grounds. Of prime importance was his landscaping of the Gloucester House garden. In addition planting camellias in the shrubbery to the east of this lawn, he added two gardens of low rounded formal shrubs, a jacaranda in the middle of the lawn and four murraya exotica were planted on the corners of the lawn and allowed to grow to a height of 4-5 feet.

Where the paths led to the verandah, camellias were planted on either side, to accentuate the entrances. The eye was led outwards toward toward the covered walkway by planting second jacaranda beyond the garden . The walkway was planted with creepers, making a green covered way.

In the forecourt of Gloucester House, two small conifers flanked the steps in the planter boxes and the curve of the retaining wall was relected in the line of poplars planted. Poplars were also the choice of tree for the gardens of King George V Hospital. Other feature from this period would have included azaleas, Nandina domestica and a pergola between C block and the Nurses Home. One of the most prominent plantings of this period is the row of Flindersia australis which lines the front of the Hospital. The Ficus microphylla var. Hil/i which are at the main front of the Hospital also date from this period. Both these plantings have now entirely replaced the palm plantings from 1907. During this period photographic evidence indicates the quadrangle associated with the Nurses Home was planted with a deciduous tree, palms and sub-tropical perennials.

1954-1970 Mr Garth

Additional poplars were planted in the garden which replaced the Prince Alfred Hotel, Ficus microphylla var. Hilli were planted near the Queen Mary Nurses Home and more informal arrangements were associated with gardens such as that around the Gerald Lewers Fountain which included a clump of bamboo, most probably planted when the fountain was installed. Other changes included the simplification of the paths in the Hospital and the provision of more car parking space. Street tree planting was undertaken on the western side of the Hospital although the trees which lined Salisbury Road were consistently pruned by the Electricity Authority. Four conifers were planted on either side of the statue of King George V at the end of this period.

1970·the present

Apart from the re-design of the Lambie-Dew garden in 1991 which used camellias which were donated to the Hospital, bulbs and agapanthus, some of which came from the significant garden at Yaralla, the major plantings undertaken during this period have been native species such as Casuarinas, westringia, grevilleas, leptospermum and acacias. Climbing plants include Chinese star jasmine.

Areas that have undergone change recently are the quadrangle containing the Hordern fountain where the mature plantings and older paths have been supplemented with tree ferns, impatiens, mondo grass and new paving; and the garden associated with the retained piece of facade from D block.

2.2.3 Gloucester House

The following history has been extracted from the Conservation Management Plan prepared by Heritage Group, State Projects, NSW Public Works in May 1997 for the Royal Prince Alfred Hospital:

Gloucester House was opened on 25th August 1936 by Governor of NSW, Admiral Sir David Murray Anderson. It was built to provide accommodation for private fee-paying patients, and was one of the first private hospital ward buildings in Australia and one of the Schlink's major initiatives. Named after the Duke of Gloucester, it was an attempt to transform the hospital's image from being a hospital for the 'sick poor' to one able to cater for the wealthy and middle classes.

Gloucester House was designed by architects Stephensen, Meldrum and Turner in the early modern style. It was featured in 'Art in Australia' as a building with innovative elements such the as the north-facing and east-facing verandahs that maximised sunlight, the sliding windows that regulated air and light, and the small individual and shared rooms which were uncommon before World War II. Stephensen was a person friend of Schlink and this was the beginning of their long term association with the hospital.

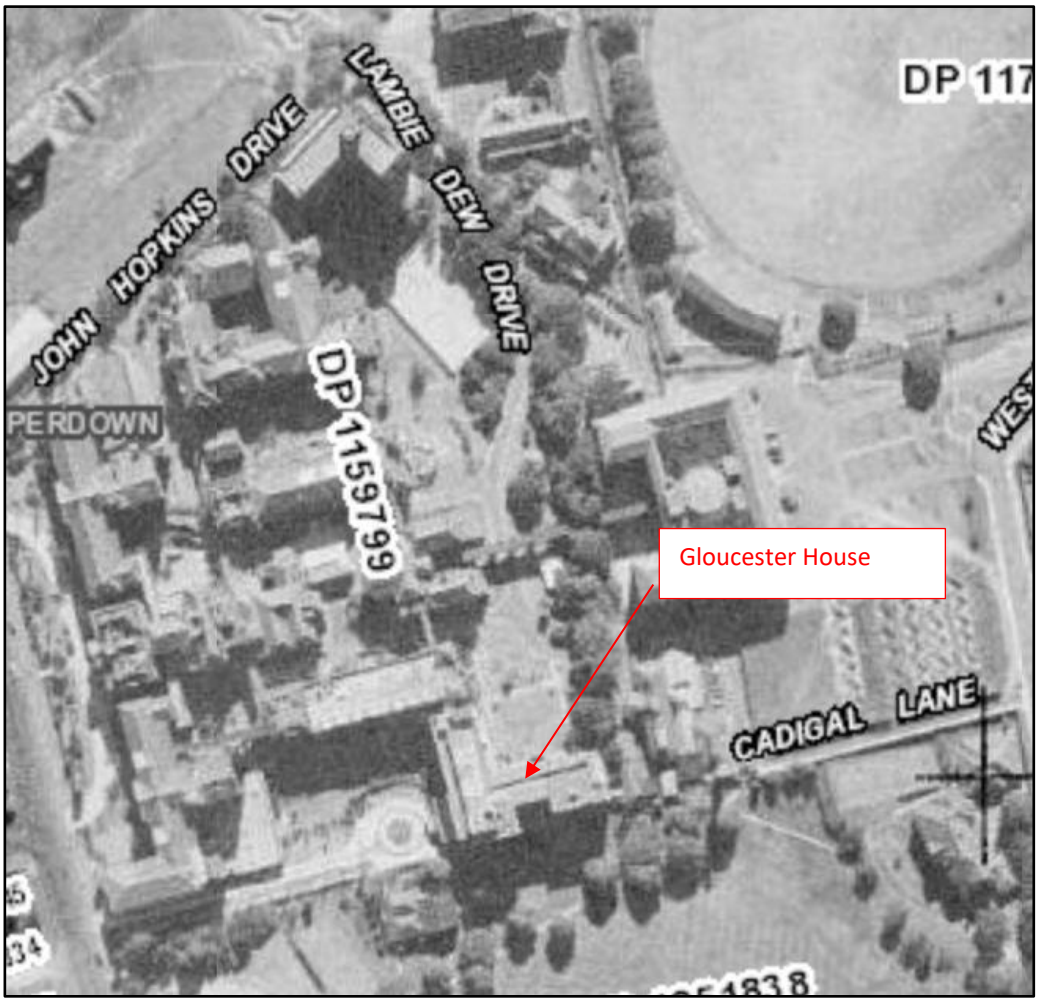


Figure 14. 1943 aerial view of the site (Source: NSW Land and Property Information, 'SIX Maps', n.d., http://maps.six.nsw.gov.au/, annotated by Heritage 21).

3.0 PHYSICAL EVIDENCE

3.1 The Setting

The site is located at 50 Missenden Road, Camperdown. The suburb of Camperdown is located 4 kilometres south-west of the Sydney Central Business District.

Missenden Road extends from Paramatta Road to the north of the subject site, towards King Street on the south. It is characterised by health facilities and educational facilities, and colleges associated with the University of Sydney. The subject site is bound to the north by St. John's College, and to the south by St. Andrew's College. Both colleges display heritage-listed sandstone buildings, cementing the Missenden Road streetscape as a historic precinct. The topography of Missenden Road is generally flat, with historic mature plantings lining the street.

The subject site is bound to the rear (the east), by the University of Sydney Campus which consists of a combination of Victorian, Federation, and contemporary structures. West of the subject site is primarily residential, consisting of Victorian worker's terraces.

3.2 Physical Description

The Royal Prince Alfred Hospital Campus centres around Missenden Road, providing a central axis for the campus. The King George V building and the Royal Prince Alfred Hospital main building act as central pillars within the campus. The Queen Mary building is located on Grose Street and portrays a visual relationship with the King George V building where they represent similar design features. Additionally, Gloucester House sits to the south of the main hospital building and is separated from Missenden Road by a long driveway. As a result, Gloucester House is largely obscured from view from within the public domain. To the rear of the main hospital building, the 1880s Pathology Building and the 1950s Chapel sit at the base of a series of historic mature trees, separated from the centre of the hospital campus by a series of extensions to the primary hospital building located on Missenden Road.

Salisbury Road, Grose Street and Lucas Street provide a series of east-west connections within the campus and provide access to the surrounding residential area.

3.3 Condition and Integrity

The subject site has undergone various phases of development, irreversibly altering the setting of original buildings on the site. Several detracting and neutral contemporary buildings have been introduced. However, originally buildings have largely retained their external form and fabric and appear to be overall in a good condition. The most affected by contemporary development is the pavilion, however additions have been concentrated to the rear and site of the pavilion, therefore retaining the presentation of the site to Missenden Road.

3.4 Images

The following photographs have been taken by Heritage 21 on the site inspection undertaken on 21 January 2022, unless stated otherwise. These photos feature the Rear Gardens and Gloucester House.



Figure 15. External view to the rear gardens, facing north.



Figure 16. External view to the rear gardens facing north towards Building 94 (Tissue Pathology and Diagnostic Oncology).



Figure 17. External view facing north on Lambie Dew Drive.



Figure 18. External view to Gloucester House.



Figure 19. External view to Gloucester House, within the garden setting.



Figure 20. External view to the pedestrian bridge between Gloucester House and Building 89.

4.0 HERITAGE SIGNIFICANCE

In order to assess the impact of the proposed works on the heritage significance of the subject site, the University of Sydney HCA (in which the subject site is located), and heritage items in the vicinity of the site, it is necessary to first ascertain the heritage significance of these places. Accordingly, Statements of Significance for the subject site (refer to Section 4.1.1) and the items within the subject site that this SOHI is related to (refer to Section 4.1.2 for the Rear Gardens and 4.1.3 for Gloucester House) are presented below. The University HCA (in which the subject site is located) is also provided (Section 4.1.4). The University of Sydney (which is in the visual catchment of the proposed works) is also presented below (Section 4.1.5).

The significance of these places, will form part of our considerations in the assessment of heritage impact, undertaken in Section 6.0 below.

4.1 Established Significance

4.1.1 The Subject Site

The following Statement of Significance has been extracted from the Conservation Management Plan prepared by Heritage Group, State Projects, NSW Public Works in May 1997:

> *Royal Prince Alfred Hospital is of cultural significance:*
>
> *•for its continuous use as a major Australian medical and surgical hospital since its opening in 1882.*
>
> *•as the first hospital, in Australia, to be established as a training hospital, with legislated links to a University Medical School.*
>
> *•as a leading medical research institution, both historically and now.*
>
> *•for its continued association with Sydney University, primarily in the provision of medical education, with links at the level of the*
>
> *•Senate of the University and the Board of the hospital as well as at the medical level.*
>
> *•for the continuing development of the hospital's high standard of medical theory and practice, evident in changes to the building fabric.*
>
> *•as a memorial, erected by Sydney residents, to the attempted assassination of HRH Prince Alfred. The Royal family continue to be patrons of the hospital.*
>
> *•for its establishment as a charity hospital, funded largely by public subscription gathered from Sydney residents.*

•as it contains the remnants of probably the most elaborate pavilion general hospitals in Australia, set in a landscaped garden.

•for the design of the original pavilion layout, which was based on British and Colonial examples and incorporated the latest innovations in hospital design and layout. It represents the peak of the building type, on a worldwide level, and an early example, in Australia, of a pavilion hospital.

•as the earliest of the two specifically designed pavilion style ward blocks of general hospitals in inner Sydney.

•for the close contact that Alfred Roberts maintained with Florence Nightingale regarding a suitable layout for the hospital and the design of the Nurses Home. Many of her ideas were embodied in the original hospital layout and in the detailed design of the ward pavilions.

•As containing physical evidence, in the original hospital layout and plantings, of mid nineteenth century theory regarding the transmission of disease by 'miasmas'.

•As the site of pioneering medical technology including the early introduction of the Listerian techniques of antisepsis and subsequently asepsis.

4.1.2 The Rear Gardens (Precinct 4)

The following Statement of Significance has been extracted from the Conservation Management Plan prepared by Heritage Group, State Projects, NSW Public Works in May 1997:

The precinct is of considerable historical significance because it contains elements which demonstrate past philosophies of the landscape's role in hospital design. The presence of a tennis court in this area is of historical significance as it demonstrates the continuity of this activity since the early days of the hospital.

The mature plantings which lined the original back drive and those which indicate Waterhouses's design input are of historic and aesthetic significance.

The planting associated with the mortuary is a rare example of scientific through of a particular period of time.

4.1.3 Gloucester House (Building 88)

The following Statement of Significance has been extracted from the Conservation Management Plan prepared by Heritage Group, State Projects, NSW Public Works in May 1997:

Gloucester House is of significance for the following values:

- *One of the first purpose-designed private hospital wards in Australia. It is the first intermediate hospital of any size to cater for the middle classes.*
- *Still being used for hospital wards purposes.*
- *Represents an attempt to transform the image of Royal Prince Alfred Hospital to cater for the middle classes. It was the first attempt of any large hospital to be self-supporting.*
- *A commemoration of the visit by the Duke of Gloucester.*
- *Of architectural significance as an innovative building designed in the 1930s in the 'Moderne' style; an award winning design.*
- *Retains much of its integrity.*
- *First major Stephensen Meldrum & Turner building at the hospital, and first major impact of Schlink's ideas on the planning of the hospital.*
- *Represents a stylistic and architectural break with earlier buildings and architects but respects original pavilion plan.*

4.1.4 The University of Sydney HCA

The following Statement of Significance is available for the University of Sydney heritage conservation area on the State Heritage Inventory:[7]

> *The university is a heritage cultural landscape containing buildings of exceptional individual value set within a designed landscape with large areas enclosed by a historic fence. The place developed into a series of precincts each with a special character. The Conservation Area has significance as the site of the first University in Australia established in 1850, operating continuously at Camperdown since 1858. The site has historic significance for its continuing association with the development of tertiary education in Australia. Incorporating Prince Alfred Hospital and various residential colleges, the Area represents the establishment and continued expansion of institutional uses on Grose Farm. The area has high aesthetic significance for its collection of fine buildings and public spaces dating from the 1850s, and has association with several prominent architects including Blacket, Vernon and Wilkinson.*
>
> *The continuing function of the institution as a University is also of exceptional cultural significance. An important Sydney landmark, containing what is probably the most significant group of Gothic Revival buildings in the country.*

[7] *University of Sydney Heritage Conservation Area*, State Heritage Inventory, Heritage NSW, https://apps.environment.nsw.gov.au/dpcheritageapp/ViewHeritageItemDetails.aspx?ID=2431001.

4.1.5 University of Sydney

The following Statement of Significance is available on the State Heritage Inventory for the University of Sydney (01974), located in the vicinity of the subject site:[8]

> *The University of Sydney, University Colleges and Victoria Park is of state historical significance, as a vestige of Governor Phillip's original 1,000 acres (404 ha) 'Kanguroo Ground' Crown reserve of 1790 and for its connection to the 18th century British government's approach to colonialism and its concept of 'terra nullius' as the foundation for dispossession of Aboriginal land in the immediate area of Sydney.*
>
> *The cultural landscape is of state heritage significance for its ability to demonstrate activities of the colonial era (1792-1855) associated with Grose Farm, convict stockade, and female orphan school.*
>
> *The University of Sydney is of state historical significance as the first and oldest university in Australia, dating from 1850. Reflecting in the cultural landscape changes in tertiary education, landscape design, institutional architecture, economic development and social attitudes; including pioneering university education for women in NSW (1881) and the establishment of the first university college for women in Australia, Women's College in 1892.*
>
> *The cultural landscape is aesthetically significant at a state level reflecting directly the influence of E.T. Blacket (1850s), W.L.Vernon (1890s), W.B. Griffin (1910s), Professor L. Wilkinson (1920s) and the Government Architect's Office (1960s) in shaping the place. In particular, Blacket's location of the Great Hall and East Range of the Quadrangle (1854-1862) utilised the site's topography to provide a dramatic presentation of the University on approach from the city, a setting with planning axis that still remains.*
>
> *The University of Sydney and Victoria Park as connected landscapes have tangible links to Charles Moore, Director of the Royal Botanic Gardens (1848-1896) and subsequent designers using prevalent 19th century theories of landscape design, plant material and horticultural techniques.*
>
> *The University grounds, more than any other site, reflect Professor Leslie Wilkinson 's work in beautifying and unifying buildings and their settings, along with major contributions to the planning and planting of gardens by Professor E. G. Waterhouse.*

[8] The University of Sydney, University Colleges and Victoria Park, State Heritage Inventory, Heritage NSW, https://apps.environment.nsw.gov.au/dpcheritageapp/ViewHeritageItemDetails.aspx?ID=5056444.

Victoria Park is a significant Victorian-era park dedicated in 1870. The park retains substantial components of its formative 19th-century planning and design, including the grand avenue linking City Road and the remaining original gate lodge to the tower of the Main Building of the University.

The provision of sport and leisure facilities across the site have contributing significantly to the retention of open space and green buffers between the built forms of the campus, and are important to the people of Sydney and NSW.

The Main Quadrangle Building, the Anderson Stuart Building and the Gate Lodges, together with St Paul's, St John's and St Andrew's Colleges, as a rare composition, comprise what is the most important group of Gothic and Tudor Revival style architecture in New South Wales and potentially Australia. Together they deliberately evoke the academic traditions and standards of Oxford and Cambridge, as expressed in the University motto ("Sidere Mens Eadem Mutato", meaning, "though the constellation has changed, the spirit remains the same."). The landscape and grounds features associated with these buildings, including Victoria Park, contribute to its values of civic virtue and support the existence and appreciation of their state aesthetic significance.

The University of Sydney holds significance for its role as a site for student activism during the 20th century. In particular, the 1965 Freedom Ride led by Charles Perkins, Vietnam War and conscription protests.

As a long-standing tertiary institution, the University of Sydney's association with eminent men and women who are its graduates, academics and chancellery demonstrates a major contribution to all aspects of Australian society and the nation's development.

The University of Sydney and University Colleges contain one of the densest collections of heraldic representations in NSW and Australia.

The place is of state heritage significance in demonstrating the aspirations of colonial Sydney to shape its own society, polity and ideals; which ultimately led to the establishment of the University of Sydney and University Colleges by Acts of Parliament in 1850 and 1854 respectively that created the university at Grose Farm.

The University of Sydney, University Colleges and Victoria Park has been a major landmark of Sydney and NSW since its inception. It holds substantial social values and associations, and is held in high esteem for a range of affiliated communities and groups as an iconic place of historic, academic, cultural, sporting, recreational and social pursuits and events.

The intactness of the groupings of buildings and landscapes across the history of the development of the site represents a microcosm of the development of architectural design, town planning and landscape design in New South Wales and Australia.

5.0 WORKS PROPOSED

5.1 Proposal Description

The proposed REF #2 early works package involves the following:

Lambie Dew Drive Civil Works:

- New pavement for vehicle turning and pedestrian pavement.

Bridge and walkway (within the Gloucester House building):

- Demolition of existing lower level (Level 4) bridge/walkway; and
- Installation of new, stepped access way to Level 4 to provide a 4.5 metres clearance to the roadway.

Associated road works to Gloucester House Drive

- Reconfiguration of the traffic island and road surface at Main Patient Entrance;
- Provision of a traffic management system to control access of delivery vehicles;
- Adjustments to humps, footpaths and kerb lines, tree pruning;
- Installation of a turning bay adjacent to the loading dock to facilitate access for delivery vehicles approaching from Gloucester House Drive;
- Pruning of one (1) Ficus macrocarpa var. Hilli (Hills Fig) growing on the St Andrews College campus at the University of Sydney; and
- Removal of four trees located on the site as part of tree group 59 (*Howea Forsteriana* - Kentia Palm trees).

5.2 Drawings

Our assessment of the proposal is based on the following detailed survey plans by RPS dated 10 September 2021 and received by Heritage 21 on 21 September 2021. They are also based on the following Architectural Plans by Jacobs dated 17 May 2022 and received by Heritage 21 on 18 May 2022. These are reproduced below for reference only; the full set of drawings should be referred to for any details.

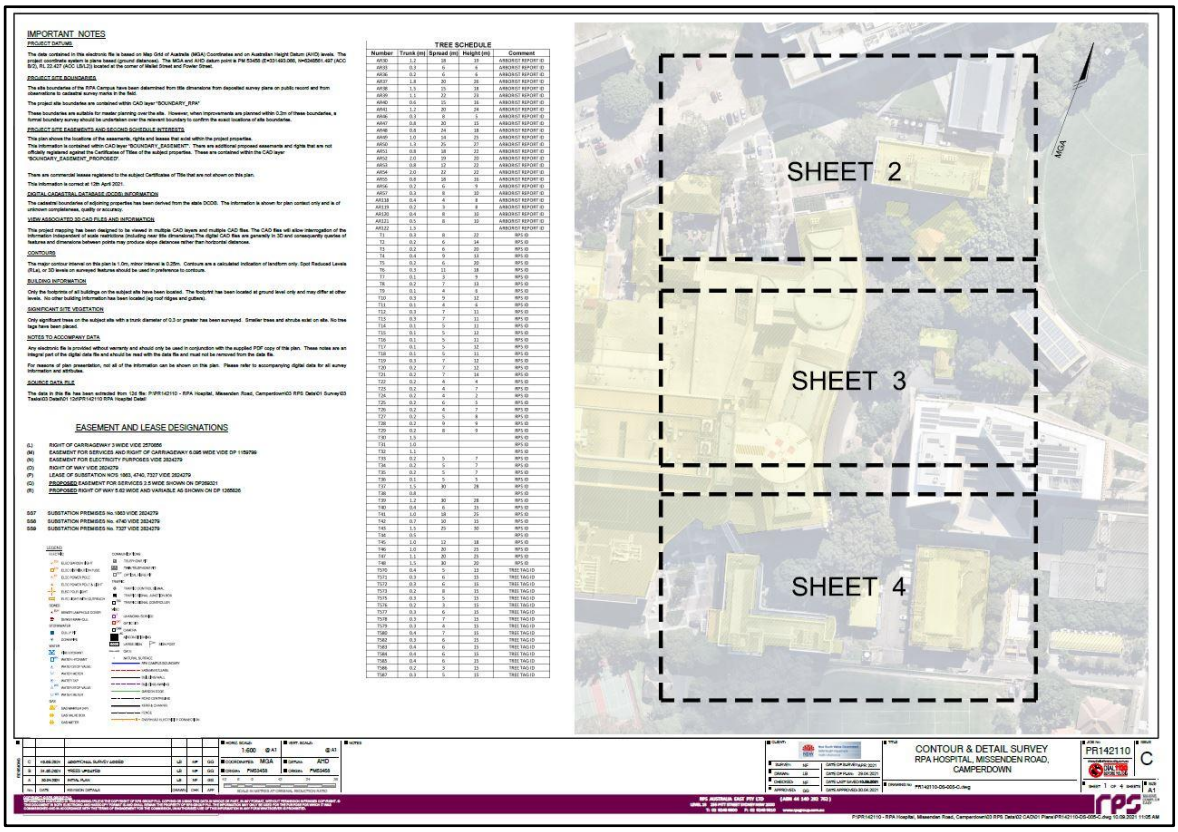


Figure 21. Contour and Detail Survey - 1

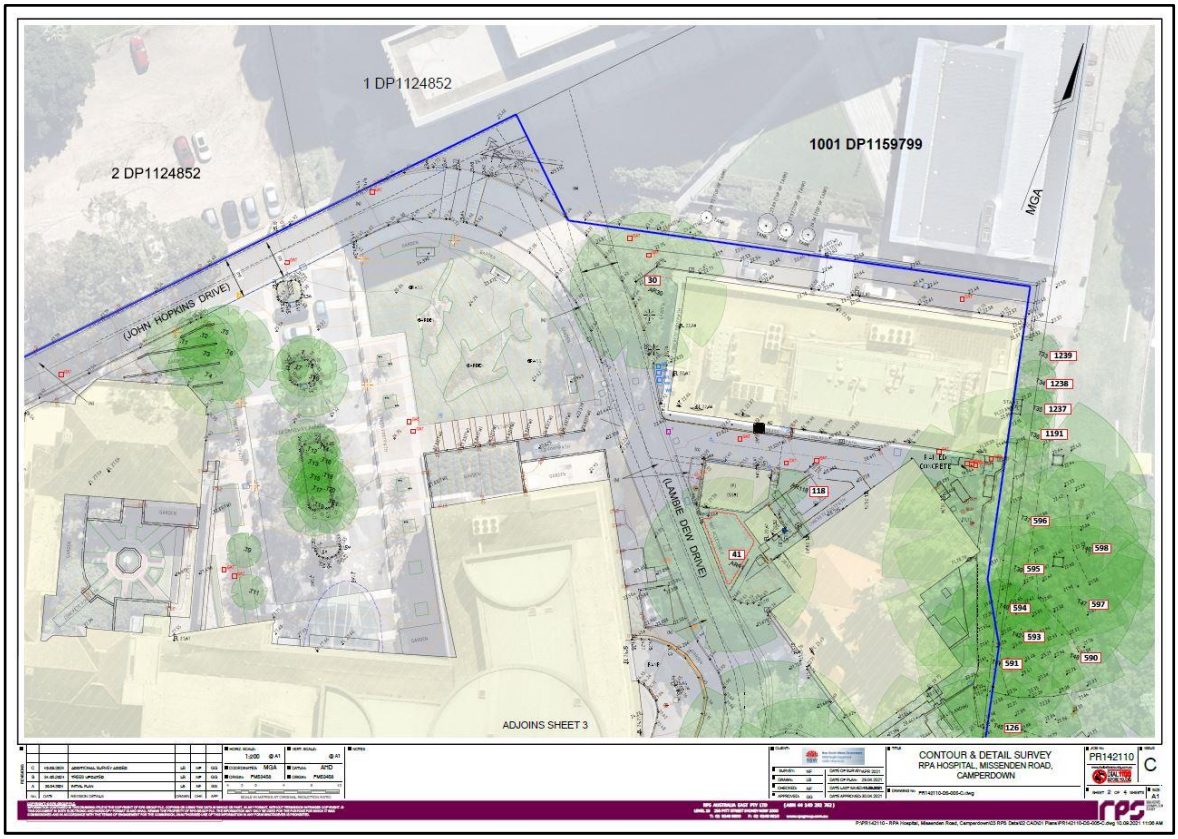


Figure 22. Contour and Detail Survey - 2

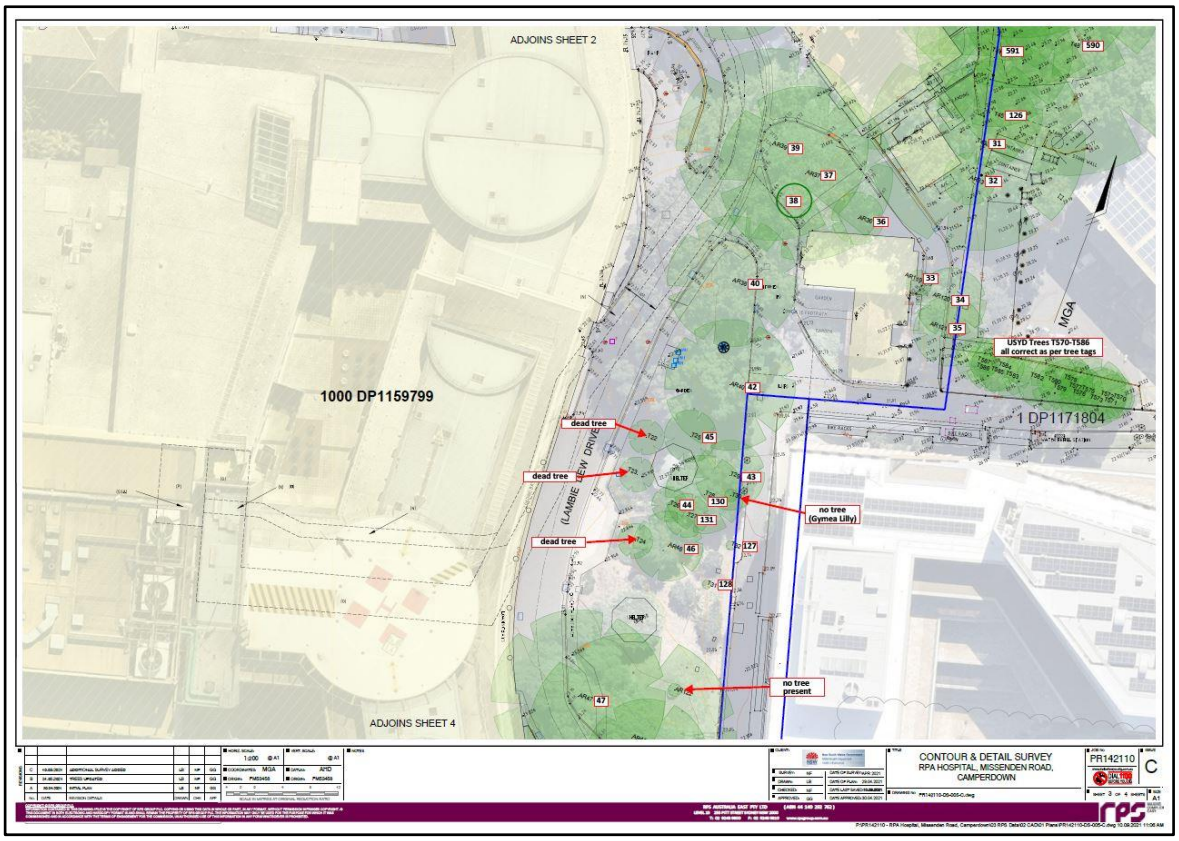


Figure 23. Contour and Detail Survey - 3

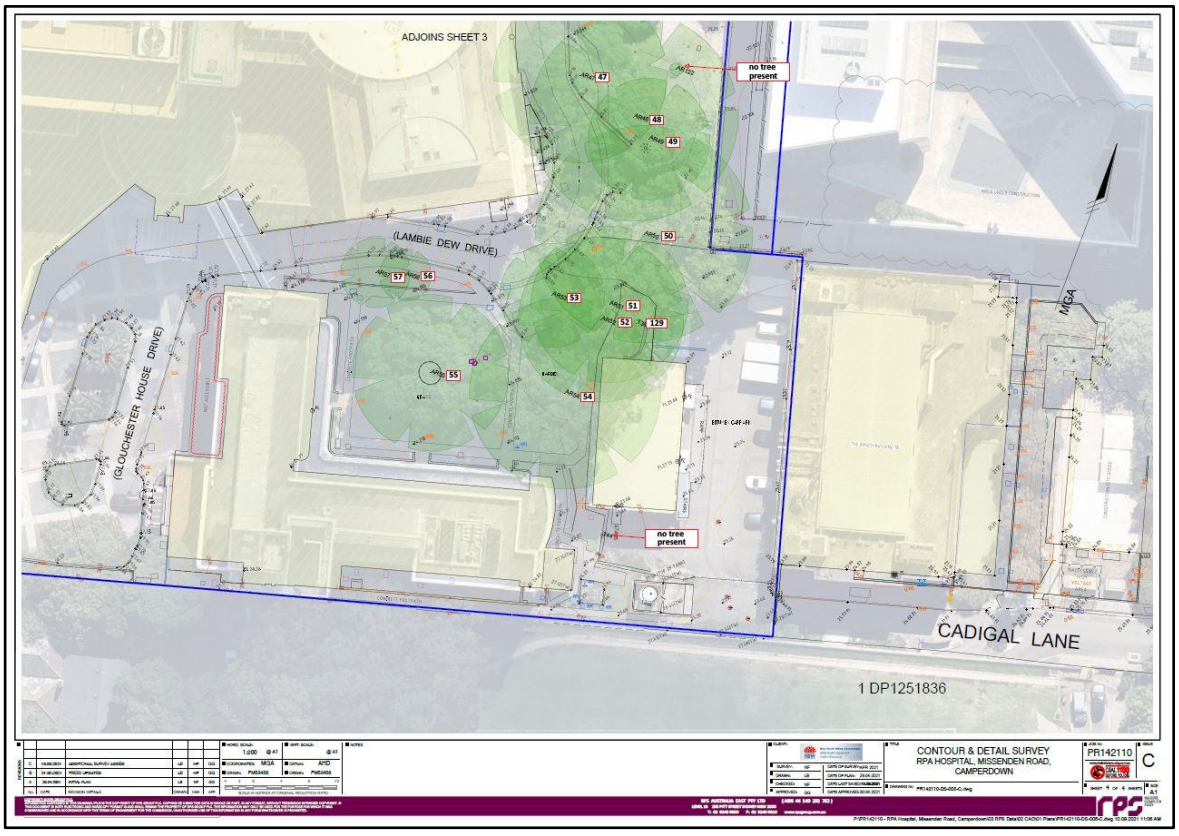


Figure 24. Contour and Detail Survey – 4

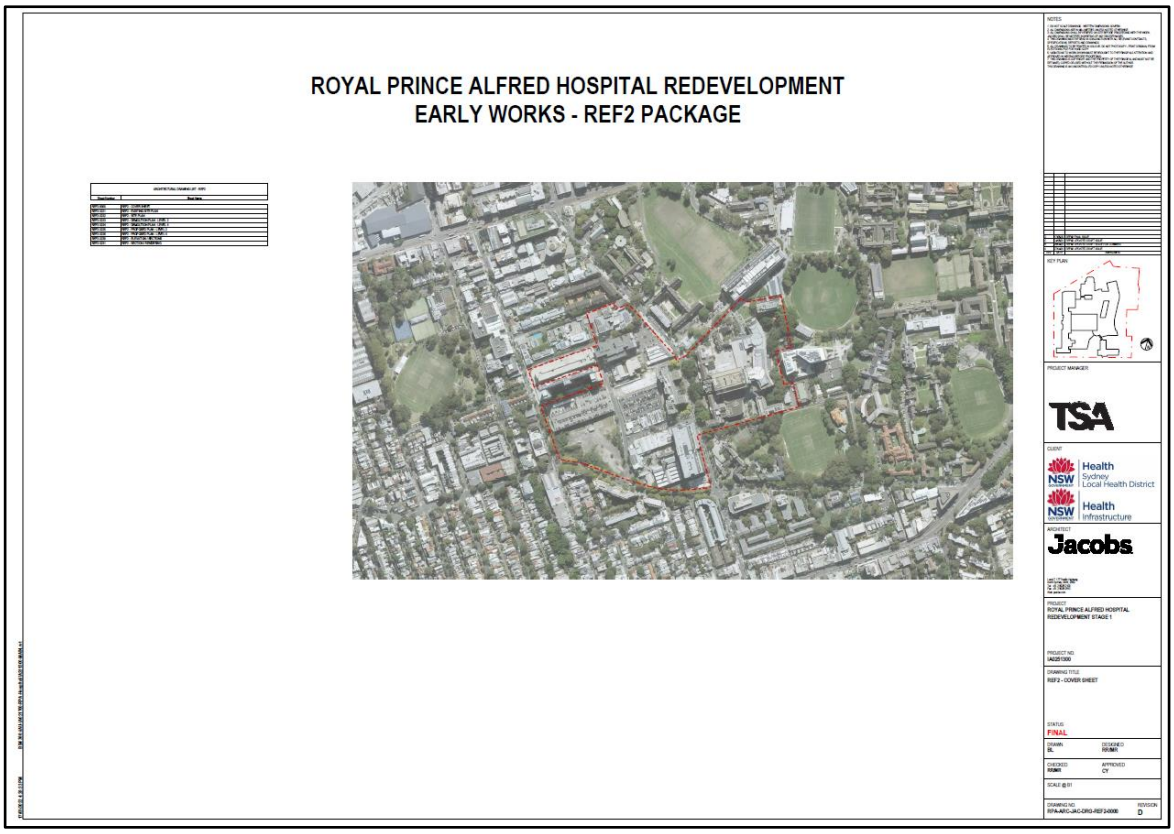


Figure 25. Cover Sheet.

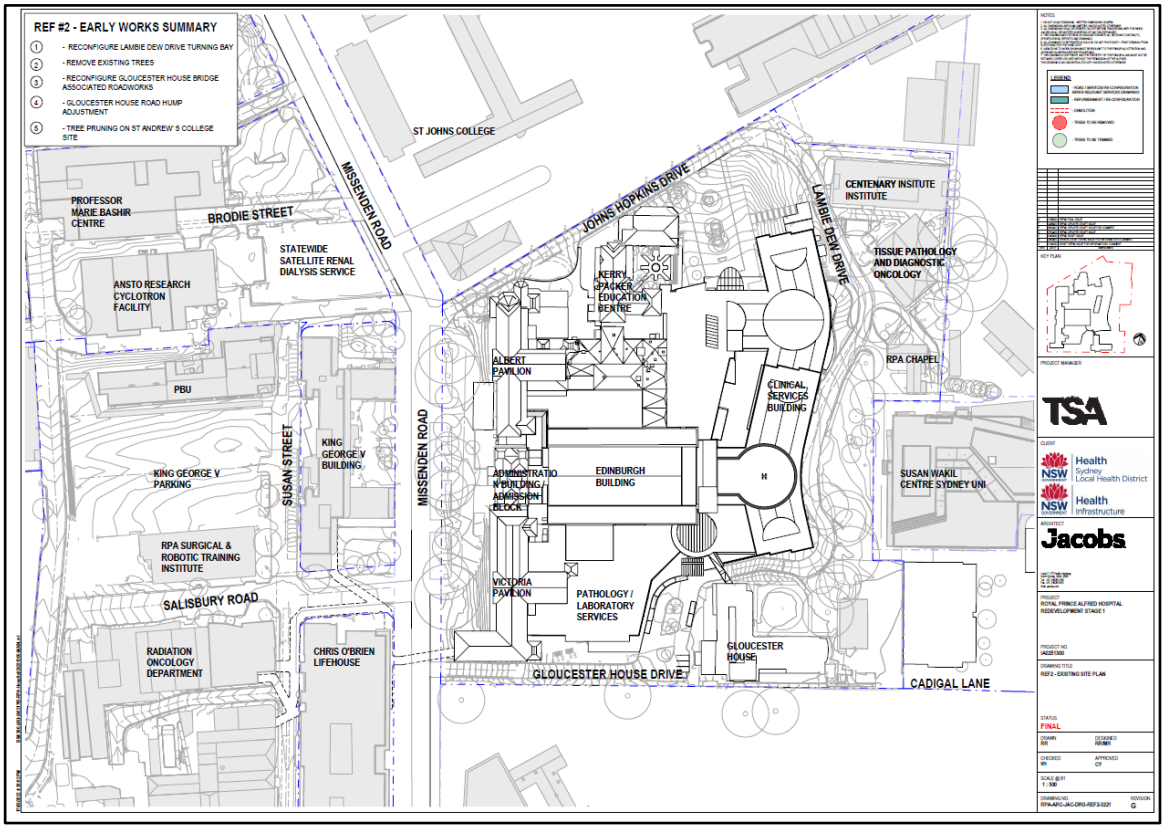


Figure 26. Existing Site Plan.

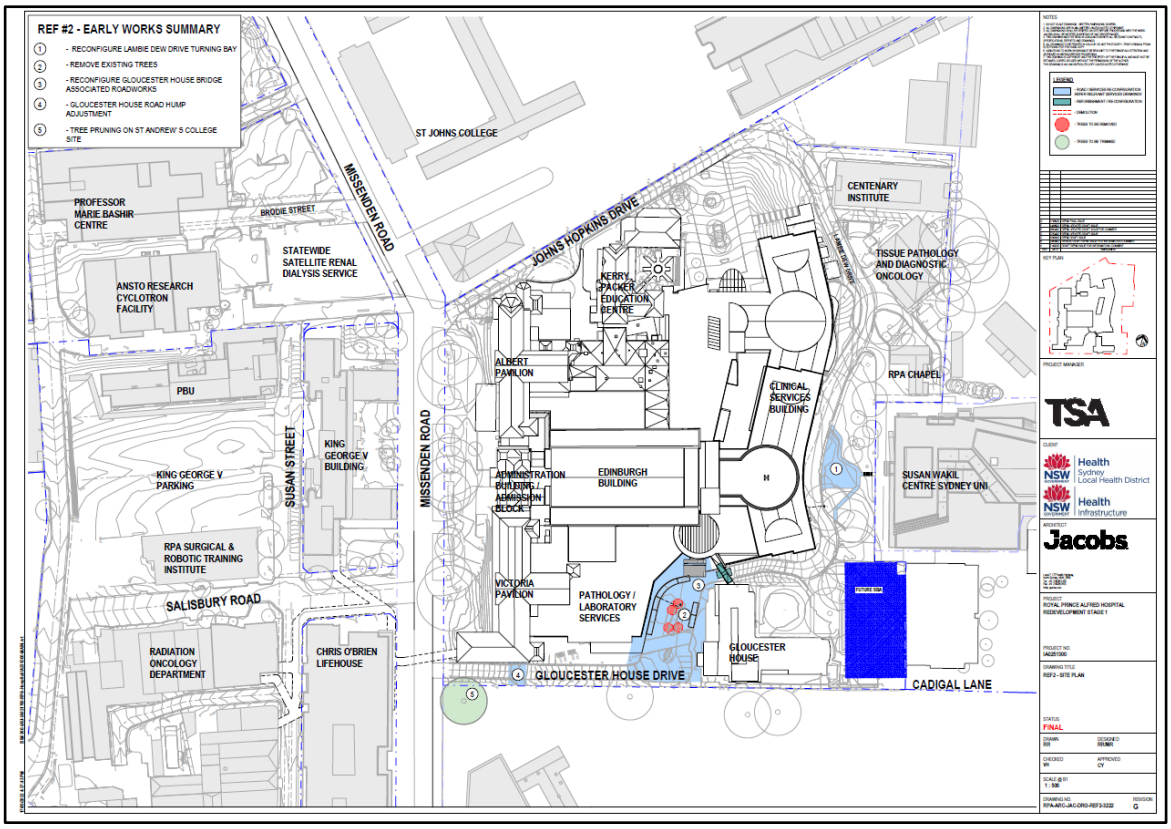


Figure 27. Site Plan.

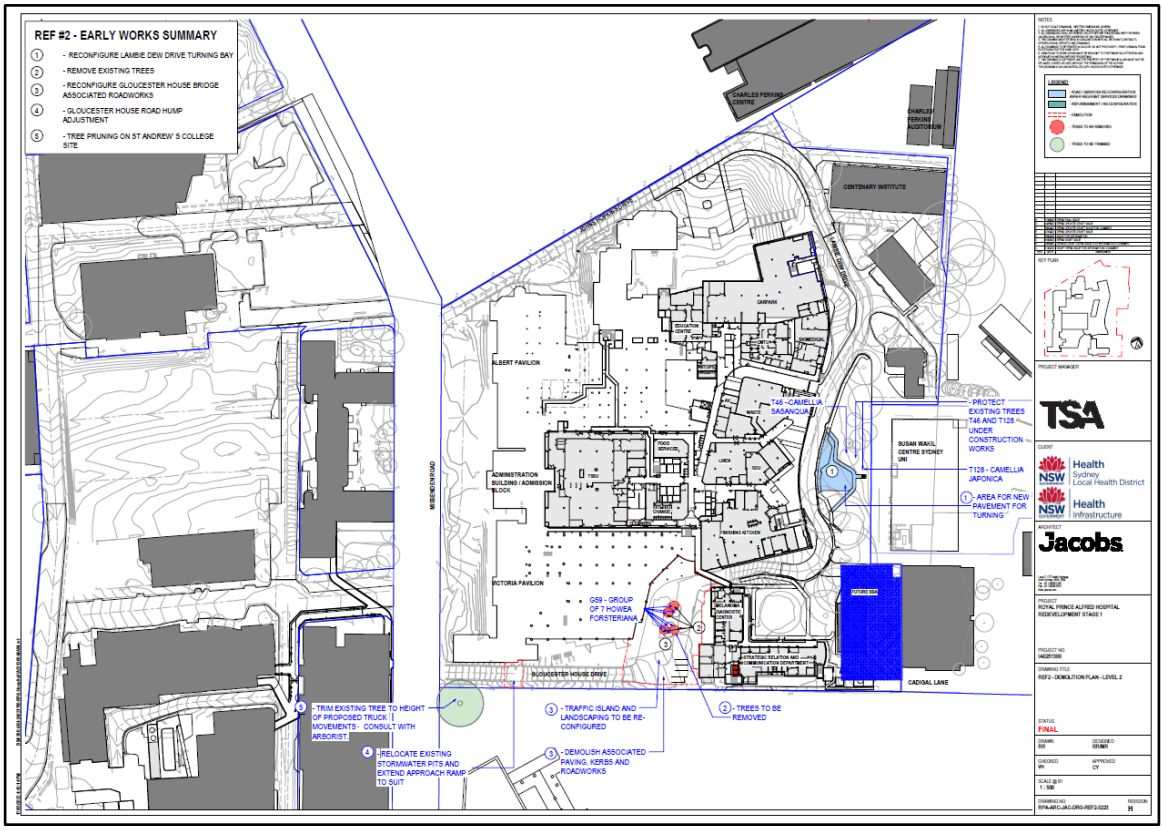


Figure 28. Demolition Plan – Level 2.

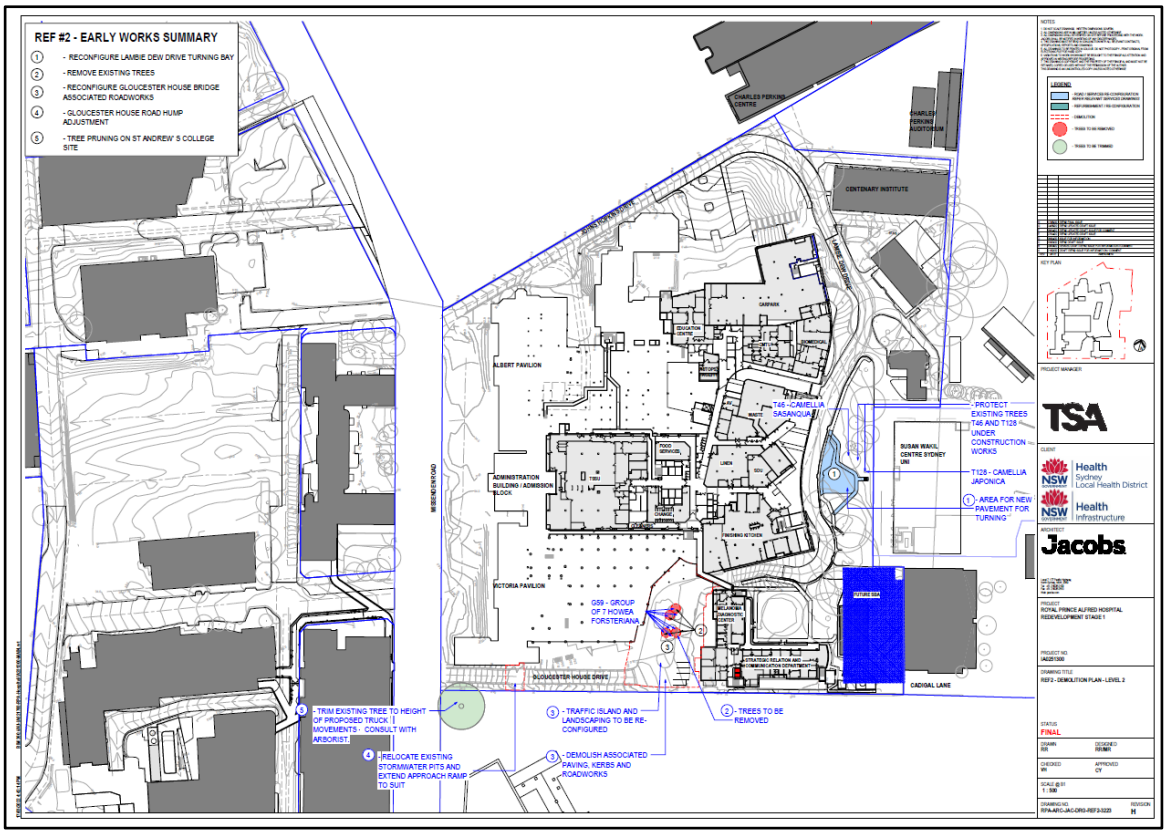


Figure 29. Demolition Plan – Level 4.

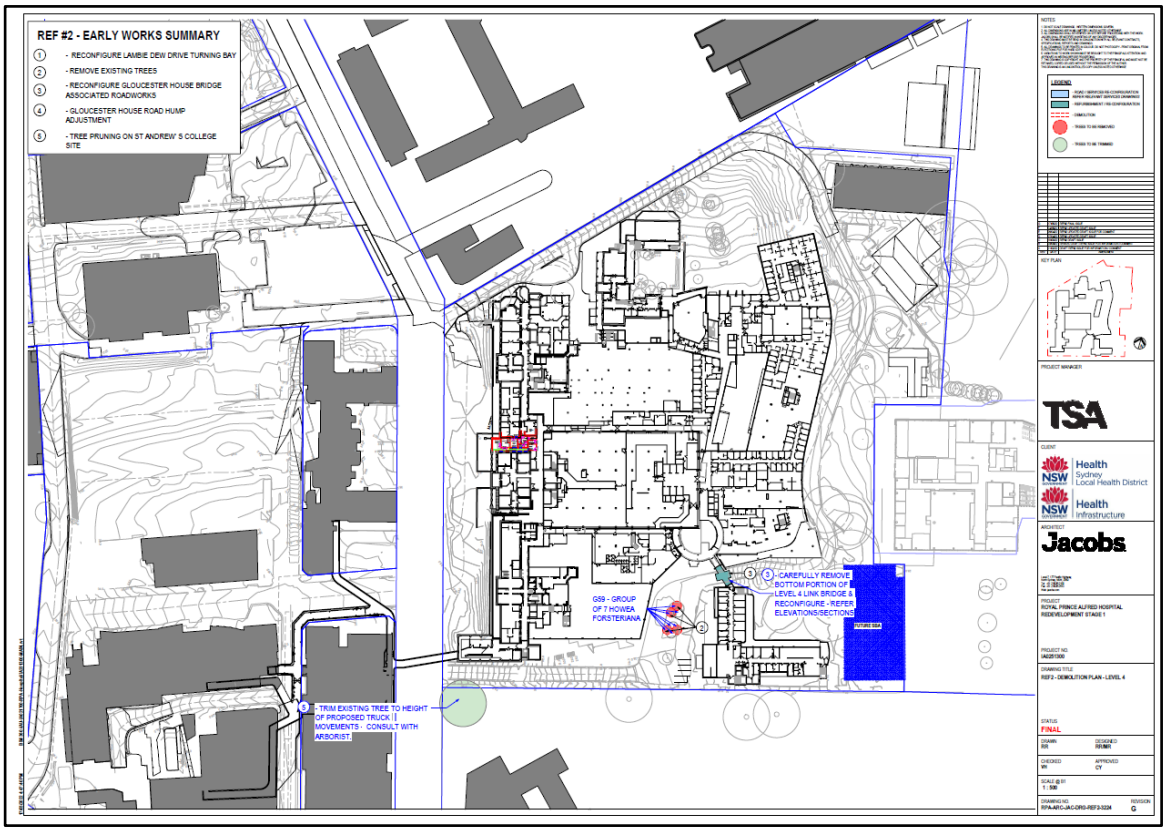


Figure 30. Proposed Plan – Level 2.

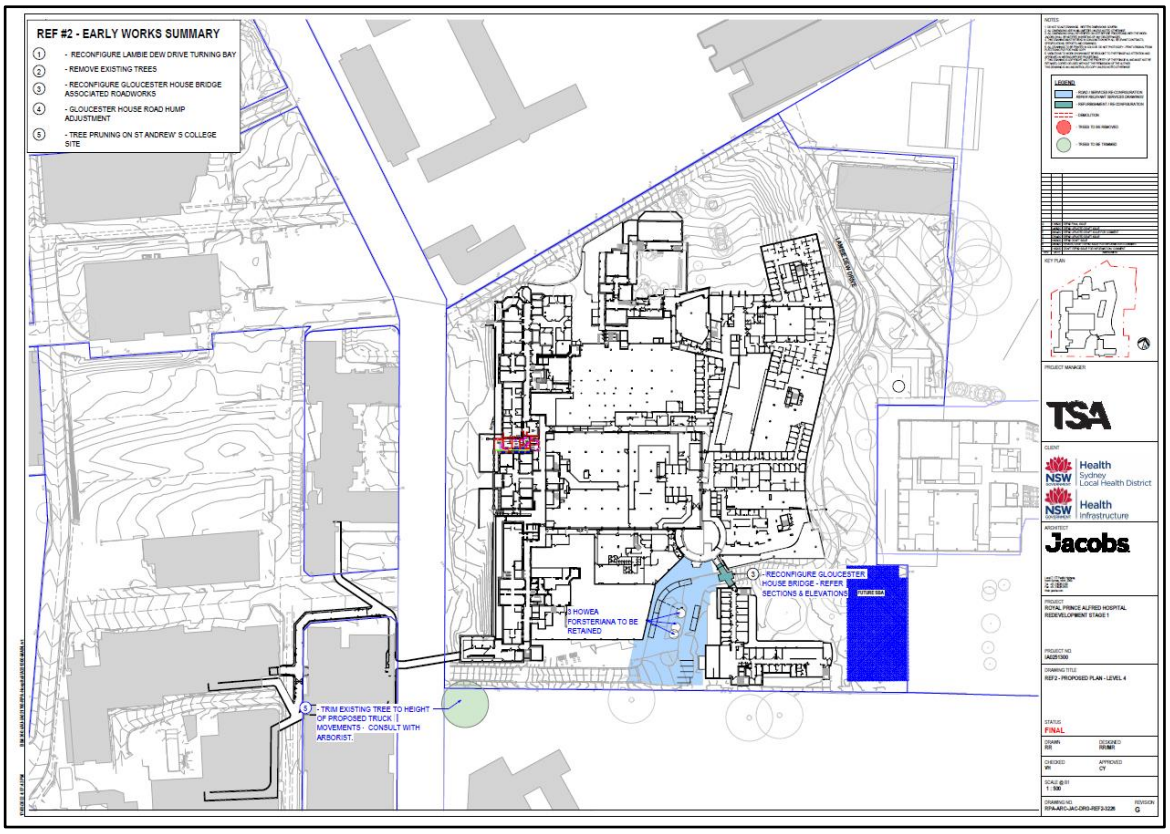


Figure 31. Proposed Plan – Level 4.

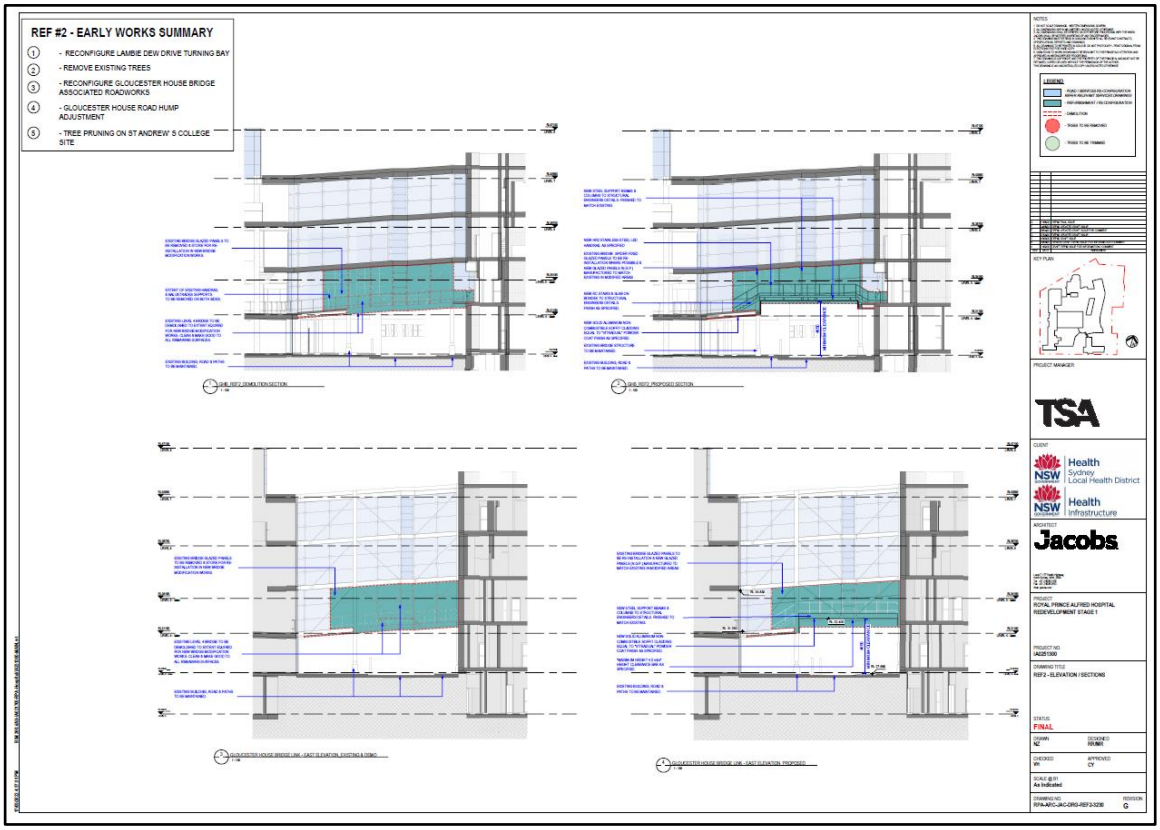


Figure 32. Elevation and Sections – Gloucester Bridge Link.



Figure 33. Section/Rendering.

6.0 ASSESSMENT OF HERITAGE IMPACT

6.1 Heritage Management Framework

Below we outline the heritage-related statutory and non-statutory constraints applicable to the subject site including the objectives, controls and considerations which are relevant to the proposed development as described in Section 5.0 above. These constraints and requirements form the basis of this Heritage Impact Assessment.

6.1.1 Sydney Local Environmental Plan 2012

The statutory heritage conservation requirements contained in Section 5.10 of the Sydney Local Environmental Plan (SLEP) 2012 are pertinent to any heritage impact assessment for future development on the subject site. The relevant clauses for the site and proposal are outlined below:

(1) Objectives
(2) Requirement for consent
(4) Effect of proposed development on heritage significance
(5) Heritage assessment

6.1.2 Sydney Development Control Plan 2012

Our assessment of heritage impact also considers the heritage-related sections of the Sydney Development Control Plan (SDCP) 2012 that are pertinent to the subject site and proposed development. These include:

Section 2 - Locality statements

2.3.5 University of Sydney/Royal Prince Alfred Hospital

Section 3 - General Provisions

3.9.1 Heritage Impact Statements
3.9.4 Development of sites of State heritage significance or containing more than one heritage item
3.9.5 Heritage items
3.9.6 Heritage conservation areas
3.9.7 Contributory buildings
3.9.10 Building materials for heritage items and buildings within heritage conservation areas
3.10.5 Public and community buildings older than 50 years

6.1.3 Royal Prince Alfred Hospital Conservation Management Plan 1997

Our assessment of heritage impact also considers the relevant sections of the Royal Prince Alfred Hospital Conservation Management Plan (CMP), prepared by Heritage Group, State Projects, NSW Public Works in May 1997. These include:

19.0 Conservation Policies

2.0 Integration into the Management of the Site

2.6 Recording

2.7 Interpretation

3.0 Context

3.1 Boundaries

3.2 Relationship to Sydney University

3.4 Continued expansion

4.0 Integrity of the Original Design

4.1 The Layout of the Hospital

4.2 Master Planning

5.0 Planning New Works

6.0 Grounds

6.1 Landscaped Precincts

7.0 Undertaking New Works

7.1 Integration of New Work

7.2 Relationship to Main Buildings

7.3 Building Regulations

8.0 New Infrastructure

11.0 Archaeology

The following recommended **Conservation Policy is for The Rear Gardens (Precinct 4):**

The health of the mature plantings should be assessed by a qualified arborist.

Many of the significant species are camphor laurels which are now considered to be weeds. No attempt, however, should be made to remove these significant mature specimens. Only young seedlings of camphor laurel should be removed as part of a regular maintenance program. Eventually replacement planting of the camphor laurels will need to be considered. As the environment surrounding the Hospital is highly urbanised there seems to be little

danger of the invasion of camphor laurel into remnant bushland of the area. Therefore replacement with young camphor laurels could be acceptable. If and when replacement planting is needed the situation should be assessed by a tree specialist who has had considerable experience in the heritage field.

The large trees surrounding the original mortuary should be retained.

The mature lemon scented gums, camphor laurels, figs, jacaranda, magnolia grandiflora and brushbox lining the drive should be retained.

The following recommended **Conservation Policy is for Gloucester House (Building 88):**

Conserve and maintain the building in accordance with the Burra Charter.

Continue to use Gloucester House for wards purposes.

Continue maintenance of external fabric and surviving internal original fabric.

Retain configuration externally and internally.

Conserve the original fabric of the lobby areas.

Remove intrusive elements in possible. Reconstruct planter boxes to harmonise with the building.

Retain relationship to related garden precincts and entry roadway.

6.1.4 NSW Office of Environment & Heritage guidelines

In its guidelines for the preparation of Statements of Heritage Impact, the NSW Office of Environment & Heritage provides a list of considerations in the form of questions aiming at directing and triggering heritage impact assessments. These are divided in sections to match the different types of proposal that may occur on a heritage item, item in a heritage conservation area or in the vicinity of heritage. Below are listed the considerations which are most relevant to the proposed development as outlined in Section 5.0 of this report.

Minor partial demolition (including internal elements)

- *Is the demolition essential for the heritage item to function?*
- *Are important features of the item affected by the demolition (e.g. fireplaces in buildings)?*
- *Is the resolution to partially demolish sympathetic to the heritage significance of the item?*
- *If the partial demolition is a result of the condition of the fabric, is it certain that the fabric cannot be repaired?*

Minor additions (see also minor partial demolition)

- *How is the impact of the addition on the heritage significance of the item to be minimised?*
- *Can the additional area be located within an existing structure? If no, why not?*
- *Will the additions visually dominate the heritage item?*
- *Is the addition sited on any known, or potentially significant archaeological deposits? If so, have alternative positions for the additions been considered?*
- *Are the additions sympathetic to the heritage item? In what way (e.g. form, proportions, design)?*

New landscape works and features (including carparks and fences)

- *How has the impact of the new work on the heritage significance of the existing landscape been minimised?*
- *Has evidence (archival and physical) of previous landscape work been investigated? Are previous works being reinstated?*
- *Has the advice of a consultant skilled in the conservation of heritage landscapes been sought? If so, have their recommendations been implemented?*
- *Are any known or potential archaeological deposits affected by the landscape works? If so, what alternatives have been considered?*
- *How does the work impact on views to, and from, adjacent heritage items?*

Tree removal or replacement

- *Does the tree contribute to the heritage significance of the item or landscape?*
- *Why is the tree being removed?*
- *Has the advice of a tree surgeon or horticultural specialist been obtained?*
- *Is the tree being replaced? Why? With the same or a different species?*

6.1.5 Other Heritage Considerations

- The historical use of the site would be maintained and if not, if the proposed new use would be suitable to the heritage significance;
- The historical setbacks and boundaries of the site would be retained as existing; and
- Any significant views to and from significant buildings or elements, or across significant areas would be impacted.

6.2 Heritage Impact Assessment

Below we assess the impact that the proposed development would have upon the subject site, the University of Sydney heritage conservation area in which it is located, and the heritage item in the vicinity. This assessment is based upon the Historical Context (refer to Section 2.0), the Physical Evidence (refer to Section 3.0), Heritage Significance (refer to Section 4.0) the Proposal (refer to Section 5.0), a review of the Heritage Management Framework (refer to Section 6.1) and the impact of the proposal on the relevant heritage item situated in the vicinity of the site (refer to Sections 1.3 and 3.4).

6.2.1 Impact Summary

The proposed works which form part REF Package #2 primarily consists of civil works to Lambie Dew Drive and Gloucester House Drive which would not impact upon any heritage items and their associated significant building fabric. The works are minor and do not impact upon the general setting and character of the subject site. As such, they would have a neutral impact to the heritage significance of the subject site, heritage conservation area in which it is located and heritage item in the vicinity. It is noted that where excavation works are required, an archaeologist should be engaged, as required. Additionally, where the works are in close proximity to any of the heritage items, a temporary protection plan should be implemented to avoid damage caused by vehicle access, ground movement and other associated construction risks.

The package proposes the removal of the lower ground link between Gloucester House and Building 88 and construction of a new, stepped link which provides increased height clearance for vehicular access. The existing walkway is deemed to be of little heritage significance, as it is a later-addition contemporary structure which remains distinguishable as new within the context of the subject site. As such, the modification of this bridge would have a neutral impact to the heritage significance of the subject site. It is recommended to implement a temporary protection plan for Gloucester House during these works to avoid any damage to significant fabric.

6.2.2 Heritage Impact Assessment

The following table summarises the proposed works and the impact they would have upon the subject site, the University of Sydney heritage conservation area in which it is located, and the heritage item in the vicinity.

Scope Item	Impact Assessment	Assessment Summary
Lambie Dew Drive Civil Works		
New pavement for vehicle turning and pedestrian pavement.	**Neutral**	The reconfiguration of Lambie Dew Drive to facilitate a new turning bay, including road works and level adjustments, are required to improve access and servicing to this part of the campus. These works are not associated with any heritage items within the subject site, nor would they directly impact any significant building fabric.
Bridge and walkway (within the Gloucester House Building)		
Demolition of existing lower ground (Level 4) bridge/walkway.	**Neutral**	The pedestrian bridge to Gloucester House from Building 88 is a contemporary, later addition. It is readily recognisable as an addition and retains a distinction between the heritage item and the later addition development on the subject site. Given this, the link is considered to be of little significance and can be modified or removed as desirable. The demolition of the lower ground portion of the bridge, would thus have a neutral impact to the heritage significance of Gloucester House and the subject site. It is recommended to provide temporary protection to Gloucester House during these demolition activities to avoid any damage to the heritage item.
Installation of new, stepped access way to Level 4 to provide 4.5 metres clearance to the roadway.	**Neutral**	The installation of a new stepped access way in lieu of the existing lower bridge walkway would be an addition to a contemporary, later addition which is of little significance. These works would allow for increased vehicular access to the rear of the subject site. The proposed access way is of the same style, character and uses the same contemporary materials as the existing walkway. The proposed addition does not involve any additional penetrations into the significant fabric of Gloucester House. This addition would this remain readily identifiable as new and distinct from the heritage item. Similar to the demolition works of the existing, temporary protection to Gloucester House during construction is recommended to avoid any damage to the heritage item.
Associated road works to Gloucester House Drive		

Scope Item	Impact Assessment	Assessment Summary
Reconfiguration of the traffic island and road surface at Main Patient Entrance Provision of a traffic management system to control access of delivery vehicles Adjustments to humps, footpaths and kerb lines, tree pruning Installation of a turning bay adjacent to the loading dock to facilitate access for delivery vehicles approaching from Gloucester House Drive	**Neutral**	The road works for Gloucester House Drive are required to improve and access and servicing to this part of the campus. These works are not associated with any heritage items within the subject site, nor would they directly impact any significant building fabric. However, temporary protection of heritage assets in the vicinity of these works should be implemented if heavy vehicles movements are anticipated.
Pruning of one (1) Ficus macrocarpa var. Hilli (Hills Fig) growing on the St Andrews College campus at the University of Sydney	**Neutral**	The Arboriculture Impact Assessment Report prepared by Martin Peacock Tree Care, dated 10 May 2022, notes that this pruning would not impact the health or amenity value of the tree. As such, Heritage 21 is of the opinion that these works would not engender a negative impact to the subject site.
Removal of four trees located on the site as part of tree group 59 (*Howea Forsteriana* - Kentia Palm trees)	**Neutral**	The trees scoped for removal have been assessed in the Arboriculture Impact Assessment Report prepared by Martin Peacock Tree Care, dated 10 May 2022. The report notes that '*these trees are relatively recent plantings and have no heritage significance'.* Noting the age of these plantings, and no association with early landscaping of the hospital, Heritage 21 is of the opinion that this removal would not engender a negative impact to the subject site. The report by Martin Peacock Tree Care also notes that planting new trees in an appropriate location would offset the loss of amenity and canopy cover at the site. Heritage 21 recommends new planting to occur in the vicinity of Gloucester House, at the entry point via Gloucester House Drive. This is to comply with the Conservation Policy '*Retain relationship to related garden precincts and entry roadway'* as stipulated in the Conservation Management Plan.

7.0 CONCLUSION & RECOMMENDATIONS

7.1 Impact Summary

The NSW Office of Environment & Heritage's guidelines require the following aspects of the proposal to be summarised.[9]

7.1.1 Aspects of the proposal which respect or enhance heritage significance

In our view, the following aspects of the proposal would respect the heritage significance of the subject site, the University of Sydney heritage conservation area and heritage item in the vicinity:

- The proposal involves minor civil works to allow for increased accessibility to the rear of the site, without impacting on any significant fabric;
- The proposal would facilitate the ongoing historic use of the site as a hospital while allowing for the conservation of significant fabric; and
- The proposal would involve the modification of a later, addition contemporary walkway which is deemed to be of little heritage significance.

7.1.2 Aspects of the proposal which could have detrimental impact on heritage significance

In our view, there are no aspects of the proposal which could be detrimental to the significance of the subject site, the University of Sydney heritage conservation area and heritage item in the vicinity. The neutral impacts of the proposal have been addressed above in Section 7.1.1.

Recommendations are provided in Section 7.2 below as further mitigation measures.

7.1.3 Sympathetic alternative solutions which have been considered and discounted

No solutions of greater sympathy with the significance of the subject site, heritage conservation area or heritage items in the vicinity have been discounted to our knowledge.

Mitigation measures are provided for consideration in Section 7.2 of this report which are based on our initial recommendations.

7.2 Mitigation Measures

To ensure maximum conservation of significance of the subject site, heritage conservation area and heritage items in the vicinity, Heritage 21 also recommends the following:

7.2.1 Temporary Protection Measures

Prior to the commencement of any work, consideration shall be given to the development of temporary protection measures that would identify potential risks and outline methodologies to

[9] NSW Office of Environment and Heritage, 'Statements of Heritage Impact' (Heritage Office and Department of Urban Affairs & Planning, 1996), http://www.environment.nsw.gov.au/resources/heritagebranch/heritage/hmstatementsofhi.pdf.

negate any physical impact on significant fabric located in the vicinity of the area of works on the subject site. This is to be prepared by a suitably qualified contractor and implemented prior to the works to be monitored by the architect and followed by all tradespeople involved.

7.2.2 Heritage Architect Monitoring

A Heritage Architect should be engaged to periodically monitor the works on site, give necessary advice and sign off upon conclusion.

7.2.3 Archaeological Monitoring

For the excavation activities, an archaeologist should be engaged to monitor the subterranean works, as required in the event of unexpected finds.

7.3 General Conclusion

In the opinion of Heritage 21, the proposed REF Package #2 engenders a neutral impact to the heritage significance of the subject site. The works entails minor civil works to Lambie Dew Drive and Gloucester House Drive which are not associated with the heritage items on the site and their associated building fabric. The construction works involve the modification of a later, addition contemporary walkway which is of little significance.

8.0 SOURCES

Australia ICOMOS. 'The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance'. Australia ICOMOS, 2013. http://australia.icomos.org/publications/charters/.

City of Sydney Council. 'Sydney Development Control Plan', 2012. https://www.cityofsydney.nsw.gov.au/development-control-plans.

———. 'Sydney Local Environment Plan', 2012. https://www.legislation.nsw.gov.au/view/html/inforce/current/epi-2012-0628.

Heritage Council of NSW. 'Better Placed Design Guide for Heritage'. Government Architect New South Wales. 2019. https://www.governmentarchitect.nsw.gov.au/resources/ga/media/files/ga/design-guides/better-placed-design-guide-for-heritage-2019-01-30.pdf.

Heritage Group State Projects. 'Royal Prince Alfred Hospital Conservation Management Plan'. State Projects, Department of Public Works & Service. 1997.

Heritage 21. 'Significance Assessment Report: The Royal Prince Alfred Hospital (RPA) Camperdown'. 2019.

The Planning Team. 'Grounds Conservation Management Plan (revised)'. 2017. https://www.sydney.edu.au/content/dam/corporate/documents/about-us/campuses/heritage-and-conservation-documents/Grounds%20CMP%20Final%20(revised%202017).pdf.

NSW Heritage Office and Royal Institute of Architects. 'Design in Context: Guidelines for Infill Development in the Historic Environment'. 2005. https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Heritage/design-in-context-guidelines-for-infill-development-historic-environment.pdf.

NSW Land and Property Information. 'SIX Maps', n.d. http://maps.six.nsw.gov.au/.

NSW Office of Environment and Heritage. 'Assessing Heritage Significance'. NSW Heritage Office, 2001. NSW Heritage Manual. http://www.environment.nsw.gov.au/resources/heritagebranch/heritage/listings/assessingheritagesignificance.pdf.

———. 'State Heritage Inventory'. *Search for NSW Heritage*, n.d. http://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx.

———. 'Statements of Heritage Impact'. Heritage Office and Department of Urban Affairs & Planning, 1996. NSW Heritage Manual. http://www.environment.nsw.gov.au/resources/heritagebranch/heritage/hmstatementsofhi.pdf.



Royal Prince Alfred Hospital, Redevelopment Stage 1: Aboriginal Due Diligence Assessment

FINAL REPORT

Prepared for TSA Management on behalf of Health Infrastructure

13 May 2022

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Contents

Glossary ..... **v**

Summary ..... **vi**

1 Introduction **1**

1.1 Project background 1
1.2 Location of the study area 1
1.3 Proposed works 1
1.4 Planning approvals 3
1.5 Scope of the assessment 3
1.6 Aboriginal consultation 3

2 Desktop assessment **6**

2.1 Landscape context 6
2.2 Geology, soils and landforms 6
2.3 Flora and fauna 12
2.4 Land use history 13

3 Aboriginal context **20**

3.1 Ethnohistory and contact history 20
3.2 Regional context 21
3.3 Local context 22
3.3.1 Identified Aboriginal archaeological sites 25
3.4 Summary 28
3.4.1 Predictive statements 28

4 Archaeological field investigation **31**

4.1 Archaeological field investigation aims 31
4.2 Field investigation methods 31
4.3 Constraints to the field investigation 32
4.4 Visibility 32
4.5 Exposure 33
4.6 Disturbances 34
4.7 Investigation results and discussion 36

5 Conclusions and recommendations **39**

5.1 Conclusions 39
5.2 Recommendations 39

References **42**

Appendices **45**

Appendix 1 AHIMS search results **46**

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Appendix 2 REF #2 Designs 47

Tables

Table 1 Blacktown soil landscape characteristics (Bannerman & Hazelton 1990, p.29) 7
Table 2 AHIMS sites within the study area 26
Table 3 Aboriginal site prediction statements 29

Figures

Figure 1 Location of the study area 4
Figure 2 Study area detail 5
Figure 3 Geological units in the vicinity of the study area 9
Figure 4 Hydrology and topography in the vicinity of the study area 10
Figure 5 Soil landscapes in the vicinity of the study area 11
Figure 6 AHIMS within the vicinity of the study area 27
Figure 7 Survey results and coverage 38
Figure 8 Due diligence flow chart 41

Photos

Photo 1 Proposed works – early works REF #2 2
Photo 2 Diagram showing Strahler stream order (Ritter et al. 1995, pp. 151). 7
Photo 3 Photograph of the RPA Hospital along Missenden Road dated to 1900 (Source: State Library of South Australia, PRG 5/37/224) 13
Photo 4 Photograph of the Nurse's quarters at RPA Hospital dated to 1900 (Source: National Library of Australia, PIC/11189 LOC Cold Store PIC NEG) 14
Photo 5 An aerial photograph dated to 1943, with the study area outlined in red (Source: NSW Spatial Services) 15
Photo 6 An aerial photograph dated to 1971, with the study area outlined in red (Source: NSW Spatial Services) 16
Photo 7 An aerial photograph dated to 1982, with the study area outlined in red (Source: NSW Spatial Services) 17
Photo 8 An aerial photograph dated to 1994, with the study area outlined in red (Source: NSW Spatial Services) 18
Photo 9 An aerial photograph dated to 2005, with the study area outlined in red (Source: NSW Spatial Services) 19
Photo 10 Port Jackson catchment area, subcatchment and aquatic zones, with registered shell midden and archaeological deposit sites as at 28 February 1990 and known excavated sites (Source: Attenbrow 1990) 21
Photo 11 General visibility along Johns Hopkins Drive, photo facing south-west 32
Photo 12 General visibility within the northern portion, with photo showing the cultural garden, photo facing south-west 33

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Photo 13 Area of exposure located within landscaped gardens, photo facing north-east 34
Photo 14 RPA Hospital Women and Babies building, carpark and landscaping, photo facing south-east 35
Photo 15 RPA Hospital Clinical Services building, photo facing south 35
Photo 16 Communication cables in the northern portion of the study area 36
Photo 17 Water hydrant and landscaped gardens in the eastern portion of the study area, photo facing north-east 36

Glossary

ACHA	Aboriginal Cultural Heritage Assessment
ADDA	Aboriginal Due Diligence Assessment
AHIMS	Aboriginal Heritage Information Management System
BP	Before Present
Biosis	Biosis Pty Ltd
Due diligence code	*Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*
EP&A Act	*Environmental Planning and Assessment Act 1979*
GSV	Ground Surface Visibility
Heritage NSW	Heritage NSW, Department of Premier and Cabinet (DPC)
ICOMOS	International Council on Monuments and Sites
JMCHM	Jo McDonald Cultural Heritage Management
LALC	Local Aboriginal Land Council
LEP	Local Environment Plan
LGA	Local Government Area
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
PAD	Potential Archaeological Deposit
REF	Review of Environmental Factors
RPA	Royal Prince Alfred
Study area	Lot 1000 DP 1159799, Royal Prince Alfred Hospital, Camperdown, NSW
SLHD	Sydney Local Health District
The Code	The *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*

Summary

Biosis Pty Ltd (Biosis) has been commissioned by TSA Management on behalf of Health Infrastructure (client) to undertake an Aboriginal Due Diligence Assessment (ADDA) for the proposed Stage 1 Redevelopment of the Royal Prince Alfred (RPA) Hospital, Camperdown, New South Wales (NSW) (the study area). The early works covered within this ADDA will be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* NSW (EP&A Act) as a Review of Environmental Factors (REF) (REF #2).

The search of the Aboriginal Heritage Information Management System (AHIMS) database identified 74 Aboriginal archaeological sites within a 3 by 3 kilometre search area, centred on the proposed study area. None of these sites were located within the study area. Background research identified that extensive development has occurred throughout the majority of the study area. Artefact scatters and potential archaeological deposits (PAD) sites are the most common in the surrounding area. Despite this, prior studies within close proximity and within the study area have identified low archaeological potential due to extensive disturbances caused by development (JMCHM 2006, JMCHM 2007, Comber Consultants Pty Ltd 2010, Comber 2009, Biosis Pty Ltd 2012).

A field investigation was undertaken on 20 September 2021 by Anthea Vella (Biosis, Project Archaeologist); Rowena Welsh-Jarrett (Metropolitan Local Aboriginal Land Council (LALC), Cultural Sites Officer); and George Long, Karinya Bellear, and Kristina Zarkos (Sydney Local Health District (SLHD)). During the field investigation, areas of the proposed development were targeted, and no Aboriginal sites or objects were identified. The field investigation identified that the study area as a whole has been subject to disturbance and has low potential to contain intact archaeological deposits. As such, it is assessed that there is low potential for Aboriginal archaeological sites to occur within the study area.

Prior to any impacts occurring within the study area, the following is recommended:

Recommendation 1: No further archaeological assessment is required

No further archaeological work is required in the study area due to the entire study area assessed as having low archaeological potential.

Recommendation 2: Continued consultation with Metropolitan LALC

Consultation with Metropolitan LALC should be continued by the Project team. Metropolitan LALC have requested that a smoking ceremony is completed prior to ground disturbing works and that a cultural sites officer is present during ground disturbing works for the REF. TSA Management are to consult with Metropolitan LALC to arrange this.

Recommendation 3: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the *National Parks and Wildlife Act 1974* (NPW Act). It is an offence to disturb an Aboriginal site without a consent permit issued by Heritage NSW, Department of Premier and Cabinet (Heritage NSW). Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object the archaeologist will provide further recommendations. These may include notifying Heritage NSW and Aboriginal stakeholders.

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Recommendation 4: Discovery of skeletal remains

If any suspected human remains are discovered during any activity you must:

1. Immediately cease all work at that location and not further move or disturb the remains.
2. Notify the NSW Police and Heritage NSW' Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
3. Not recommence work at that location unless authorised in writing by Heritage NSW.

1 Introduction

1.1 Project background

Biosis has been commissioned by TSA Management on behalf of Health Infrastructure to undertake an ADDA for the proposed Stage 1 Redevelopment of the RPA Hospital, Camperdown, NSW (the study area). The early works covered within this ADDA will be assessed under Part 5 of EP&A Act as a REF (REF #2).

An assessment in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010a) has been undertaken for the study area in order to inform responsibilities with regards to Aboriginal cultural heritage in the area. In addition to the basic tasks required for a due diligence assessment, an extended background review, as well as an archaeological field investigation in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b) (the Code) was conducted, in order to adequately map areas of high, moderate and low archaeological sensitivity.

1.2 Location of the study area

The study area is located within the Sydney Local Government Area (LGA), Parish of Petersham, and County of Cumberland (Figure 1). The study area incorporates Lot 1000 DP 1159799 and is bounded by John Hopkins Drive to the north, Gloucester House Drive and private property to the south, The University of Sydney grounds to the east and Missenden Road to the west (Figure 2).

1.3 Proposed works

A summary of the early works as proposed within REF #2 is listed below and in Photo 1:

Bridge and walkway (within the Gloucester House building):

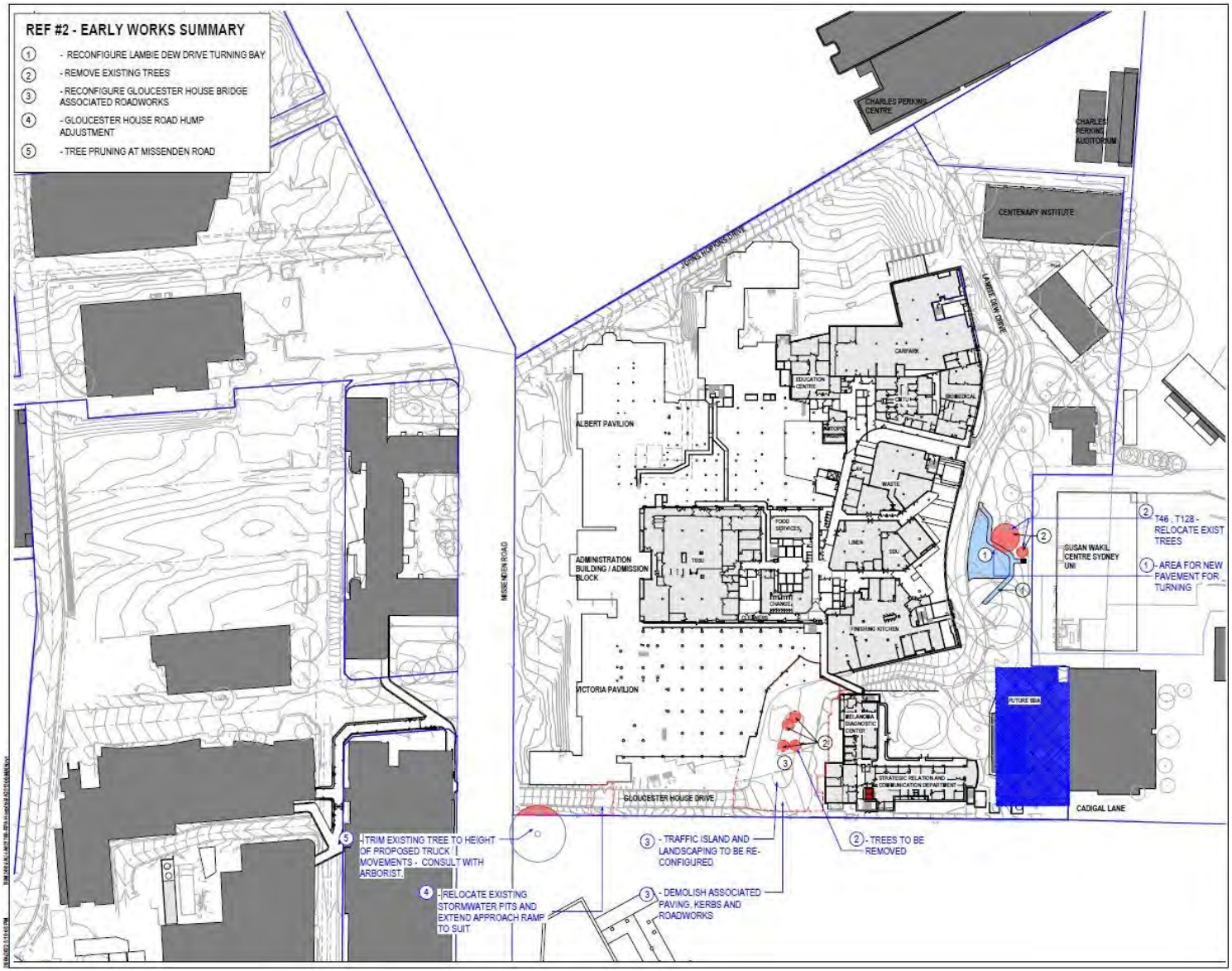
- Demolition of existing lower level (Level 4) bridge/walkway.
- Installation of new, stepped access way to Level 4 to provide a 4.5 metres clearance to the roadway.

Associated road works to Gloucester Drive

- Reconfiguration of the traffic island and road surface at Main Patient Entrance.
- Provision of a traffic management system to control access of delivery vehicles.
- Adjustments to humps, footpaths and kerb lines, tree pruning.
- Installation of a turning bay adjacent to the loading dock to facilitate access for delivery vehicles approaching from Gloucester House Drive.
- Pruning of one (1) *Ficus macrocarpa var. Hilli* (Hills Fig) growing on the St Andrews College campus at the University of Sydney.
- Removal of six trees located on the site.

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Photo 1 Proposed works – early works REF #2



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1.4 Planning approvals

The proposed development will be assessed against Part 5 of the EP&A Act. Other relevant legislation and planning instruments that will inform the assessment include:

- NPW Act.
- *National Parks and Wildlife Amendment Act 2010* (NSW).
- *Sydney Local Environmental Plan 2012* (LEP).

1.5 Scope of the assessment

The following is a summary of the major objectives of the assessment:

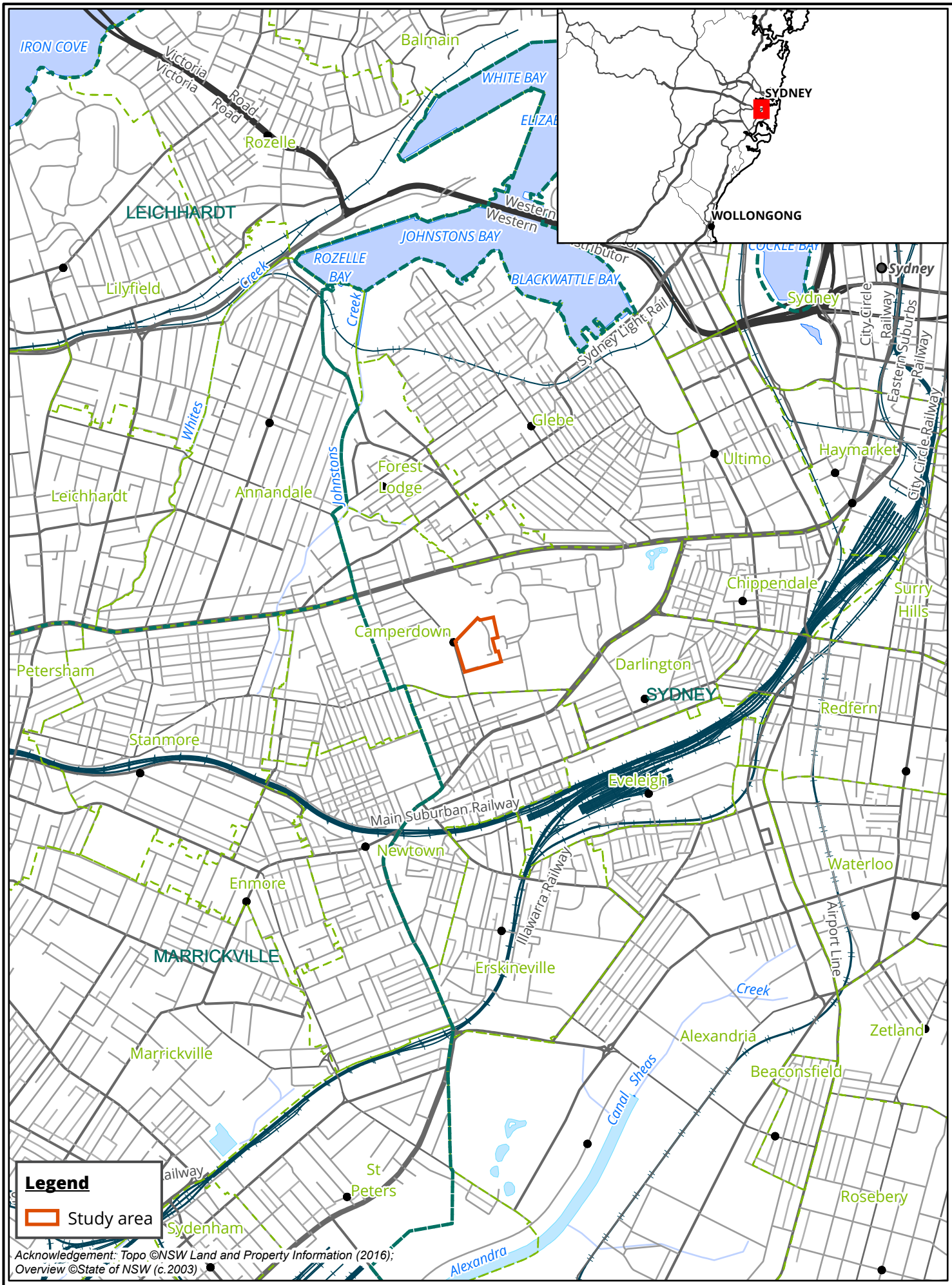
- Conduct background research in order to recognise any identifiable trends in site distribution and location, including a search of AHIMS.
- Undertake an archaeological field investigation as per requirement 5 of the Code, with particular focus on landforms with high potential for heritage places within the study area, as identified through background research.
- Record and assess sites identified during the field investigation in compliance with the guidelines endorsed by Heritage NSW.
- Determine levels of archaeological and cultural significance of the study area.
- Make recommendations to mitigate and manage any cultural heritage values identified within the study area.

1.6 Aboriginal consultation

Rowena Welsh-Jarrett (Cultural Sites Officer) from Metropolitan LALC); and George Long, Karinya Bellear, and Kristina Zarkos from SLHD attended the archaeological field investigation on 20 September 2021. The areas containing the proposed works were noted to have been disturbed by the construction of several buildings, roads and footpaths, carparks, landscaping, and associated subsurface infrastructure. During the archaeological field investigation several comments were made and are noted below:

- That the cultural gardens (adjacent to the Women and Babies hospital building) as well as existing landscaped areas are to be replaced by the Project in the future if impacted by the proposed development. Designated land should be put aside for the cultural gardens as well as more green space. This should be either the same amount of land as the existing cultural gardens or more if possible.
- A smoking ceremony to be provided by Metropolitan LALC prior to ground disturbing works.
- Metropolitan LALC to be present during ground disturbing works for monitoring.

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Figure 1 Location of the study area

Matter: 35565
Date: 25 August 2021,
Drawn by: AM, Checked by: AV, Last edited by: amackegard
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Metres
Scale 1:25,000@ A4, GDA 1994 MGA Zone 56

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Acknowledgements: Basemap © Land and Property Information 2016; Imagery © Department of Customer Service 2020

Figure 2 Study area detail

Matter: 35565, Date: 25 August 2021,
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2 Desktop assessment

A brief desktop assessment has been undertaken to review existing archaeological studies for the study area and surrounding region. This information has been synthesised to develop some Aboriginal site predictive statements for the study area and identify known Aboriginal sites and/or places recorded in the study area. This desktop assessment has been prepared in accordance with requirements 1 to 4 of the Code.

2.1 Landscape context

It is important to consider the local environment of the study area in any heritage assessment. The local environmental characteristics can influence human occupation and associated land use and consequently the distribution and character of cultural material. Environmental characteristics and geomorphological processes can affect the preservation of cultural heritage materials to varying degrees or even destroy them completely. Lastly, landscape features can contribute to the cultural significance that places can have for people.

2.2 Geology, soils and landforms

The study area is located on the southern side of Sydney Harbour. It is underlain by the Ashfield Shale which is part of the Wianamatta group geological unit (Figure 3). Ashfield Shale contains dark-grey to black claystone-siltstone and fine sandstone-siltstone laminate. Artefact sites are common across the Ashfield Shale formation (Bannerman & Hazelton 1990, p.3). Aboriginal artefact scatter sites are common across the Ashfield Shale formation, as are potential archaeological deposits (PADs). The presence of underlying shale deposits suggests that sites commonly found within sandstone formations, such as grinding grooves and rock shelters/rock art, are less likely to be present.

The surrounding landform consists of gently undulating rises broad rounded crests and gently inclined slopes with a gradient of less than 5%. The underlying soil landscape is the Blacktown soil landscape, and is described in further detail below. Local relief within the Blacktown soil landscape is up to 30 metres and rocky outcropping is absent (Bannerman & Hazelton 1990, p.28). Topography within the study area includes a gradual slope towards the west of the study area (Figure 4).

Stream order is recognised as a factor which assists the development of predictive modelling in Sydney Basin Aboriginal archaeology, and has seen extensive use in predictive modelling for the Sydney region, most notably by Jo McDonald Cultural Heritage management (JMCHM 2000, JMCHM 2005a, JMCHM 2005b, JMCHM 2008). These predictive models have a tendency to favour higher order streams as the locations of campsites and therefore archaeological remains. Larger water sources would have been more likely to provide a stable source of water and by extension other resources which would have been used by Aboriginal groups.

The stream order system used for this assessment was originally developed by Strahler (1952). It functions by adding two streams of equal order at their confluence to form a higher order stream, as shown in Photo 2. As stream order increases, so does the likelihood that the stream would be a perennial source of water.

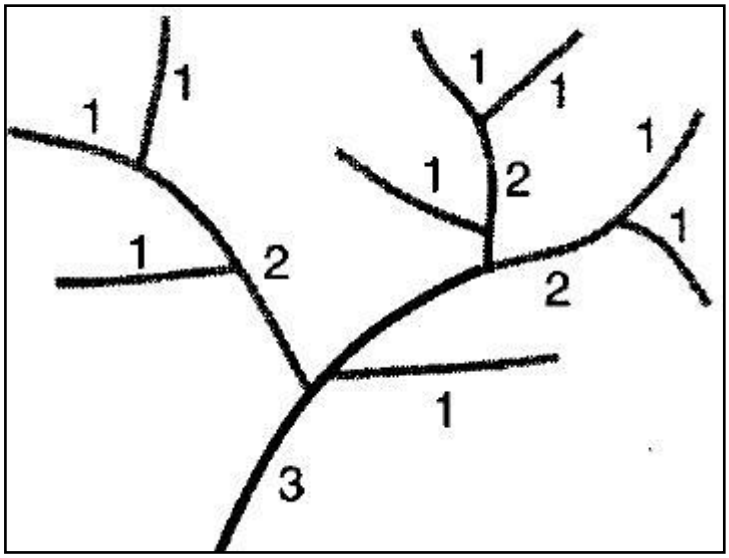


Photo 2 Diagram showing Strahler stream order (Ritter et al. 1995, pp. 151).

No watercourses are present within the study area (Figure 4). The closest water course is Orphan School Creek, approximately 660 metres north-west, which is a first order non-perennial water course and tributary of Johnstons Creek, a second order non-perennial water course, approximately 927 metres north-west. Both watercourses feed Rozelle Bay, a permanent waterbody of Sydney Harbour located approximately 1.7 kilometres north of the study area. Due to the presence of significant modern development within Camperdown and surrounding areas there is potential that further watercourses existed in the area that no longer remain. For example, the Blackwattle Creek swamplands was previously located within the surrounding area prior to historical land reclamation (JMCHM 2007, Biosis 2012).

Soil landscapes have distinct morphological and topological characteristics that result in specific archaeological potential. They are defined by a combination of soils, topography, vegetation and weathering conditions. Soil landscapes are essentially terrain units that provide a useful way to summarise archaeological potential and exposure.

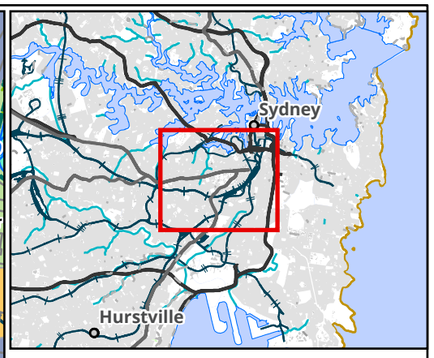
The Blacktown soil landscape is present within the study area and is characterised as a residual soil landscape (Figure 5). Dominant soils consist of shallow to moderately deep (<100 centimetres) red and brown podzols on crests and in well drained topographies, and deep (150-300 centimetres) yellow podzolic soils and soloths on lower slopes and drainage channels. The soils can be hard setting with moderate erodability (Bannerman & Hazelton 1990, p.28). A description of the soil types within the Blacktown soil landscape are provided in Table 1.

Table 1 Blacktown soil landscape characteristics (Bannerman & Hazelton 1990, p.29)

Soil material	Description
Blacktown 1 (*bt1*) - Friable brownish-black loam	Friable brown loam to clay loam with a moderately pedal subangular block structure and rough-faced porous fabric ped fabric. This soil material generally occurs as a topsoil (A horizon) up to 30 cm in thickness. Peds are well defined and range from 2-20 mm. Rounded iron indurated fine gravel-sized shale fragments and charcoal fragments sometimes occur as inclusions. Soil colour is brownish black (10YR 2/2), and can also range from dark reddish brown (5YR 3/2) to dark yellowish brown (10yr 3/4). Soil varies from moderately acidic to neutral.
Blacktown 2 (*bt2*) - Hardsetting	Hardsetting brown clay loam to silty clay loam, with an apedal massive to weakly

Soil material	Description
brown clay loam	pedal structure and porous earthy fabric. Occurs as an A2 Horizon deposit and occasionally a nA1 horizon topsoil. Typically between 10 to 30 cm in thickness. Peds range from 20-50 mm. Platy, iron indurated gravel sized shale fragments are common, with rare inclusions of charcoal and roots. Soil colour is predominately dark brown (7.5YR 4/3), but can range from dark reddish brown (2.5YR 3/3) to dark brown (10YR 3/3). Soil acidity varies from moderately acidic to slightly acidic.
Blacktown 3 (*bt3*) - Strongly pedal, mottled brown light clay	Brown light to medium clay with strong pedal polyhedral or subangular-blocky structure and smooth faced dense ped fabric that occurs as a subsoil (B horizon). The soil texture increases with depth and peds range from 5-20 mm. Fine to coarse gravel sized shale fragments are a common inclusion and often occur within stratified bands, with roots and charcoal rarely being present. Soil colour is brown (7.5YR 4/6), and can range from reddish brown (2.5YR 2/6) to brown (10YR 4/6). The pH of this soil material varies from strongly acidic to slightly acidic.
Blacktown 4 (*bt4*) - Light grey plastic mottled clay	Plastic light grey silty clay to heavy clay with moderately pedal polyhedral to subangular blocky structure, and smooth-faced dense ped fabric, that occurs as a deep subsoil deposit overlying shale bedrock (B^3 or C Horizon). Peds range between 2-20 mm. Inclusion consists of weathered ironstone concretions and rock fragments. Gravel sized shale fragments and roots occur occasionally, but charcoal is rare within this soil deposit. Red, yellow and brown mottles are present and soil colour is usually light grey (10YR 7/1) or sometimes greyish yellow (2.5YR 6/2). Soil acidity ranges from strongly acidic to moderately acidic.

Residual soils form from the in-situ weathering of bedrock material, resulting in slow accumulation of soils over long periods of time. Due to their age and slow accumulation, residual soil landscapes have reasonable potential to preserve archaeological deposits in an open context, such as stone artefacts derived from occupation sites. However, this slow accumulation when combined with extensive land clearing and land use (usually associated with pastoral and civic development) will result in an increased likelihood that soils will have been disturbed. This results in poor preservation of archaeological material in these locations.



Legend

Study area

Geological Units

- QH_bd,Coastal deposits - dune facies
- QH_ebw,Estuarine basin and bay (subaqueous)
- QH_ei,Estuarine interbarrier creek deposits
- QH_hr,Anthropogenic deposits - reclaimed estuarine areas
- Q_av,Alluvial valley deposits
- Q_avf,Alluvial fan deposits
- Q_h,Anthropogenic deposits
- Q_hw,Anthropogenic stored water, pondage, reservoirs, canals
- Tuth,Hawkesbury Sandstone
- Twia,Ashfield Shale

Figure 3 Geological units in the vicinity of the study area

0 160 320 480 640 800

Metres

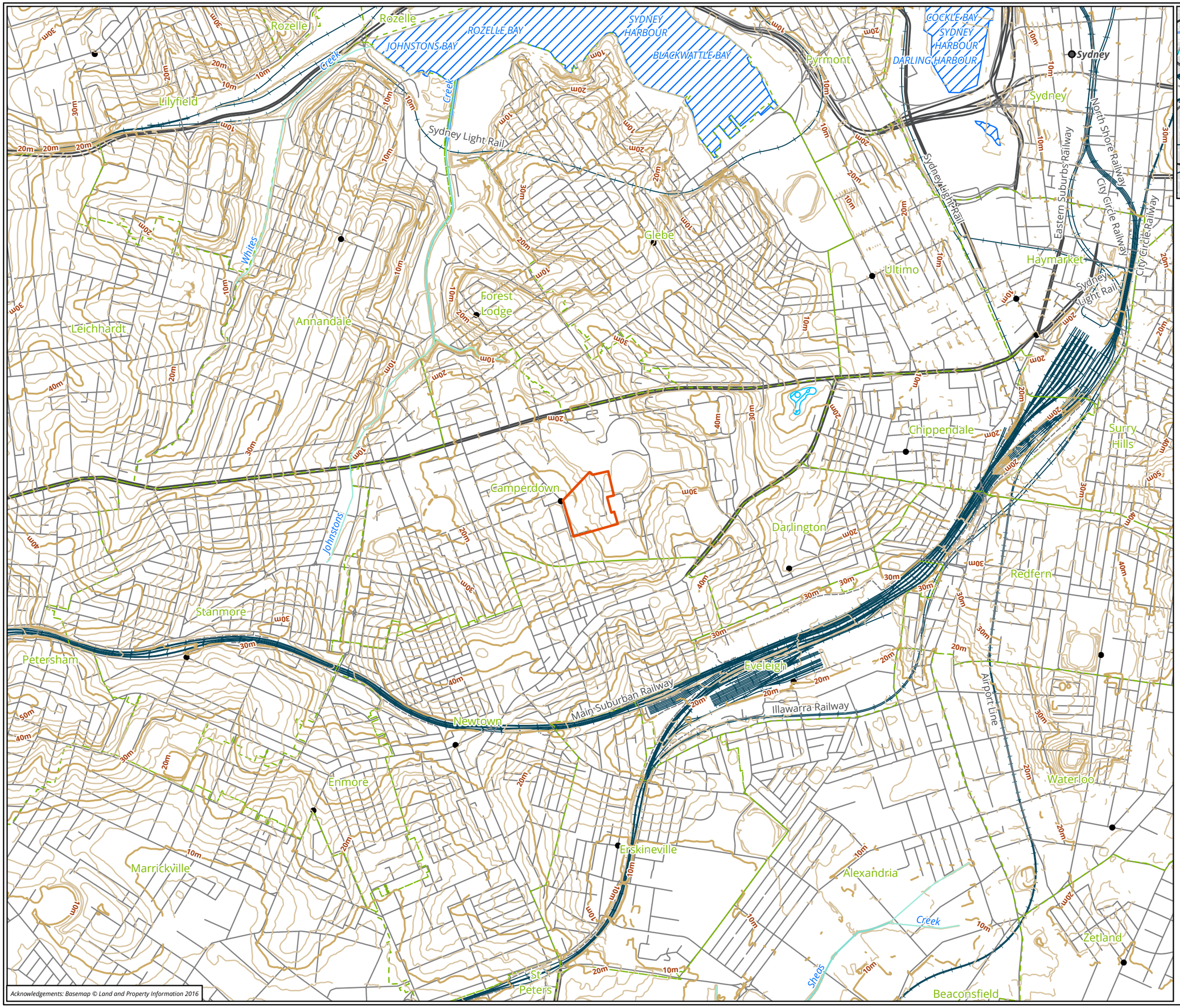
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Acknowledgements: Basemap © NSW Land and Property Information 2016; Geology © State of New South Wales through Regional NSW 2020



Legend

- Study area
- Contour (2m)

Strahler Order

- 1
- 2

Figure 4 Hydrology and topography in the vicinity of the study area

0 110 220 330 440 550

Metres

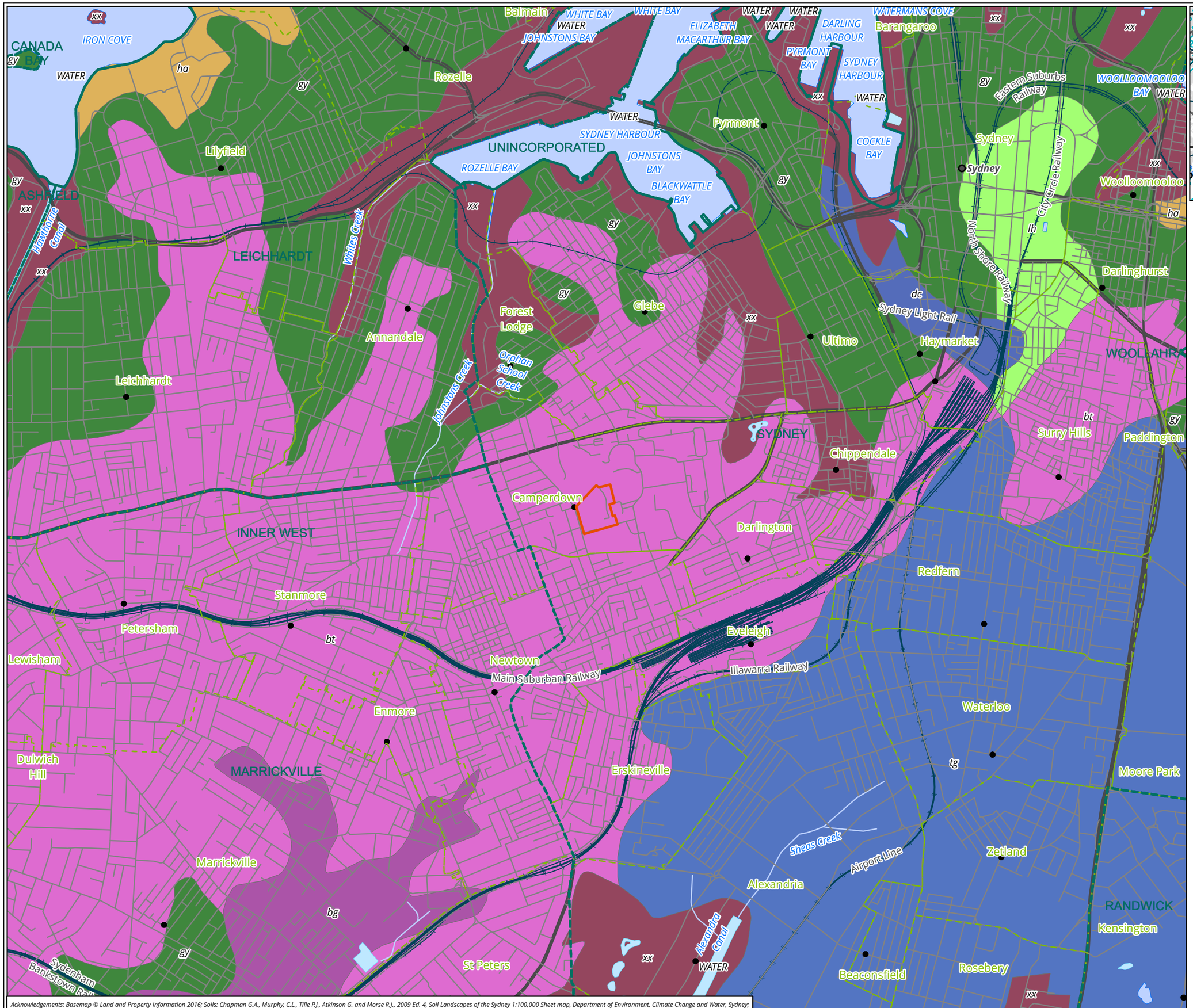
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35565_RPAH_ACHA_ADDA, Layout:35565_ADDA_F4_Hydrology



Legend

- Study area

Soil Landscape units

- bg - BIRRONG
- bt - BLACKTOWN
- dc - DEEP CREEK
- gy - GYMEA
- ha - HAWKESBURY
- lh - LUCAS HEIGHTS
- tg - TUGGERAH
- WATER - WATER
- xx - DISTURBED TERRAIN

Figure 5 Soil landscapes in the vicinity of the study area

0 160 320 480 640 800

Metres

Scale: 1:20,000@ A3

Coordinate System:
GDA 1994 MGA Zone 56

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35565_RPAH_ACHA_ADDA, Layout: 35565_ADDA_F5_Soils

Acknowledgements: Basemap © Land and Property Information 2016; Soils: Chapman G.A., Murphy, C.L., Tille P.J., Atkinson G. and Morse R.J., 2009 Ed. 4, Soil Landscapes of the Sydney 1:100,000 Sheet map, Department of Environment, Climate Change and Water, Sydney;

2.3 Flora and fauna

The Sydney Basin Bioregion includes distinct ecological zones, including open forest and open woodland, with riparian vegetation extending along many of the watercourses. Each ecological zone hosts a different array of floral and faunal species, many of which would have been utilised according to seasonal availability. Aboriginal inhabitants of the region would have had access to a wide range of avian, terrestrial and aquatic fauna and repeated firing of the vegetation would have opened up the foliage allowing ease of access through and between different resource zones.

Within the Cumberland subregion of the Sydney Basin Bioregion a variety of vegetation types are present, with Grey Box *Eucalyptus microcarpa*, Forest Red Gum *Eucalyptus tereticornis*, Narrow-leaved Ironbark *Eucalyptus crebra* woodland, and Spotted Gum *Corymbia maculata* are present on shale hills. Hard-Leaved Scribbly Gum *Eucalyptus sclerophylla*, Rough-Barked Apple *Angophora floribunda*, and Old Man Banksia *Banksia serrata* are identified on alluvial sands and gravels. Broad-Leaved Apple *Angophora subvelutina*, Cabbage Gum *Eucalyptus amplifolia*, Forest Red Gum, and Swamp Oak *Casuarina glauca* are present on river flats. Tall Spike Rush *Eleocharis sphacelata*, and Juncus *Juncus effusus* with Parramatta Red Gum *Eucalyptus parramattensis* noted around lagoons and swamps (NPWS 2003, p.193).

The Blacktown soil landscape typically supports dry sclerophyll forest; predominantly species of eucalypt, including Forest Red Gum, Narrow Leaved Ironbark and Grey Box *Eucalyptus moluccana* (Bannerman & Hazelton 1990, p.29). Broad Leaved Ironbark *Eucalyptus fibrosa* and White Stringy Bark *Eucalyptus globoidea* are also occasionally present.

Plant resources were used in a variety of ways. Fibres were twisted into string, which was used for many purposes, including the weaving of nets, baskets and fishing lines. String was also used for personal adornment. Bark was used in the provision of shelter; a large sheet of bark being propped against a stick to form a gunyah (Attenbrow 2002).

Native fauna that would have been present in the vicinity of the study area include: Australian Wood Duck *Chenonetta jubata*, White-Faced Heron *Egretta novaehollandiae*, Eastern Long-Necked Tortoise *Chelodina longicollis*, Eastern Water Skink *Eulamprus quoyii*, Garden Skink *Lampropholis guichenoti*, Welcome Swallow *Hirundo neoxena*, Western Swamphen *Porphyrio porphyrio*, as well as arboreal fauna including owls *Strigiformes*, Ringtailed Possum *Pseudocheirus peregrinus* and Brushtailed Possums *Trichosrus vulpecula*, and gliders *Petauridae*.

As well as being important food sources, animal products were also used for tool making and fashioning a myriad of utilitarian and ceremonial items. For example, tail sinews are known to have been used to make fastening cord, while 'bone points', which would have functioned as awls or piercers, are often an abundant part of the archaeological record. Animals such as Brush-tailed Possums were highly prized for their fur, with possum skin cloaks worn fastened over one shoulder and under the other. Kangaroo teeth were incorporated into decorative items, such as head bands (Attenbrow 2002).

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2.4 Land use history

The RPA Hospital opened in 1883 providing 146 beds. It was named after Queen Victoria's son, Prince Alfred, who was subject to an assassination attempt while in Sydney. His coat of arms is used as the hospital's crest. The RPA Hospital has been integral in a number of key medical achievements within NSW and Australia, such as the first liver transplant; first aortic valve replacement; the first nuclear medicine department; the first use of triage nurses; the first Perinatal Medicine Unit and first foetal heart monitor; and the first open heart surgery in NSW (NSW Government 2013, NSW Government 2018). The following section provides an analysis of historical aerials to demonstrate development within the study area from the late 19th century to the early 21st century.

Photographs of the hospital dated to c.1900 show the original hospital building, nurses' quarters and surrounds (Photo 3 and Photo 4).



Photo 3 Photograph of the RPA Hospital along Missenden Road dated to 1900 (Source: State Library of South Australia, PRG 5/37/224)



Photo 4 Photograph of the Nurse's quarters at RPA Hospital dated to 1900 (Source: National Library of Australia, PIC/11189 LOC Cold Store PIC NEG)

An aerial photograph dated to 1943 shows that the majority of the study area had undergone disturbance, due to the construction of hospital buildings and landscaping (Photo 5). Limited areas of undeveloped land remain within the study area. Grassed areas and trees are visible within the eastern portion and the south, providing potentially undisturbed areas. An aerial photograph dated to 1971 shows limited further change (Photo 6).



Photo 5 **An aerial photograph dated to 1943, with the study area outlined in red (Source: NSW Spatial Services)**



Photo 6 An aerial photograph dated to 1971, with the study area outlined in red (Source: NSW Spatial Services)

An aerial photograph dated to 1982 shows alterations have occurred within the central portion of the study area with the construction of a large multistorey building (Photo 7). Limited changes are visible in the surrounding areas. It should be noted that the alignment of this aerial is further south of the study area.

Within the 1994 aerial, the demolition of structures to the north and south of the multistorey building within the centre of the study area can be seen (Photo 8). Demolition and construction of these structures would have caused significant disturbances within these areas.



Photo 7 **An aerial photograph dated to 1982, with the study area outlined in red (Source: NSW Spatial Services)**



Photo 8 An aerial photograph dated to 1994, with the study area outlined in red (Source: NSW Spatial Services)

An aerial photograph dated to 2005 show a number of further developments have occurred (Photo 9). New structures has been constructed in the central north and east of the study area. Earth movements are also visible within the south. Structures have also been removed in the northernmost portion and a garden area replaces it.



Photo 9 **An aerial photograph dated to 2005, with the study area outlined in red (Source: NSW Spatial Services)**

3 Aboriginal context

3.1 Ethnohistory and contact history

Our knowledge of Aboriginal people and their land-use patterns and lifestyles prior to European contact is mainly reliant on documents written by non-Aboriginal people. These documents are affected by the inherent bias of the class and cultures of their authors, who were also often describing a culture that they did not fully understand - a culture that was in a heightened state of disruption given the arrival of European people. Early written records can however be used in conjunction with archaeological information and surviving oral histories from members of the Aboriginal community in order to gain a picture of Aboriginal life in the region.

Despite a proliferation of Aboriginal heritage sites there is considerable ongoing debate about the nature, territory and range of pre-contact Aboriginal language groups in the greater Sydney region. These debates have arisen largely because, by the time colonial diarists, missionaries and proto-anthropologists began making detailed records of Aboriginal people in the late 19th century; pre-European Aboriginal groups had been broken up and reconfigured by European activity. The following information relating to Aboriginal people is based on such early records.

Prior to the arrival of British colonists in 1788, the area was occupied by the Wangal, a clan of the Dharug people. The exact boundaries of the Wangal clan's estate (the area over which a local descent group exercises primary spiritual and occupation rights) are unclear. Steele (2002, p.19) suggests that the eastern boundary into lands belonging to the neighbouring Burramatta clan may have been somewhere in the Homebush Bay area. Turbet (2001, p.21) suggests that the lands inhabited by the Wangal extend along the southern foreshores of the Parramatta River from Petersham to Rosehill. The Cadigal clan occupied the area to the immediate east along Port Jackson.

At the time of European arrival, the Aboriginal peoples of Sydney functioned within a complex system of relationships, customs, rituals, beliefs and mutual obligations. It is estimated there were at least two dozen clans in the Sydney region, likely containing 25-60 people each, deriving membership and ownership of clan territory (estates) predominantly from their fathers. Clans were named after their lands, highlighting the importance of connection to country. Different clans were also distinguished by hair styles, body decoration, weapons and tools and also the techniques used to create those items. The coastal Aboriginal people of Sydney held strong relationships with other coastal groups north and south of Sydney, with less involvement with the inland Aboriginal peoples of the greater Sydney area (Irish 2017, pp.17–19, Karskens 2009, p.42, Attenbrow 2010, p.28); this area has been termed the Affiliated Coastal Zone by Irish (2017), and which spans from Port Stephens in the north to Shoalhaven in the south, and extending into the Southern Highlands. Clan members intermarried (for example, Barangaroo, a Cammeraygal woman, and Woollarawarre Bennelong, a Wangal man), with the children of these marriages having connections, rights and responsibilities to their parent's clan estates, and potentially even those of their grandparents and other ancestors. However, individuals also held access rights beyond their familial relationships (Irish 2017, pp.17–19, 24–25, Attenbrow 2010, p.22). It is estimated that the Aboriginal population around Sydney was between 1,500 and 3,000 people, with the Cammeraygal people numbering as many as 50 or 60 (Attenbrow 2002, pp.17–23, 29).

The Wangal lived primarily on fish and shellfish, supplementing their diet when necessary with vegetables, marsupials, birds and insects. The negative effects of European settlement in the 1780s and 1790s were quickly felt by local groups. Limited food supplies led to competition between settlers and local Aboriginal groups for what resources existed, and the difficulties caused by this were compounded by a smallpox epidemic in 1789 (Beecroft-Cheltenham History Group 1995, pp.13–18).

3.2 Regional context

A number of archaeological assessments have been conducted in the wider Sydney region. This section summarises relevant assessments to provide an archaeological overview of the study area and the Sydney region.

Attenbrow (1990) undertook an investigation titled "The Port Jackson Archaeological Project" for the Australian Museum, which includes the study area (Photo 10). The purpose of this report was to improve upon the existing literature about Aboriginal life utilising the archaeological record. Fieldwork focused largely on existing recorded Aboriginal sites, and also supplementary surveys in areas which had the potential to hold further Aboriginal sites. The project investigated the roles played by marine and land animals in the diet of Aboriginal people within the Port Jackson area, as well as their use of stone, bone and shell in implements and weapons. The survey relocated and recorded 112 sites with middens and deposits. Attenbrow (1990) concluded that the distance from the harbour mouth influenced the range and predominance of particular shellfish species in middens. It appears that Aboriginal people were occupying areas of the foreshore and exploiting shellfish for at least 4,500 years, and that over time there was a change in the predominance of particular shellfish species.

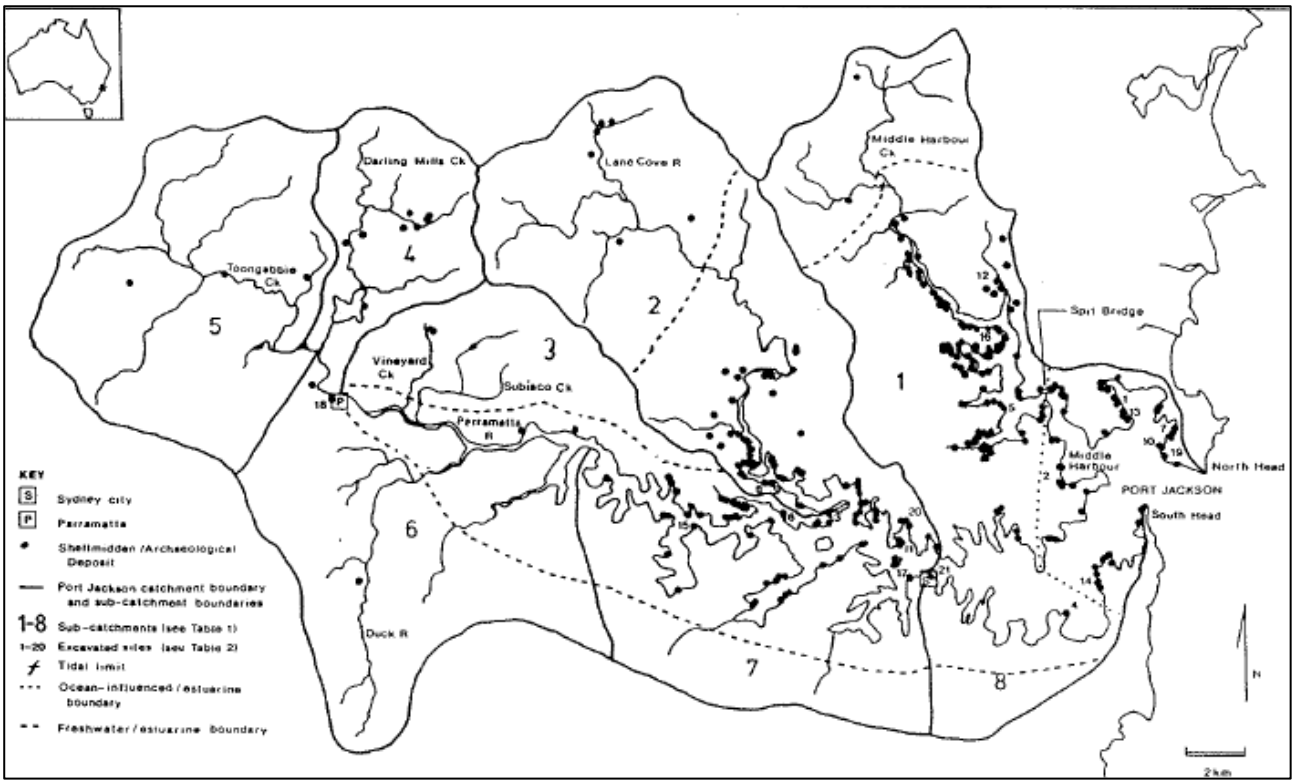


Photo 10 Port Jackson catchment area, subcatchment and aquatic zones, with registered shell midden and archaeological deposit sites as at 28 February 1990 and known excavated sites (Source: Attenbrow 1990)

Attenbrow (1990) reported on three weeks of excavations at two rock shelters with shell middens (AHIMS 45-6-560 and 45-6-1045) located in Neilson Park, Vaucluse, approximately 8.5 kilometres north east of the study area, as part of Stage 2 of the Port Jackson Archaeological Project. At AHIMS site 45-6-560, an area measuring 2 by 1 metres was established within and outside of the rock shelter. Two instances of human bone were identified in two units within the shelter, and following consultation with the La Perouse LALC, the bones were left in-situ, and these areas were backfilled and no further work undertaken. Excavations continued in the units established outside of the shelter; the deposit was excavated to a maximum depth of 70 centimetres,

but this varied due to the presence of sloping bedrock and rock slab. Soils in this location consisted of dark humic-rich soils, and were less stratified than the deposit within the shelter; a hearth was recovered and excavated at a depth of 2-5 centimetres. In addition to Aboriginal objects and cultural material, European artefacts were also recovered, with the shelter having been used during the Great Depression in the 1930s. At AHIMS 45-6-1045, an area measuring 1 by 1 metres, with an overall depth of 80 centimetres, where it reached rock. A hearth was identified, and the soils consisted of a black to very dark brown sandy sediment. The presence of rusted metal pieces throughout the soil profile suggests that the deposit was significantly disturbed; no further excavations took place at AHIMS 45-6-1045.

Conyers (1990) completed an assessment which consisted of background research and a survey carried out to record the 'Aboriginal carvings and areas' in the Lane Cove River State Recreation Area, located approximately 12 kilometres north of the study area (Conyers 1990, p.1). The predictive modelling undertaken for this study identified the coastal margins of the area as the likely location of shell midden deposits, occurring in both open contexts and rock shelters. Areas where the underlying geology consists of shales were considered the locations where campsites, PADs, quarries and scarred trees would occur, with it being noted that due to extensive vegetation clearance scarred trees are unlikely to be identified. Areas overlying the Hawkesbury Sandstone were the likely locations of rock shelters, art sites, rock engravings, and grinding grooves (Conyers 1990, pp.30–34). The survey relocated three previously recorded sites, identified seven new sites, and noted five potential habitation sites. The three relocated sites were all rock engravings. Two newly recorded sites were rock engravings, and five were middens. The five potential habitation sites were all rock shelters with PADs. It was recommended that all sites be managed appropriately, and in some cases be subject to further investigation.

Aboriginal Heritage Office (AHO) (2011) undertook a broad assessment of Aboriginal cultural heritage for the City of Ryde Council. The area included the foreshores of the Parramatta River, approximately 10 kilometres north-west of the current study area. The report contains a detailed discussion of Aboriginal socio-cultural history for the Ryde area, as well as information on landscape resources and current Aboriginal perspectives on cultural heritage. In regards to the Parramatta River foreshore area, AHO determined that middens were the most common site type, followed by rock shelters with middens. As AHO's report is a broad survey of a municipal area, its recommendations focus on high level legislative policy and guideline formulation, rather than recommendations for specific Aboriginal heritage sites.

Coffey (2018) undertook a geotechnical survey at Concord Hospital approximately 10 kilometres north west of the study area. A total of 17 core samples were taken over then entire study area. The survey identified that the broader study area sat on geological deposits of Ashfield Shale, Hawksbury Sandstone and Quarternary Alluvium, with a layer of Mittagong Formation between the former layers. The underlying soil profiles were largely disturbed fill, overlaying a clay base at approximately 0.5 to 1.4 metres. The results of this study strongly suggest that the chance of subsurface cultural deposits being located within the assessment area was low.

Biosis (2018) undertook an ADDA and an Aboriginal Cultural Heritage Assessment (ACHA) (2019) for the same area assessed by Coffey as part of the Stage 1 Concord Hospital redevelopment works to support a REF. The investigation comprised a foot survey of the Stage 1 area of the project. The area was assessed as being highly modified by previous construction and hospital use. No Aboriginal cultural heritage objects were located and the area was assessed as having low archaeological potential.

3.3 Local context

A number of archaeological assessments have been conducted within 10 kilometres of the study area.

Attenbrow (1988) provided a summary of the registered Aboriginal sites present within the Hunters Hill municipality, located approximately 7 kilometre north-west of the study area, specifically at the time of reporting. These include shell middens, archaeological deposits, artwork (drawings, stencils, paintings, engravings and outline figures), grinding grooves and human burials. Three grinding groove sites were also discussed, with only one relocated during the survey. At each grinding groove site there are only two grooves, and all are located beside rock pools on rock platforms. Each of the sites were noted for their location on slopes more than 10 metres away from the shoreline, but on a relatively low slope gradient, and also found on both the eastern and western sides of the peninsula (with the study area marking the divide between eastern and western zones). However, the numbers of engravings and grinding grooves within the Hunters Hill area were very low, and Attenbrow (1988) proposed that maintenance or manufacture of ground-edged tools was not an important activity in this location. Equally, the low number of engravings and art make it difficult to determine whether these were part of ceremonial activities taking place in the area. Attenbrow (1988) also suggested that much of the Hunters Hill peninsula was accessed by canoe, considering the presence of most sites adjacent to the shoreline, with only short-term occupation, i.e. stopping for a meal or a maximum of a few days.

Ross and Attenbrow (1990) completed an Aboriginal site survey of Bradley's Head in Mosman, approximately 7 kilometres north east of the study area, in advance of proposed works to redevelop the memorial to HMAS Sydney in this location. The southern part of the peninsula of Bradley's Point has been extensively disturbed since 1839. These disturbances include construction of several fortifications over time, quarrying, construction of wharf facilities, landscaping, roadworks and infrastructure associated with the reserve. While no new sites were identified in the area of proposed works, one of several registered AHIMS sites, a shell midden, was relocated at Bradley's Beach (AHIMS 45-6-2062). One part of the area of proposed works, a flat above the car park, was noted for potential to contain sub-surface evidence of Aboriginal occupation, and it was recommended that sub-surface testing must take place in consultation with the Aboriginal community should disturbances be proposed for this area.

JMCHM (2006) conducted test excavations at the University of Sydney Central Site, Darlington Campus located approximately 146 metres east of the study area. Background research noted a number of swamps and fresh water creeks would have been present in the surrounding area. An AHIMS search did not identify any sites within the study area or University grounds. However, nearby artefact scatter sites and middens were noted. A survey of the site identified low to moderate archaeological potential. A backhoe trench was initially used to removed fill covering a buried A horizon. Nine 1 by 1 metre test pits were then excavated. One tuff flake was identified in the A horizon. Soil profiles displayed evidence of extensive disturbance, with no intact archaeological deposits remaining. This was attributed to significant developments since 1798 associated with pastoral, government, residential and commercial uses followed by University purposes. No further assessment was recommended.

JMCHM (2007) undertook an indigenous archaeological assessment for the University of Sydney ARC Medical Research building, located approximately 50 metres north of the study area. Background research identified that the land likely previously consisted of low ridgelines with sandstone valleys draining to upper parts of Port Jackson. Much of this land has been modified so that watercourses and surrounding swamplands are unrecognisable. These swamplands surrounded the study area and were reclaimed by the government during the 1800s. Extensive clearance of vegetation, construction, landscaping, terracing and planting have occurred. One AHIMS site was recorded to be located within the university land, associated within the Blackwattle Swamplands, which was a stone axe head. A number of artefact scatters and midden sites were also recorded in the vicinity.

A survey of the study area did not identify any sites. Two areas of PAD had previously been predicted within the site based on landforms, however significant disturbance within this area was used to determine low

archaeological potential. This was also based on previous testing within the university lands identifying high disturbance and low potential to contain intact deposits. No further assessment was recommended.

Comber (2009) undertook an ADDA including a survey for the construction of the Sydney Metro Light Rail project, running from Sydney University (Broadway) to Parramatta. The proposed rail line's route ran approximately 7 kilometres south-east of the current study area, and concluded that this area was highly disturbed. Following the survey, Comber recommended that no subsurface excavations were needed.

Comber (2009) conducted an ACHA for the Sydney Metro Network Stage 2 Central to Westmead, which incorporates the northern portion of the study area. The proposed Metro Stage 2 included a 24.1 kilometre underground metro rail line that would be tunnelled approximately 25 metres below the surface. A search of the AHIMS register identified no sites recorded within the study area. Background research was used to determine that sites were likely to be located within close proximity to water sources and within Hawkesbury Sandstone rather than Wianamatta shales. Parramatta Station was the only proposed station to be located nearby a watercourse, the Parramatta River and a tributary of Clay Cliff Creek. Artefacts were determined to have potential to occur in areas of minimal disturbance and grinding grooves if sandstone outcropping occurred.

A survey of the study area did not identify any sites. This was attributed to the highly developed nature of the study area, with minimal ground exposure. Sydney University land was determined to be highly disturbed based on excavations undertaken by JMCHM (2006). Camperdown, which includes the study area, was determined to be highly disturbed by residential construction and associated infrastructure, and the construction of Parramatta Road. It was determined that subsurface archaeological material would be unlikely to exist. Parramatta and Rosehill were determined to contain archaeological potential due to the presence of previously known sites within the area and proximity to water courses. It was recommended that test excavations and salvage should be undertaken prior to development.

Comber (2010) conducted an Aboriginal heritage impact consideration report for the Chris O'Brien Life House, at the RPA Hospital, located to the west of the study area. Research identified that colonial residential and industrial development had occurred on the land prior to becoming part of the RPA Hospital in the 1930s. The general outpatients building and Page Chest Clinic was constructed on the site and later demolished. This extensive land use was determined to have caused significant disturbance likely to have destroyed any evidence of Aboriginal occupation. Consequently, it was determined that a detailed survey and assessment was not required. Consultation with the Metro LALC was recommended prior to development.

Biosis (2012) was engaged to undertake an ACHA for 445-473 Wattle Street, Ultimo, a site for proposed student accommodation, approximately 1.8 kilometres east of the study area. Background research indicated that the Cadigal and possibly Wangal clans were associated with the Ultimo area at the time of European settlement. The presence of Blackwattle Creek nearby would have provided multiple resources for local Aboriginal people, and shell middens and stone artefact sites are located across the City of Sydney area and in the vicinity of the study area. The predictive statements developed for the site noted that areas of PAD were likely to be present within the study area, with potential cultural material including stone artefacts, midden deposits, burials and post-contact sites. A full coverage survey was not possible due to the presence of built items and the ground surface being obscured by concrete and asphalt surfaces. As such a discussion of the proposed development and general landform attributes took place with the developer and registered Aboriginal party representatives. The site was assessed as holding archaeological potential in the natural alluvial soils beneath historical fill layers and was registered as AHIMS 45-6-3064. Avoidance of the alluvial soils was recommended, as were test excavations prior to any construction impacts taking place.

Biosis (2012) undertook an Aboriginal archaeological assessment for The Quay Project at the corner of Quay Street and Ultimo Road, Haymarket, located approximately 1.6 kilometres north-east of the current study area. An ADDA had been previously undertaken by Biosis in 2011 of the site, which assessed that, while the

site location would have been of considerable value to Aboriginal people due to nearby resources and topographical suitability for camping, impacts to the natural soils through European development since the 18th century would have removed evidence of Aboriginal occupation from the soil. However, remnant natural topsoils were encountered during historical archaeological excavations, which prompted further investigation of any potential cultural deposits through a program of test excavations, focusing on areas of potentially intact topsoils. The test excavations confirmed the findings of the ADDA, and found that the remnant soil deposits were very shallow and contained only European artefacts, with no Aboriginal objects identified. It should be noted though that a stone artefact (AHIMS 45-6-2987) was recovered from the fill deposit of a post hole near Test Pit 5. As this artefact was recovered from a disturbed context, the significance of the artefact was considered to be low, and did not alter the assessment of the significance of the site as low.

Dominic Steele Consulting Archaeology (2015) undertook test excavations at AHIMS 45-6-1925 as part of mitigation measures for impacts to Aboriginal heritage for the construction of a new section of boardwalk in Glades Bay Park, Gladesville, approximately 8 kilometres north-west of the current study area. These test excavations were carried out under an Aboriginal Heritage Impact Permit. Three test pits measuring 50 by 50 centimetres were excavated, and no Aboriginal objects or archaeological deposits were identified. The soil profile presented redeveloped alluvial and colluvial soil that were waterlogged and affected by tide movements, overlying sandstone bedrock. Shell material was present on a partly grassed flat sandstone platform approximately 0.5 metres east of the boardwalk, and it was suggested that it was also likely that archaeological deposits may be present in this area due to its location above the high water mark and higher likelihood of survival. This assessment indicated that AHIMS 45-6-1925 was restricted to the surface of the rock platform with a low likelihood that archaeological shell midden material would occur in sub-surface deposits in the immediate vicinity.

Biosis (2019) completed an ACHA at St Joseph's College Hunters Hill, approximately 7.7 kilometres north of the study area. The assessment included background research, Aboriginal community consultation, field investigation, and test excavations. The field investigation identified low potential due to the high levels of previous disturbance, and a lack of landscape features which would indicate Aboriginal people utilised the area for occupational purposes. Archaeological test excavations were undertaken within the north-western and the north-eastern portions of the site within areas of low potential to confirm whether any subsurface archaeological deposits were present. No subsurface archaeological deposits were identified within the study area. The study area was assessed to contain low archaeological potential. No further archaeological investigations were recommended.

3.3.1 Identified Aboriginal archaeological sites

An extensive search of the AHIMS database was conducted on 11 August 2021 (Client service ID: 612989). The search identified 74 Aboriginal archaeological sites within a 3 by 3 kilometre search area, centred on the study area (Table 2). None of these registered sites are located *within* the study area (Figure 6). The mapping coordinates recorded for these sites were checked for consistency with their descriptions and location on maps from Aboriginal heritage reports where available. These descriptions and maps were relied where notable discrepancies occurred.

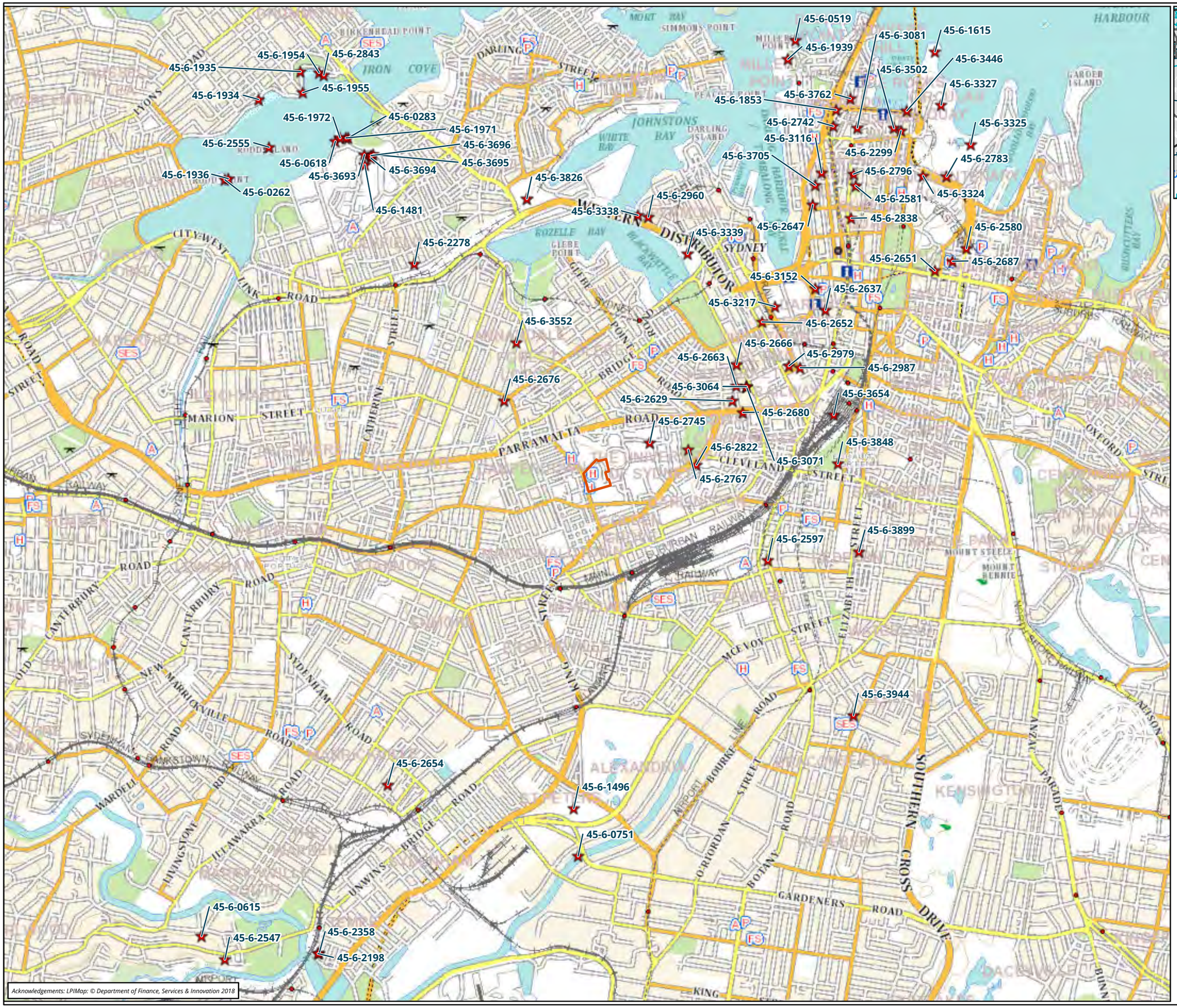
It should be noted that the AHIMS database reflects Aboriginal sites that have been officially recorded and included on the list. Large areas of NSW have not been subject to systematic, archaeological survey; hence AHIMS listings may reflect previous survey patterns and should not be considered a complete list of Aboriginal sites within a given area. Some recorded sites consist of more than one element, for example artefacts and a modified tree, however for the purposes of this breakdown and the predictive modelling, all individual site types will be studied and compared. This explains why there are 107 results presented here, compared to the 74 sites identified by the AHIMS database.

Table 2 AHIMS sites within the study area

Site type	Occurrences	Frequency (%)
Artefact	37	34.58
PAD	32	29.90
Shell	23	21.50
Art (Pigment or Engraved)	4	3.74
Aboriginal resource and gathering	3	2.80
Burial	2	1.88
Aboriginal ceremony and dreaming	2	1.88
Non-human bone and organic material	1	0.93
Modified tree	1	0.93
Waterhole	1	0.93
Grinding groove	1	0.93
Total	**107**	**100**

A simple analysis of the AHIMS sites registered within a 3 by 3 kilometre search of the study area indicates that the dominant site type is artefact, representing 34.58% (n=37), followed by PAD with 29.90% (n=32) and shell with 21.50% (n=23). Art represented 3.74% (n=4), Aboriginal resource and gathering represented 2.80% (n=3), and burial and Aboriginal ceremony and dreaming both represented 1.88% (n=2 each). Non-human bone and organic material, modified tree, water hole and grinding groove had the lowest site type frequency representing 0.93% (n=1).

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Figure 6 AHIMS within the vicinity of the study area

Matter: 35565, Date: 25 August 2021,
Drawn by: AM, Checked by: AV, Last edited by: amackegard
Location: P:\35500s\35565\Mapping\
35565_RPAH_ACHA_ADDA, Layout: 35565_ADDA_F6_AHIMS

3.4 Summary

Background research confirms that the study area is underlain by the Ashfield Shale with a gradual westward sloping topography. Although there are currently limited natural water sources remaining in the vicinity of the study area, Blackwattle Creek previously made up the surrounding area prior to being reclaimed in the 1800s. This swampland would have provided significant plant and animal resources for Aboriginal people occupying the land.

The Blacktown soil landscape is found across the entire study area. The Blacktown soil landscape is a residual and moderately deep landscape, and there is potential for intact archaeological deposits to remain within areas of minimal disturbance. Basic historical background research identified that the land had been cleared and developed as a hospital by the late 1800s. Historical aerial imagery shows that this has continued to be the primary use of the land and continues to be today. The continued redevelopment of study area has likely disturbed archaeological deposits. The majority of the study area is covered by development, including hospital buildings, footpaths, roads, and landscaped gardens.

A review of the AHIMS register identified no sites either in the study area or within a 200 metre vicinity. Despite this, artefact and PAD sites were noted to be the most common site types within the surrounding area. Previous assessments within close proximity to the study area, including the study area itself, have identified low archaeological potential due to extensive disturbance caused by development (JMCHM 2006, JMCHM 2007, Comber Consultants Pty Ltd 2010, Comber 2009, Biosis Pty Ltd 2012).

The combined presence of the Blacktown soil landscape and the former Blackwattle Creek could indicate subsurface archaeological potential. However, it is likely that the study area has been too disturbed by previous development to contain intact archaeological deposits.

3.4.1 Predictive statements

A series of statements been formulated to broadly predict the type and character of Aboriginal cultural heritage sites likely to exist throughout the study area and where they are more likely to be located.

These statements are based on:

- Local and regional site distribution in relation to landform features identified within the study area.
- Consideration of site type, raw material types and site densities likely to be present within the study area.
- Findings of the ethnohistorical research on the potential for material traces to present within the study area.
- Potential Aboriginal use of natural resources present or once present within the study area.
- Consideration of the temporal and spatial relationships of sites within the study area and surrounding region.

Based on this information, the following statements have been developed, indicating the site types most likely to be encountered during the field investigation and subsequent sub-surface investigations across the present study area (Table 3). The definition of each site type is described firstly, followed by the predicted likelihood of this site type occurring within the study area.

Table 3 Aboriginal site prediction statements

Site type	Site description	Potential
Flaked stone artefact scatters and isolated artefacts	Artefact scatter sites can range from high-density concentrations of flaked stone and ground stone artefacts to sparse, low-density 'background' scatters and isolated finds.	Moderate: Stone artefact sites have been previously recorded in the region on level, well-drained topographies in close proximity to reliable sources of fresh water. Due to the distance from permanent fresh water resources, the potential for artefacts to be present within the study area is assessed as moderate.
PADs	Potential sub surface deposits of cultural material.	Moderate: PADs have been previously recorded in the region across a wide range of landforms. PADs are likely to be present within areas adjacent to water courses or on high points in undisturbed landforms.
Shell middens	Deposits of shells accumulated over either singular large resource gathering events or over longer periods of time.	Low: Shell midden sites have not been recorded within the vicinity of the study area, however nearby permanent water sources that support shellfish communities. There is a low potential for shell middens to be located in the study area as no permanent water sources are present.
Quarries	Raw stone material procurement sites.	Low: There is no record of any quarries being within or surrounding the study area.
Modified trees	Trees with cultural modifications	Low: Due to extensive vegetation clearance no remnant trees remain within the study area.
Grinding grooves	Grooves created in stone platforms through ground stone tool manufacture.	Low: Suitable horizontal sandstone rock outcrops and drainage lines are not present within the study area.
Burials	Aboriginal burial sites.	Low: Aboriginal burial sites are generally situated within deep, soft sediments, caves or hollow trees. Areas of deep sandy deposits will have the potential for Aboriginal burials. The soil profiles associated with the study area are not commonly associated with burials.
Aboriginal Ceremony and Dreaming sites	Such sites are often intangible places and features and are identified through oral histories, ethnohistoric data, or Aboriginal informants.	Low: There are currently no recorded mythological stories for the study area.

Site type	Site description	Potential
Post-contact sites	These are sites relating to the shared history of Aboriginal and non-Aboriginal people of an area and may include places such as missions, massacre sites, post-contact camp sites and buildings associated with post-contact Aboriginal use.	Low: There are no post-contact sites previously recorded in the study area and historical sources do not identify any.
Aboriginal places	Aboriginal places may not contain any 'archaeological' indicators of a site, but are nonetheless important to Aboriginal people. They may be places of cultural, spiritual or historic significance. Often they are places tied to community history and may include natural features (such as swimming and fishing holes), places where Aboriginal political events commenced or particular buildings.	Low: There are currently no recorded Aboriginal historical associations for the study area.
Non human bone and organic material	Objects which can be found within cultural deposits as components of an Aboriginal site such as fish or mammal bones, ochres, cached objects which may otherwise have broken down such as resin, twine, dilly bags, nets etc.	Low: Non human bone and organic material have previously been recorded in the vicinity of the study area. They have low potential to occur due to the significant disturbance present within the study area.
Rock shelters with art and / or deposit	Rock shelter sites include rock overhangs, shelters or caves, and generally occur on, or next to, moderate to steeply sloping ground characterised by cliff lines and escarpments. These naturally formed features may contain rock art, stone artefacts or midden deposits and may also be associated with grinding grooves.	Nil: The sites will only occur where suitable sandstone exposures or overhangs possessing sufficient sheltered space exist, which are not present within the study area.
Waterhole	A source of fresh water for Aboriginal groups which may have traditional ceremonial or dreaming significance and/or may also be used to the present day as a rich resource gathering area (e.g. waterbirds, eels, clays, reeds etc)	Nil: Waterholes have been recorded in the vicinity of the study area. As no watercourse is present within the study area, no waterholes will be present.

4 Archaeological field investigation

An archaeological field investigation of the study area was undertaken on 20 September 2021 by Anthea Vella (Biosis, Project Archaeologist); Rowena Welsh-Jarrett (MLALC, Cultural Sites Officer); and Kristina Zarkos, George Long, and Karinya Bellear (SLHD). The field investigation sampling strategy, methodology and a discussion of results are provided below.

4.1 Archaeological field investigation aims

The principle aims of the field investigation were to:

- Undertake a systematic field investigation of the study area targeting areas with the potential for Aboriginal heritage.
- Identify and record Aboriginal archaeological sites visible on the ground surface.
- Identify and record areas of Aboriginal archaeological and cultural sensitivity.

4.2 Field investigation methods

The field investigation was conducted on foot. Recording during the field investigation followed the archaeological field investigation requirements of the Code and industry best practice methodology. Information that recorded during the survey included:

- Aboriginal objects or sites present in the study area during the survey.
- Survey coverage.
- Any resources that may have potentially have been exploited by Aboriginal people.
- Landform elements, distinguishable areas of land approximately 40m across or with a 20m radius (CSIRO 2009).
- Photographs of the site indicating landform.
- Ground surface visibility (GSV) and areas of exposure.
- Observable past or present disturbances to the landscape from human or animal activities.
- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.

Where possible, the identification of natural soil deposits within the study area was undertaken. Photographs and recording techniques were incorporated into the field investigation including representative photographs of survey units, landform, vegetation coverage, GSV and the recording of soil information for each survey unit where possible. Any potential Aboriginal objects observed during the field investigation were documented and photographed. The location of Aboriginal cultural heritage and points marking the boundary of the landform elements were recorded using a hand-held Global Positioning System and the Map Grid of Australia (94) coordinate system.

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4.3 Constraints to the field investigation

With any archaeological field investigation there are several factors that influence the effectiveness (the likelihood of finding sites) of the field investigation. The factors that contributed most to the effectiveness of the field investigation within the study area were GSV and disturbances, due to the extensive development throughout the entirety of the study area.

4.4 Visibility

In most archaeological reports and guidelines visibility refers to GSV, and is usually a percentage estimate of the ground surface that is visible and allowing for the detection of (usually stone) artefacts that may be present on the ground surface (DECCW 2010b). GSV across the study area was low (5%) to non-existent (0%), with the majority of the study area previously developed upon, subsequently obscuring the natural ground surface (Photo 11). Few areas of the study area were covered by previously modified grassed areas (Photo 12).



Photo 11 General visibility along Johns Hopkins Drive, photo facing south-west



Photo 12 General visibility within the northern portion, with photo showing the cultural garden, photo facing south-west

4.5 Exposure

Exposure refers to the geomorphic conditions of the local landform being surveyed, and attempts to describe the relationship between those conditions and the likelihood the prevailing conditions provide for the exposure of (buried) archaeological materials. Whilst also usually expressed as a percentage estimate, exposure is different to visibility in that it is in part a summation of geomorphic processes, rather than a simple observation of the ground surface (Burke & Smith 2004, p.79, DECCW 2010b).

Much like visibility, exposure across the study area was low (5%) to non-existent (0%), due to previous development within the study area (see section 4.4). Low areas of exposure were observed within landscaped gardens along the north-eastern portion of the study area (Photo 13). Approximately 5% of the study area was subject to exposure.

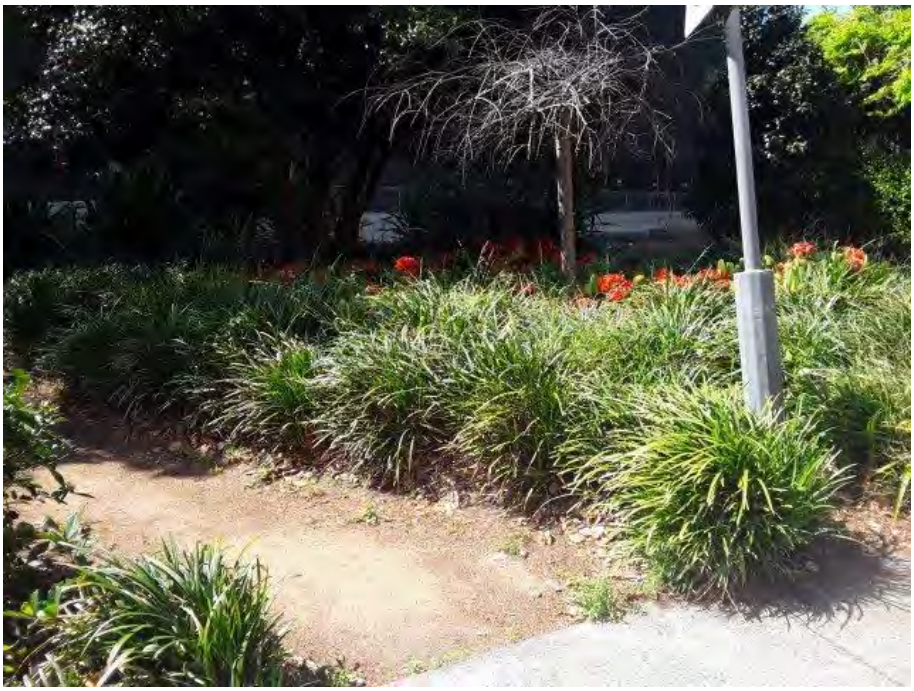


Photo 13 Area of exposure located within landscaped gardens, photo facing north-east

4.6 Disturbances

Disturbances are associated with natural and human agents. Natural agents generally affect small areas and include the burrowing and scratching in soil by animals, such as wombats, foxes, rabbits and wallabies, and sometimes exposure from slumping or scouring. Disturbances associated with recent human action include development such as landscaping and construction of buildings related to the hospital; and initial vegetation clearance.

The study area as a whole has been subject to disturbance by human activity. Historic and recent aerials (Photo 5 to Photo 9and Figure 2) show that the study area has been subject to historical vegetation clearance, ground disturbing works, construction of hospital buildings and associated subsurface infrastructure, roads, footpaths, and landscaping. These disturbances were noted during the archaeological field investigation and are shown in Photo 14 - Photo 17. No areas of natural soils were observed within the study area.



Photo 14 RPA Hospital Women and Babies building, carpark and landscaping, photo facing south-east



Photo 15 RPA Hospital Clinical Services building, photo facing south



Photo 16 Communication cables in the northern portion of the study area



Photo 17 Water hydrant and landscaped gardens in the eastern portion of the study area, photo facing north-east

4.7 Investigation results and discussion

The archaeological investigation consisted of a meandering pedestrian transect across the study area, primarily focused on the proposed area of development. The results of the field investigation have been summarised below and in Figure 7.

Background research indicates that the study area is located in the Ashfield Shale geological unit commonly associated with Aboriginal artefact scatter sites and PADs. The study area is also underlain by the residual Blacktown soil landscape, which is a slowly accumulated deep sediment with the potential to preserve archaeological sites if undisturbed. However, this slow accumulation when combined with extensive land clearing and land use (usually associated with pastoral and civic development) will result in an increased likelihood that soils will have been disturbed. The field investigation demonstrated that the study area has been previously disturbed. Upper soil profiles, where surface scatters and PADs are likely to occur, are unlikely to be intact within the study area.

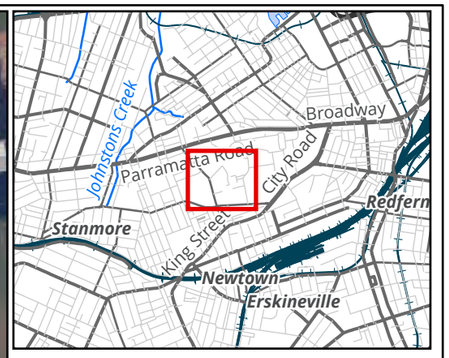
Topographically, the study area is located within a westward sloping topography with Orphan School Creek, approximately 660 metres north-west, which is a first order non perennial water course and tributary of Johnstons Creek, a second order non perennial water course, approximately 927 metres north-west. Both watercourses feed Rozelle Bay, a permanent waterbody of Sydney Harbour located approximately 1.7 kilometres north of the study area. Although there are currently limited natural water sources remaining in the vicinity of the study area, Blackwattle Creek previously made up the surrounding area prior to being reclaimed in the 1800s. These swamplands would have provided significant plant and animal resources for Aboriginal people occupying the land. However, the study area has been disturbed and it is also likely that landforms within the study area have also been modified.

Historical aerial imagery has indicated that the study area has been disturbed from development related to the hospital. These disturbances include historical vegetation clearance, ground disturbing works, construction of hospital buildings and associated subsurface infrastructure, roads, footpaths, and landscaping. Previous assessments within close proximity to the study area, including the study area itself, have identified low archaeological potential due to extensive disturbance caused by development (JMCHM 2006, JMCHM 2007, Comber Consultants Pty Ltd 2010, Comber 2009, Biosis Pty Ltd 2012).

During the field investigation no new Aboriginal sites or objects were identified. The field investigation suggested that the study area as a whole has been subject to disturbance and has low potential to contain intact or substantial archaeological deposits. There are no culturally modified trees located in the study area, therefore no culturally modified trees will be disturbed by the proposed works. As the early works REF are confined to areas of existing disturbance, it is assessed that there is low potential for Aboriginal archaeological sites to occur within these areas (Figure 7).

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Legend

- Study area
- Survey track

Archaeological potential

- Low

Figure 7 Survey results and coverage

0 10 20 30 40 50

Metres

Scale: 1:2,000@ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

Matter: 35565, Date: 26 August 2021,
Drawn by: AM, Checked by: AV, Last edited by: amackegard
Location: P:\35500s\35565\Mapping\
35565_RPAH_ACHA_ADDA, Layout: 35565_ADDA_F7_SurveyResults

5 Conclusions and recommendations

5.1 Conclusions

This assessment has determined that there is low potential for Aboriginal sites to be located within the study area. The field investigation conducted by Biosis did not identify any new Aboriginal sites or areas of potential. As the proposed development is contained to areas of existing disturbance, it is assessed that there is low potential for Aboriginal archaeological sites to occur within the study area. The results of this assessment are also demonstrated in the due diligence flow chart provided by the Code (Figure 8).

5.2 Recommendations

The following management recommendations have been developed relevant to the study area and influenced by:

- Predicted impacts to Aboriginal cultural heritage.
- The planning approvals framework.
- Current best conservation practise, widely considered to include:
  - Ethos of the Australia ICOMOS Burra Charter (2013).
  - The Code.

Prior to any impacts occurring within the study area, the following is recommended:

Recommendation 1: No further archaeological assessment is required

No further archaeological work is required in the study area due to the entire study area assessed as having low archaeological potential.

Recommendation 2: Continued consultation with Metropolitan LALC

Consultation with Metropolitan LALC should be continued by the Project team. Metropolitan LALC have requested that a smoking ceremony is completed prior to ground disturbing works and that a cultural sites officer is present during ground disturbing works for the REF. TSA Management are to consult with Metropolitan LALC to arrange this.

Recommendation 3: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the NPW Act. It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by Heritage NSW. Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object the archaeologist will provide further recommendations. These may include notifying Heritage NSW and Aboriginal stakeholders.

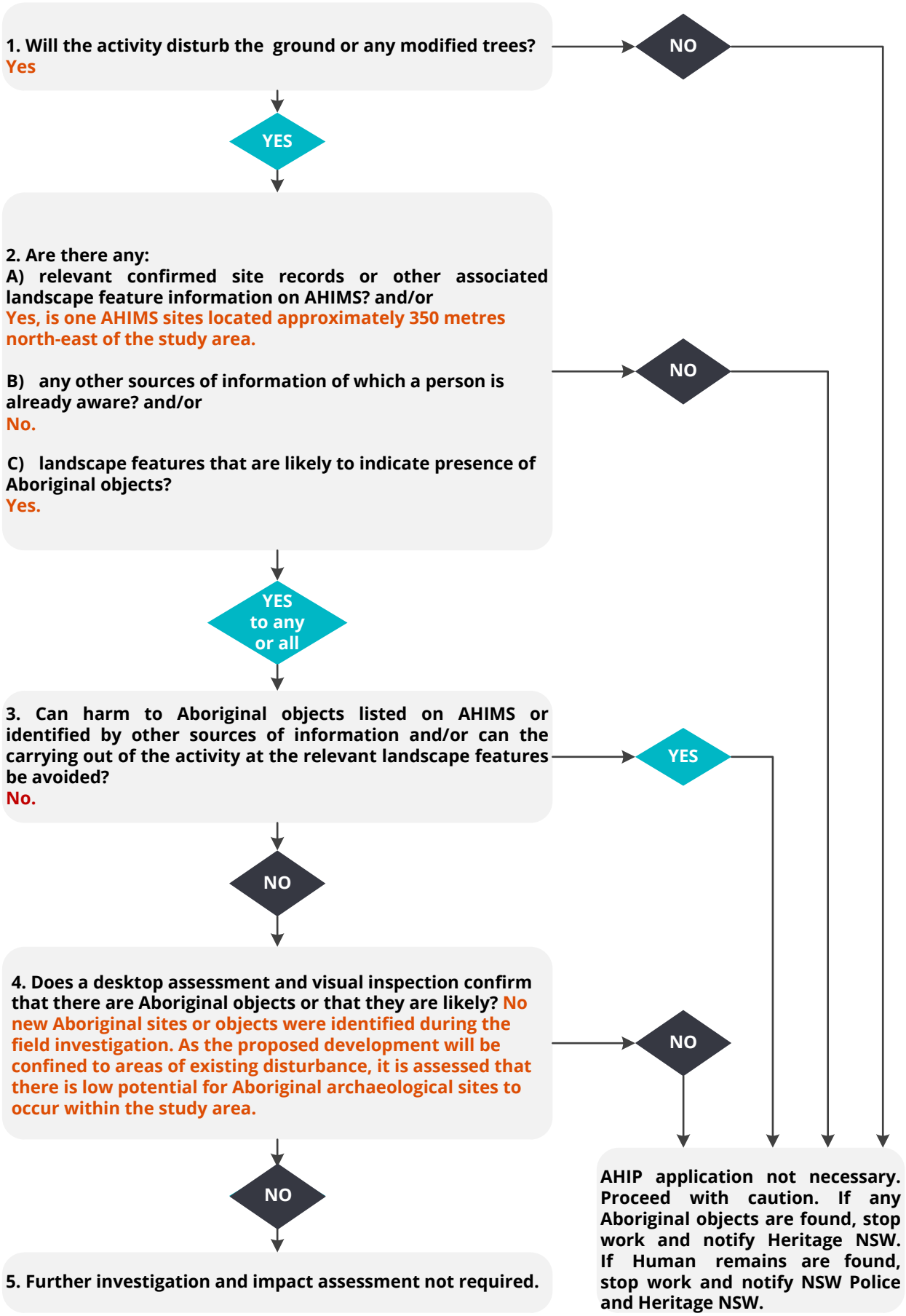
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Recommendation 4: Discovery of skeletal remains

If any suspected human remains are discovered during any activity you must:

1. Immediately cease all work at that location and not further move or disturb the remains.
2. Notify the NSW Police and Heritage NSW' Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
3. Not recommence work at that location unless authorised in writing by Heritage NSW.

Due Diligence Process



References

Aboriginal Heritage Office 2011, *Aboriginal Site Management Report*, City of Ryde.

Artefact Heritage 2014, *'Riverside' Parramatta Development Project 12-14 Phillip Street and 333-339 Church Street Aboriginal Archaeological Assessment*, Report to PCC DevCo1 Pty Ltd.

Attenbrow, V 1988, *Research into the Aboriginal occupation of the Hunter's Hill Municipality*, Report for the Municipality of Hunter's Hill.

Attenbrow, V. 1990, *The Port Jackson archaeological project : report on stage I*, Australian Museum.

Attenbrow, Val 1990, *Port Jackson Archaeological Project - Stage II. Preliminary report on excavations undertaken in august/September 1990 under NPWS permit dated 30/7/1990*.

Attenbrow, V 2002, *Sydney's Aboriginal Past: Investigating the archaeological and historical records*, University of New South Wales Press Ltd, Sydney.

Attenbrow, V 2010, *Sydney's Aboriginal Past. Investigating the Archaeological and Historical Records*, 2nd edn, University of New South Wales Press Ltd, Sydney NSW.

Bannerman, SM & Hazelton, PA 1990, *Soil Landscapes of the Penrith 1:100 000 Sheet*, Soil Conservation Service of NSW, Sydney NSW.

Beecroft-Cheltenham History Group 1995, *Beecroft and Cheltenham: the shaping of a Sydney community to 1914*, The Group, Beecroft.

Biosis 2012, *445-473 Wattle Street, Ultimo: Proposed Student Accommodation Development. Aboriginal Cultural Heritage Assessment Report*, Report prepared for Cultural Resources Management.

Biosis 2018, *Concord Hospital Redevelopment Aboriginal Due Diligence Assessment*, Report prepared for Health Infrstructure.

Biosis 2019, *Concord Hospital Redevelopment: Aboriginal Cultural Heritage Assessment*, Report prepared for Health Infrastructure. Biosis Pty Ltd.

Biosis Pty Ltd 2012, *The Quay Project, Haymarket: Archaeological Report*, Report prepared for Cultural Resources Management.

Biosis Pty Ltd 2019, *St Joseph's College Physical Education and Sports Precinct Project: Aboriginal Cultural Heritage Assessment.*, Report for Bloompark Consulting Services Pty Ltd. Biosis Pty Ltd. Project no. 29211.

Burke, H & Smith, C 2004, *The Archaeologist's Field Handbook*, 1st edn, Allen and Unwin, Sydney, NSW.

Coffey Geotechincs Pty Ltd 2018, *Geotechnical Site Investigation for Lift Well in Phase 1 Development*, Report for Health Infrastructure C/- Johnstaff.

Comber Consultants Pty Ltd 2010, *Aboriginal Cultural Heritage Consideration of Potential Impact. The Chris O'Brien Lifehouse at Royal Price Alfred Hospital, Camperdown*, Report to Conybeare Morrison on behalf of Rice Daubney.

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Comber, J 2009, *Aboriginal Cultural Heritage Assessment, Sydney Metro Network Stage 2 (Central-Westmead)*, Report to SKM/Manadis Roberts on behalf of Sydney Metro.

Conyers, B 1990, *Survey for Aboriginal Archaeological Sites: Lane Cove River State Recreation Area*.

CSIRO 2009, *Australian soil and land survey field handbook*, 3rd edn, CSIRO Publishing & National Committee on Soil and Terrain, Collingwood, Victoria.

DECCW 2010a, *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*, Department of Environment and Climate Change, Sydney NSW.

DECCW 2010b, *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*, Department of Environment and Climate Change, Sydney NSW.

DSCA 2002, *Cultural Heritage Assessment Report Parramatta Park Storage Deport, Marquee Site & Car Park Proposal*, Report to The Parramatta Park Trust.

DSCA 2015, *Aboriginal Archaeological Test Excavation Report. Glades Bay Park, Gladesville, New South Wales*, Report prepared for Ryde City Council. Dominic Steele Consulting Archaeology.

Irish, P 2017, *Hidden in Plain View: The Aboriginal People of Coastal Sydney*, NewSouth Publishing, Sydney.

JMCHM 2000, *Archaeological Survey for Aboriginal Sites: Proposed Light Industrial Subdivision, 'Austral Site', Mamre Road, Erskine Park, NSW*, Report prepared for Gunninah Environmental Consultants for Austral Brick Company. Jo McDonald Cultural Heritage Management Pty Ltd.

JMCHM 2005a, *Archaeological Salvage Excavation of Site CG1 (NPWS #45-5-2648), at the corner of Charles and George Streets, Parramatta, NSW*, Report prepared for Meriton Apartments Pty Ltd. Jo McDonald Cultural Heritage Management Pty Ltd.

JMCHM 2005b, *Archaeological Salvage Excavation of Site RTA-GI, 109-113 George Street, Parramatta, NSW*, Unpublished Report prepared for Landcom. Jo McDonald Cultural Heritage Management Pty Ltd.

JMCHM 2006, *Sydney University Campus 2010: Test Excavations at the Univeristy of Sydney Central Site, Darlington Campus*, Report prepared for Capital Insight Pty Ltd. Jo McDonald Cultural Heritage Management Pty Ltd.

JMCHM 2007, *University of Sydney: ARC Medical Research Building, Indigenous Archaeological Assessment*, Report prepared for Jones Lang LaSalle.

JMCHM 2008, *Austral Land Mamre Road , Erskine Park Archaeological Salvage Excavations*, Report prepared for Macquarie Goodman. Jo McDonald Cultural Heritage Management Pty Ltd.

Karskens, G 2009, *The Colony: A History of Early Sydney*, Allen & Unwin, Crows Nest.

NPWS 2003, *The Bioregions of New South Wales: their biodiversity, conservation and history NSW National Parks and Wildlife Service. NSW National Parks and Wildlife Service, Hurstville.*

NSW Government 2013, *History of RPA*, *Health Sydney Local Health District*, viewed 9 January 2021, <https://www.slhd.nsw.gov.au/rpa/history.html>.

NSW Government 2018, *About RPA*, <https://www.slhd.nsw.gov.au/rpa/about_us.html>.

Ritter, DF, Kochel, RC, & Miller, JR 1995, *Process Geomorphology*, Wm. C. Brown.

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Ross, A & Attenbrow, V 1990, *Aboriginal site survey: Bradley's Head*.

Strahler, A 1952, 'Hypsometric (area-altitude) analysis of erosional topology', *Geological Society of America Bulletin*, vol. 63, no. 11, pp. 1117–1142.

Turbet, P 2001, *The Aboriginies of the Sydney district before 1788*, Kangaroo Press.

Appendices

Appendix 1 AHIMS search results

This Appendix is not to be made public.

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 35565 AV

Client Service ID : 612989

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-6-2597	Wynyard St Midden	GDA	56	333469	6247920	Open site	Not a Site	Shell : -, Artefact : -	Midden	102494,102763,102765
	Contact	**Recorders**	Mr.D Coe					**Permits**		
45-6-2358	K1(same as site 45-6-2198)	AGD	56	329510	6244350	Open site	Deleted	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Doctor.Jillian Comber					**Permits**	1330,1331	
45-6-2278	Lilyfield Cave	GDA	56	330433	6250467	Closed site	Valid	Shell : -, Artefact : -, Potential Archaeological Deposit (PAD) : -	Shelter with Midden	102201
	Contact	**Recorders**	Michael Guider,Extent Heritage Pty Ltd - Pyrmont - Individual users,Mrs.Laressa Ba					**Permits**		
45-6-2299	First Government House	GDA	56	334612	6251612	Open site	Valid	Burial : -, Aboriginal Ceremony and Dreaming : -, Artefact : -	Burial/s,Historic Place	102494,102763,102765
	Contact	**Recorders**	Michael Guider,Watkin Tench,Artefact - Cultural Heritage Management - Pyrmont,M					**Permits**	4552	
45-6-0519	Moores Wharf	AGD	56	333600	6252200	Open site	Valid	Artefact : -	Open Camp Site	808
	Contact	**Recorders**	R Lampert					**Permits**		
45-6-0262	Rodd Point;Rodd Park;	AGD	56	328700	6251000	Open site	Valid	Shell : -, Artefact : -	Midden	2047
	Contact	**Recorders**	Val Attenbrow,Michael Guider					**Permits**		
45-6-2547	Nanny Goat Hill 1;NGH 1;	AGD	56	328700	6244300	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-0283	Rozelle Hospital 1;Rozelle Ho5555;	AGD	56	329760	6251360	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Val Attenbrow					**Permits**		
45-6-0615	Undercliffe Road	AGD	56	328500	6244500	Closed site	Valid	Shell : -, Artefact : -, Art (Pigment or Engraved) : -	Midden,Shelter with Art	99514
	Contact	**Recorders**	Ms.Bronwyn Conyers,D Burns					**Permits**		
45-6-1481	Rozelle Hospital 3	AGD	56	329902	6251129	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Val Attenbrow,Michael Guider					**Permits**		
45-6-2555	Rodd Island	AGD	56	329080	6251280	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-0618	Rozelle Hospital 2, Rozelle Hospital 1	AGD	56	329650	6251330	Open site	Valid	Shell : -, Artefact : -, Art (Pigment or Engraved) : -	Midden,Rock Engraving	
	Contact	**Recorders**	Val Attenbrow,Michael Guider					**Permits**		
45-6-2580	Junction Lane	AGD	56	335070	6250410	Open site	Valid	Artefact : -	Open Camp Site	102494,102763,102765
	Contact	**Recorders**	Helen Brayshaw					**Permits**	894,902,903	

Report generated by AHIMS Web Service on 11/08/2021 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 328551.0 - 335493.0, Northings : 6244311.0 - 6252495.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 74

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 35565 AV

Client Service ID : 612989

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-6-2581	Angel Place	GDA	56	334223	6251138	Open site	Valid	Artefact : -	Open Camp Site	97963,102494, 102763,10276 5
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	918	
45-6-2198	View Street	AGD	56	329500	6244350	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Michael Guider,Michael Guider					**Permits**	1330,1331	
45-6-1934	Half Moon Bay Cave;	AGD	56	328990	6251690	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-1935	Sisters Bay Cave	AGD	56	329350	6251930	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-1936	Rodd Point Cave;	AGD	56	328730	6251010	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-1939	MSB Tower;	GDA	56	333640	6252227	Open site	Destroyed	Art (Pigment or Engraved) : -	Rock Engraving	102763
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-0751	Shea's Creek Dugong	GDA	56	331839	6245378	Open site	Destroyed	Aboriginal Resource and Gathering : -, Non-Human Bone and Organic Material : -, Artefact : -	Open Camp Site	
	Contact	**Recorders**	ASRSYS,AECOM Australia Pty Ltd - Sydney,Mr.Luke Kirkwood					**Permits**		
45-6-1615	Bennelong Point	AGD	56	334800	6252100	Open site	Destroyed	Shell : -, Artefact : -	Midden	102763
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-1496	Shea's Creek	AGD	56	331697	6245597	Open site	Not a Site	Shell : -, Artefact : -	Midden	30,591,940
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-1954	Sisters Bay Cave 2	AGD	56	329510	6251920	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-1955	Sisters Bay 3;	AGD	56	329370	6251750	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Michael Guider					**Permits**	3653,3690	
45-6-1971	Rozelle Hospital 5, Rozelle Hospital 3	AGD	56	329740	6251360	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Val Attenbrow,Michael Guider					**Permits**		
45-6-1972	Rozelle Hospital 4	AGD	56	329690	6251360	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Val Attenbrow,Michael Guider					**Permits**		
45-6-1853	Lilyvale	AGD	56	333950	6251600	Open site	Valid	Shell : -, Artefact : -	Midden	102763

Report generated by AHIMS Web Service on 11/08/2021 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 328551.0 - 335493.0, Northings : 6244311.0 - 6252495.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 74

This information is not guaranteed to be free from error omission. Heritage NSW and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Val Attenbrow,Andrew Ross					**Permits**		
45-6-2629	Broadway 1	AGD	56	333060	6249100	Open site	Valid	Artefact : -		102494,102763,102765
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	1299	
45-6-2637	George street 1	AGD	56	333860	6249880	Open site	Valid	Artefact : -		98238,102494,102763,102765
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	1369	
45-6-2651	William St PAD	AGD	56	334800	6250220	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102494,102763,102765
	Contact	**Recorders**	Mr.Neville Baker					**Permits**	1589,1670	
45-6-2647	KENS Site 1	AGD	56	333750	6250785	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		99857,100494,102494,102763,102765
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	1428,1700	
45-6-2652	Ultimo PAD 1	GDA	56	333419	6249969	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102494,102763,102765
	Contact	**Recorders**	Jim Wheeler,Mr.Matthew Kelleher,Kelleher Nightingale Consulting Pty Ltd (Generic					**Permits**	1598	
45-6-2654	Fraser Park PAD	AGD	56	330100	6245800	Open site	Valid	Potential Archaeological Deposit (PAD) : -		98669,104256,104257
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd					**Permits**	1639	
45-6-2676	Johnstons Creek	AGD	56	331100	6249100	Closed site	Valid	Art (Pigment or Engraved) : 2, Artefact : 5		102142,102763
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-2666	Wattle Street PAD 1	GDA	56	333200	6249602	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102494,102763,102765
	Contact	**Recorders**	Dominic Steele Archaeological Consulting,Mr.Matthew Kelleher,Kelleher Nightinga					**Permits**	1738	
45-6-2663	Mountain Street Ultimo	GDA	56	333199	6249418	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		102494,102763,102765
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists (MDCA),Mr.Matthew Kelleher,Kelleher Nigh					**Permits**	1719	
45-6-2680	Broadway Picture Theatre PAD 1	AGD	56	333150	6249000	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102142,102494,102763,10276 5
	Contact	**Recorders**	Jim Wheeler					**Permits**	1854	

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 35565 AV

Client Service ID : 612989

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-6-2687	Crown Street PAD 1	AGD	56	334950	6250300	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102494,102763,102765
	Contact	**Recorders**	Dominic Steele Archaeological Consulting					**Permits**	2017	
45-6-2742	171-193 Gloucester Street PAD	AGD	56	333926	6251461	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102763
	Contact	**Recorders**	Jim Wheeler					**Permits**	2143,2342,2766	
45-6-2745	University of Sydney Law Building PAD	AGD	56	332350	6248740	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102201,102494,102763,102765
	Contact	**Recorders**	Doctor.Jo McDonald					**Permits**	2153,2320,2443	
45-6-2783	PAD Central Royal Botanic Gardens	AGD	56	334900	6251030	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102494,102763,102765
	Contact T Russell	**Recorders**	Haglund and Associates					**Permits**	2364	
45-6-2767	Tent Embassy	AGD	56	332680	6248680	Open site	Valid	Aboriginal Resource and Gathering : 1		102494,102763,102765
	Contact T Russell	**Recorders**	Bill Lord					**Permits**		
45-6-2796	320-328 George St PAD	AGD	56	334100	6251050	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102494,102763,102765
	Contact T Russell	**Recorders**	Mr.Dominic Steele					**Permits**	2415	
45-6-2822	USYD: Central	AGD	56	332750	6248550	Open site	Valid	Artefact : -		100302,102494,102763,102765
	Contact	**Recorders**	Jo McDonald Cultural Heritage Management see GML					**Permits**	2554	
45-6-2843	Canada Bay Midden	AGD	56	329550	6251900	Closed site	Valid	Shell : -		100436
	Contact T Russell	**Recorders**	Kate Sullivan					**Permits**	3075	
45-6-2838	420 George Street PAD	AGD	56	334080	6250670	Open site	Not a Site	Potential Archaeological Deposit (PAD) : -		102494,102763,102765
	Contact	**Recorders**	Doctor.Tim Owen					**Permits**	2654	
45-6-2960	Jackson Landing Shelter	GDA	56	332442	6250870	Closed site	Valid	Potential Archaeological Deposit (PAD) : -		102494,102763,102765
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists (MDCA),Mr.Paul Irish					**Permits**		
45-6-2979	UTS PAD 1 14-28 Ultimo Rd Syd	GDA	56	333650	6249590	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102494,102763,102765
	Contact	**Recorders**	Dominic Steele Archaeological Consulting,Mr.Dominic Steele					**Permits**	3458	

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 35565 AV

Client Service ID : 612989

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-6-3071	445-473 Wattle Street PAD	GDA	56	333285	6249412	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Biosis Pty Ltd - Sydney					**Permits**		
45-6-3081	200 George Street	GDA	56	334237	6251637	Open site	Not a Site	Potential Archaeological Deposit (PAD) : 1		103114
	Contact	**Recorders**	Ms.Sally MacLennan					**Permits**	3577,3934,4239	
45-6-2987	Poultry Market 1	GDA	56	333746	6249575	Open site	Valid	Artefact : 1		102494,102763
	Contact	**Recorders**	Ms.Samantha Higgs,Biosis Pty Ltd - Canberra					**Permits**	3506	
45-6-3064	445-473 WATTLE ST PAD	GDA	56	333285	6249412	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		102763
	Contact	**Recorders**	Biosis Pty Ltd - Sydney					**Permits**		
45-6-3152	168-190 Day Street, Sydney PAD	GDA	56	333877	6250257	Open site	Not a Site	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Mr.Josh Symons,Mr.Alex Timms					**Permits**	3789	
45-6-3116	Wynyard Walk PAD	GDA	56	333931	6251252	Open site	Destroyed	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	GML Heritage Pty Ltd - Surry Hills,GML Heritage Pty Ltd - Surry Hills					**Permits**	3670	
45-6-3217	Darling Central Midden	GDA	56	333530	6250101	Open site	Valid	Aboriginal Ceremony and Dreaming : 1, Artefact : 1, Shell : 1		
	Contact	**Recorders**	Comber Consultants Pty Limited,Ms.Tory Stening					**Permits**		
45-6-3324	RBG PAD 1	GDA	56	334802	6251224	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	AMAC Group P/L,Mr.Benjamin Streat					**Permits**		
45-6-3325	RBG PAD 2	GDA	56	335212	6251494	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	AMAC Group P/L,Mr.Benjamin Streat					**Permits**		
45-6-3327	RBG PAD 3	GDA	56	334957	6251832	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	AMAC Group P/L,Mr.Benjamin Streat					**Permits**		
45-6-3338	The Bays Precinct PAD02	GDA	56	332354	6250885	Open site	Valid	Potential Archaeological Deposit (PAD) : -		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 35565 AV

Client Service ID : 612989

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
	Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Mr.Michael Lever					Permits		
45-6-3339	The Bays Precinct PAD01	GDA	56	332779	6250555	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Artefact - Cultural Heritage Ma					Permits		
45-6-3502	Loftus PAD 01	GDA	56	334551	6251635	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Artefact - Cultural Heritage Ma					Permits	4292	
45-6-3552	Smith Hogan and Spindlers Park Midden	GDA	56	331309	6249791	Open site	Not a Site	Shell : -, Burial : -		104371
	Contact	Recorders	Mr.Mark Simon					Permits		
45-6-3654	CRS AS 01 (Central Railway Station Artefact scatter 01)	GDA	56	334035	6249170	Open site	Partially Destroyed	Artefact : -		104403
	Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Artefact - Cultural Heritage Ma					Permits	4639	
45-6-3446	71 Macquarie Street PAD	GDA	56	334663	6251783	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	GML Heritage Pty Ltd - Surry Hills,Ms.Jodi Cameron					Permits	4285	
45-6-3705	Kent and Erskine St PAD	GDA	56	333876	6251145	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	GML Heritage Pty Ltd - Surry Hills,Ms.Jodi Cameron					Permits		
45-6-3693	Callan Park Scared Tree	GDA	56	330004	6251406	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	Recorders	GML Heritage Pty Ltd - Surry Hills,Doctor.Tim Owen					Permits		
45-6-3694	Callan Park Waterhole	GDA	56	330060	6251377	Open site	Valid	Water Hole : -		
	Contact	Recorders	GML Heritage Pty Ltd - Surry Hills,Doctor.Tim Owen					Permits		
45-6-3695	Callan Park Grinding Groove (possible)	GDA	56	330080	6251407	Open site	Valid	Grinding Groove : -		
	Contact	Recorders	GML Heritage Pty Ltd - Surry Hills,Doctor.Tim Owen					Permits		
45-6-3696	Callan Park Cultural Tree	GDA	56	330061	6251398	Open site	Valid	Aboriginal Resource and Gathering : -		
	Contact	Recorders	GML Heritage Pty Ltd - Surry Hills,Doctor.Tim Owen					Permits		
45-6-3762	Harrington IFS01	GDA	56	334178	6251888	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	AMAC Group P/L,Mr.Benjamin Streat					Permits		
45-6-3848	244 Cleveland Street	GDA	56	334070	6248750	Open site	Valid	Artefact : -		
	Contact	Recorders	Comber Consultants Pty Limited,Ms.Veronica Norman					Permits		
45-6-3826	The Bays PAD 01	GDA	56	331399	6251027	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Artefact - Cultural Heritage Management - Pyrmont,Ms.Alyce Haast					Permits		

Report generated by AHIMS Web Service on 11/08/2021 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 328551.0 - 335493.0, Northings : 6244311.0 - 6252495.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 74

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 35565 AV

Client Service ID : 612989

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-6-3944	New Green Square School	GDA	56	334204	6246587	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact Metropolitan Local Aboriginal	**Recorders**	Strata Archaeology,AMAC Group P/L					**Permits**		
45-6-3899	ES-PAD-2018-01	GDA	56	334251	6247993	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Extent Heritage Pty Ltd - Pyrmont - Individual users,Doctor.Tse Siang Lim					**Permits**		

**** Site Status**

Valid - The site has been recorded and accepted onto the system as valid

Destroyed - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.

Partially Destroyed - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground

Not a site - The site has been originally entered and accepted onto AHIMS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified

Report generated by AHIMS Web Service on 11/08/2021 for Samantha Keats for the following area at Datum :GDA, Zone : 56, Eastings : 328551.0 - 335493.0, Northings : 6244311.0 - 6252495.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 74

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Appendix 2 REF #2 Designs

ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT
EARLY WORKS - REF2 PACKAGE

ARCHITECTURAL DRAWING LIST - REF2	
Sheet Number	Sheet Name
REF2-0000	REF2 - COVER SHEET
REF2-3221	REF2 - EXISTING SITE PLAN
REF2-3222	REF2 - SITE PLAN
REF2-3223	REF2 - DEMOLITION PLAN - LEVEL 2
REF2-3224	REF2 - DEMOLITION PLAN - LEVEL 4
REF2-3225	REF2 - PROPOSED PLAN - LEVEL 2
REF2-3226	REF2 - PROPOSED PLAN - LEVEL 4
REF2-3230	REF2 - ELEVATION / SECTIONS

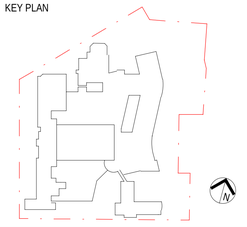


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REV	DATE	AMENDMENT
B	28/04/22	REF#2 UPDATED DRAFT ISSUE FOR COMMENT
A	27/04/22	REF#2 UPDATED DRAFT ISSUE

KEY PLAN



PROJECT MANAGER

TSA

CLIENT

NSW GOVERNMENT Health
Sydney Local Health District

NSW GOVERNMENT Health
Infrastructure

Jacobs

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North Sydney, NSW, 2060
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PROJECT
ROYAL PRINCE ALFRED HOSPITAL
REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - COVER SHEET

DRAFT

STATUS
PRELIMINARY

DRAWN	DESIGNED
BL	RR/MR
CHECKED	APPROVED
RR/MR	CY

SCALE @ B1

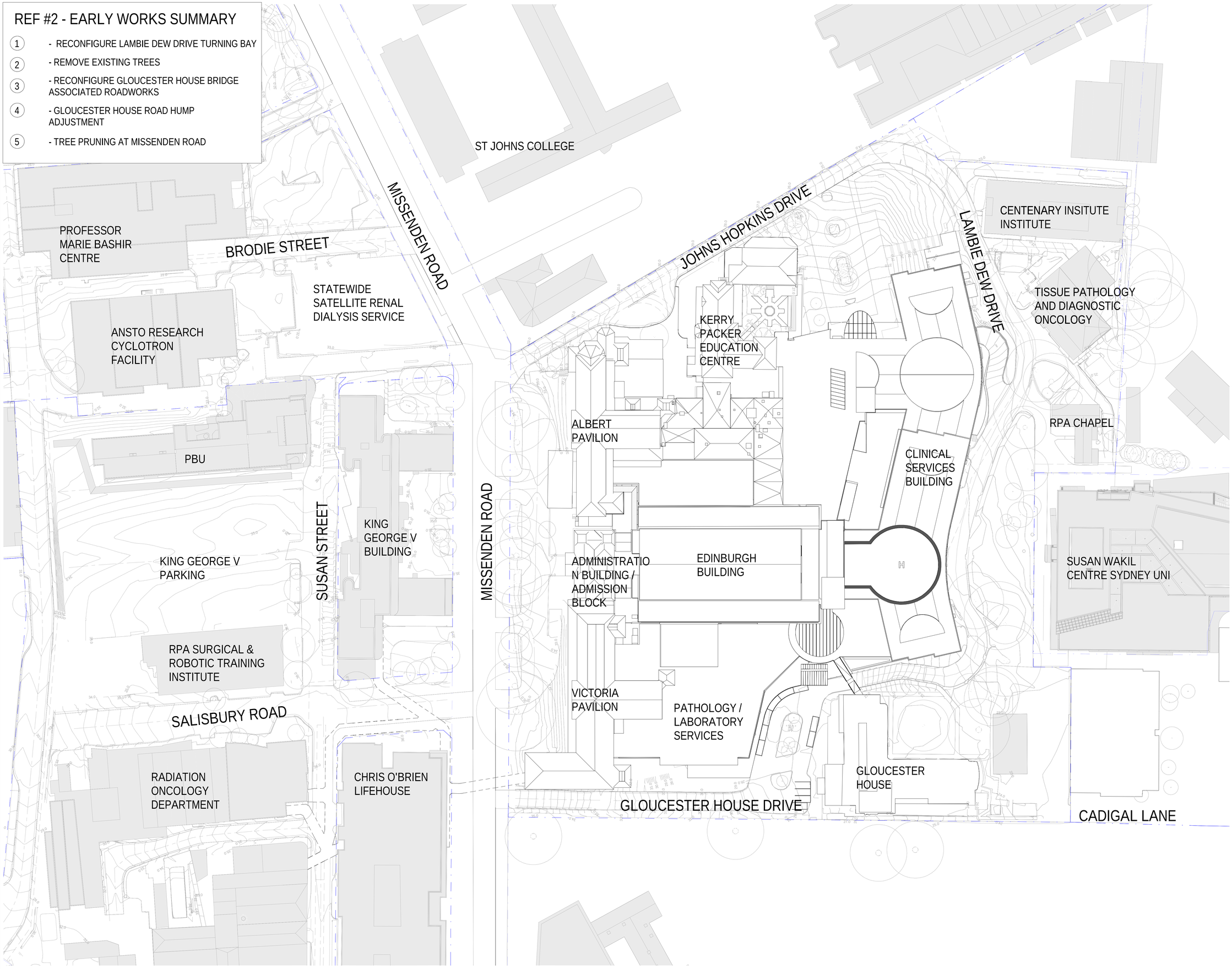
DRAWING NO. RPA-ARC-JAC-DRG-REF2-0000

REVISION B

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28/04/2022 5:05:18 PM

REF #2 - EARLY WORKS SUMMARY

1. - RECONFIGURE LAMBIE DEW DRIVE TURNING BAY
2. - REMOVE EXISTING TREES
3. - RECONFIGURE GLOUCESTER HOUSE BRIDGE ASSOCIATED ROADWORKS
4. - GLOUCESTER HOUSE ROAD HUMP ADJUSTMENT
5. - TREE PRUNING AT MISSENDEN ROAD



NOTES

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LEGEND

- ROAD / SERVICES RE-CONFIGURATION *REFER RELEVANT SERVICES DRAWINGS*
- REFURBISHMENT / RE-CONFIGURATION
- DEMOLITION
- TREES TO BE REMOVED

REV	DATE	AMENDMENT
E	28/04/22	REF#2 UPDATED DRAFT ISSUE FOR COMMENT
D	27/04/22	REF#2 UPDATED DRAFT ISSUE
C	18/03/22	REF#2 DRAFT ISSUE
B	03/03/22	REVISED DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT
A	21/02/22	DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT

KEY PLAN

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NSW GOVERNMENT Health Infrastructure

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PROJECT
ROYAL PRINCE ALFRED HOSPITAL
REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - EXISTING SITE PLAN

DRAFT

STATUS
PRELIMINARY

DRAWN	DESIGNED
RR	RR/MR
CHECKED	APPROVED
VH	CY

SCALE @ B1
1 : 500

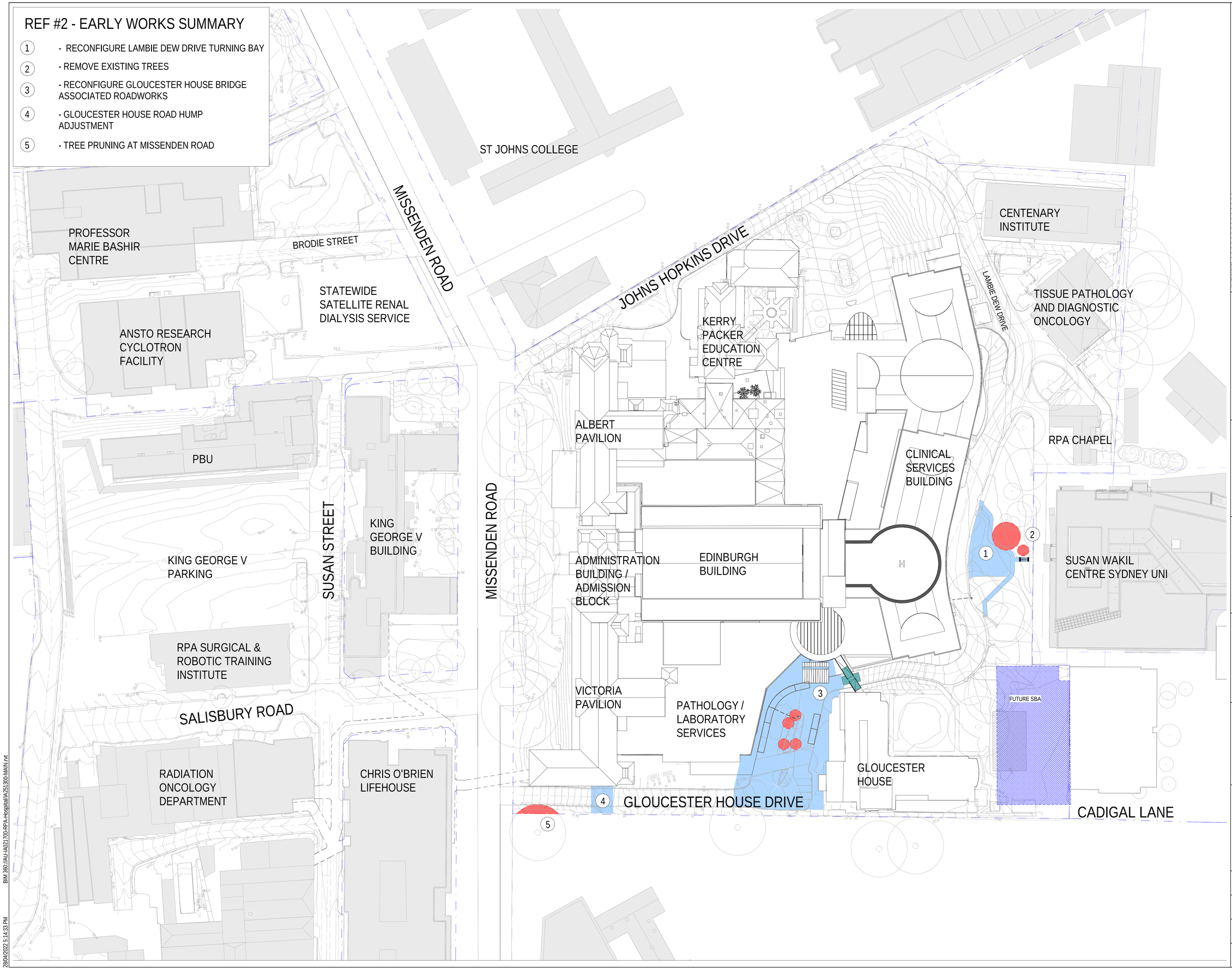
DRAWING NO.
RPA-ARC-JAC-DRG-REF2-3221

REVISION
E

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REF #2 - EARLY WORKS SUMMARY

1. - RECONFIGURE LAMBIE DEW DRIVE TURNING BAY
2. - REMOVE EXISTING TREES
3. - RECONFIGURE GLOUCESTER HOUSE BRIDGE ASSOCIATED ROADWORKS
4. - GLOUCESTER HOUSE ROAD HUMP ADJUSTMENT
5. - TREE PRUNING AT MISSENDEN ROAD



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LEGEND

- ROAD / SERVICES RE-CONFIGURATION *REFER RELEVANT SERVICES DRAWINGS*
- REFURBISHMENT / RE-CONFIGURATION
- DEMOLITION
- TREES TO BE REMOVED

REV	DATE	AMENDMENT
E	28/04/22	REF#2 UPDATED DRAFT ISSUE FOR COMMENT
D	27/04/22	REF#2 UPDATED DRAFT ISSUE
C	18/03/22	REF#2 DRAFT ISSUE
B	03/03/22	REVISED DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT
A	21/02/22	DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT

KEY PLAN

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PROJECT
ROYAL PRINCE ALFRED HOSPITAL
REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - SITE PLAN

DRAFT

STATUS
PRELIMINARY

DRAWN	DESIGNED
RR	RR/MR
CHECKED	APPROVED
VH	CY

SCALE @ B1
1 : 500

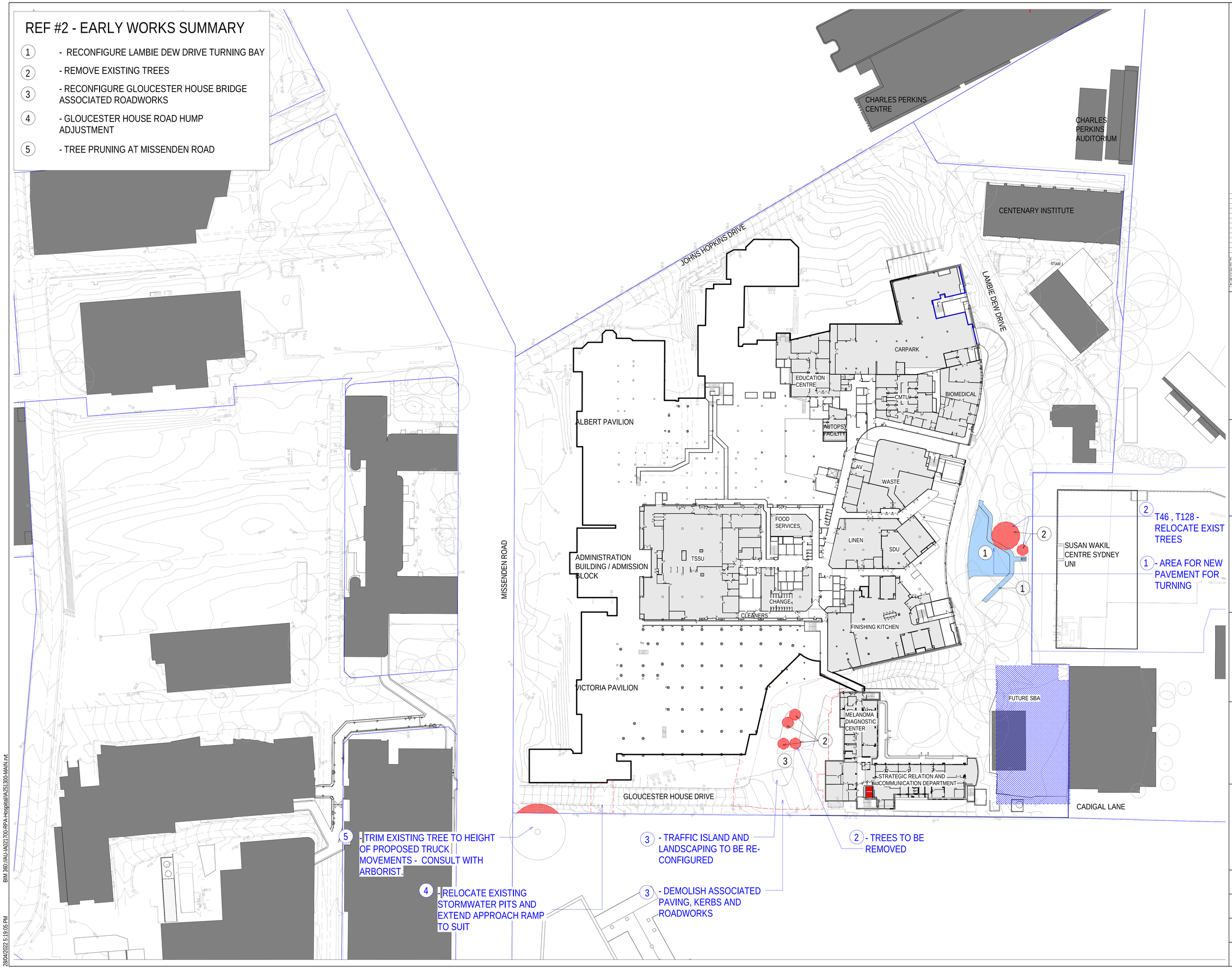
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REVISION
E

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REF #2 - EARLY WORKS SUMMARY

1. - RECONFIGURE LAMBIE DEW DRIVE TURNING BAY
2. - REMOVE EXISTING TREES
3. - RECONFIGURE GLOUCESTER HOUSE BRIDGE ASSOCIATED ROADWORKS
4. - GLOUCESTER HOUSE ROAD HUMP ADJUSTMENT
5. - TREE PRUNING AT MISSENDEN ROAD



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LEGEND

- ROAD / SERVICES RE-CONFIGURATION *REFER RELEVANT SERVICES DRAWINGS*
- REFURBISHMENT / RE-CONFIGURATION
- DEMOLITION
- TREES TO BE REMOVED

REV	DATE	AMENDMENT
F	26/04/22	REF#2 UPDATED DRAFT ISSUE FOR COMMENT
E	27/04/22	REF#2 UPDATED DRAFT ISSUE
D	08/04/22	ISSUE FOR INFORMATION
C	18/03/22	REF#2 DRAFT ISSUE
B	03/03/22	REVISED DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT
A	21/02/22	DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT

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PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - DEMOLITION PLAN - LEVEL 2

DRAFT

STATUS
PRELIMINARY

DRAWN	DESIGNED
RR	RR/MR
CHECKED	APPROVED
VH	CY

SCALE @ B1
1 : 500

DRAWING NO.
RPA-ARC-JAC-DRG-REF2-3223

REVISION
F

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28/04/2022 5:19:05 PM

REF #2 - EARLY WORKS SUMMARY

1. - RECONFIGURE LAMBIE DEW DRIVE TURNING BAY
2. - REMOVE EXISTING TREES
3. - RECONFIGURE GLOUCESTER HOUSE BRIDGE ASSOCIATED ROADWORKS
4. - GLOUCESTER HOUSE ROAD HUMP ADJUSTMENT
5. - TREE PRUNING AT MISSENDEN ROAD

3 - CAREFULLY REMOVE BOTTOM PORTION OF LEVEL 4 LINK BRIDGE & RECONFIGURE - REFER ELEVATIONS/SECTIONS

FUTURE SBA

NOTES

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LEGEND

- ROAD / SERVICES RE-CONFIGURATION
  REFER RELEVANT SERVICES DRAWINGS
- REFURBISHMENT / RE-CONFIGURATION
- DEMOLITION
- TREES TO BE REMOVED

REV	DATE	AMENDMENT
E	28/04/22	REF#2 UPDATED DRAFT ISSUE FOR COMMENT
D	27/04/22	REF#2 UPDATED DRAFT ISSUE
C	18/03/22	REF#2 DRAFT ISSUE
B	03/03/22	REVISED DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT
A	21/02/22	DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT

KEY PLAN

PROJECT MANAGER

TSA

CLIENT

NSW GOVERNMENT Health
Sydney Local Health District

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Infrastructure

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PROJECT
ROYAL PRINCE ALFRED HOSPITAL
REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - DEMOLITION PLAN - LEVEL 4

DRAFT

STATUS
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DRAWN	DESIGNED
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VH	CY

SCALE @ B1
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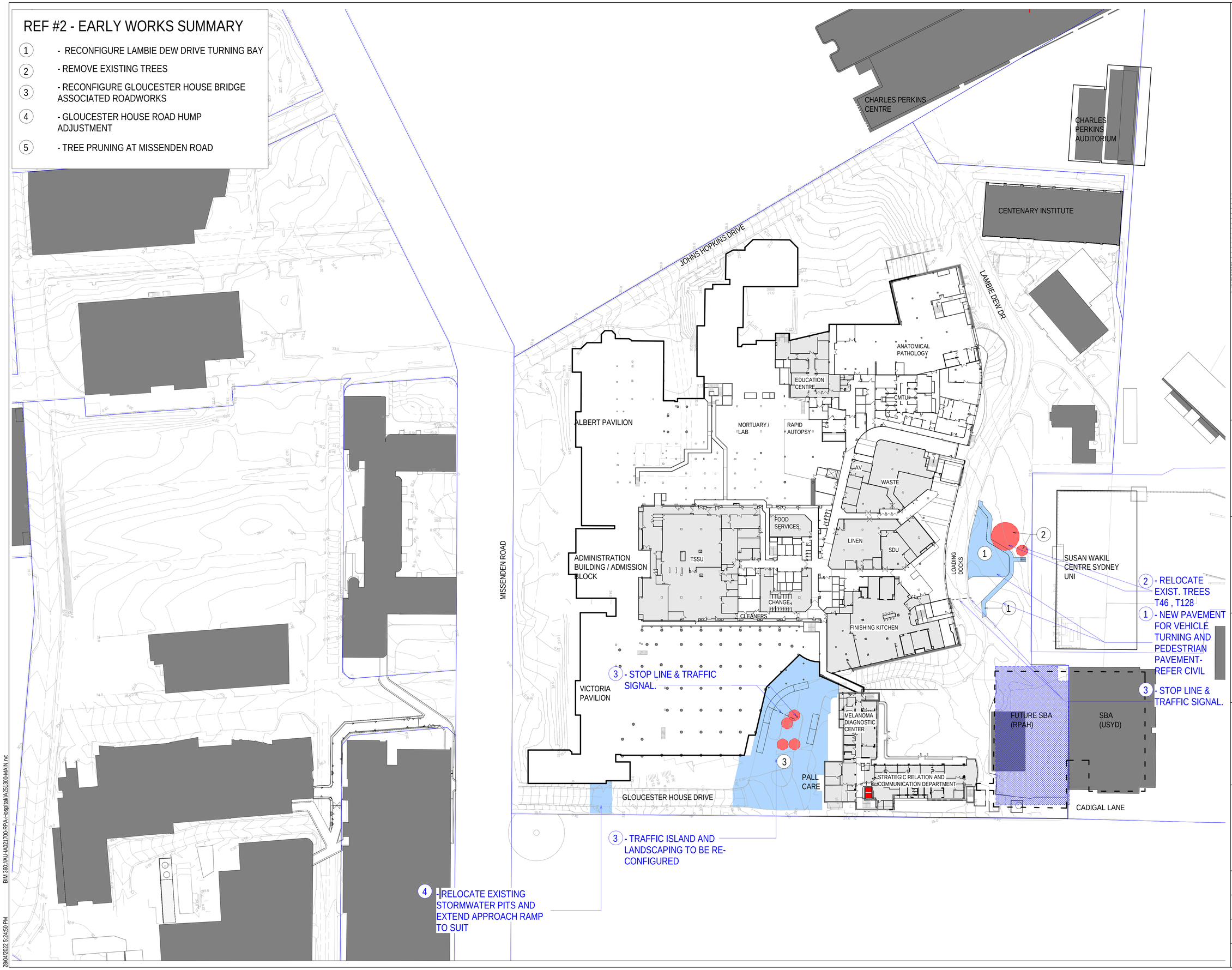
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REF #2 - EARLY WORKS SUMMARY

1. - RECONFIGURE LAMBIE DEW DRIVE TURNING BAY
2. - REMOVE EXISTING TREES
3. - RECONFIGURE GLOUCESTER HOUSE BRIDGE ASSOCIATED ROADWORKS
4. - GLOUCESTER HOUSE ROAD HUMP ADJUSTMENT
5. - TREE PRUNING AT MISSENDEN ROAD



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LEGEND

- ROAD / SERVICES RE-CONFIGURATION *REFER RELEVANT SERVICES DRAWINGS*
- REFURBISHMENT / RE-CONFIGURATION
- DEMOLITION
- TREES TO BE REMOVED

REV	DATE	AMENDMENT
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B	03/03/22	REVISED DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT
A	21/02/22	DRAFT REF#2 ISSUE FOR INFORMATION / COMMENT

KEY PLAN

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NSW GOVERNMENT Health Infrastructure

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PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - PROPOSED PLAN - LEVEL 2

DRAFT

STATUS
PRELIMINARY

DRAWN	DESIGNED
RR	RR/MR
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VH	CY

SCALE @ B1
1 : 500

DRAWING NO.
RPA-ARC-JAC-DRG-REF2-3225

REVISION
E

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REF #2 - EARLY WORKS SUMMARY

1. - RECONFIGURE LAMBIE DEW DRIVE TURNING BAY
2. - REMOVE EXISTING TREES
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4. - GLOUCESTER HOUSE ROAD HUMP ADJUSTMENT
5. - TREE PRUNING AT MISSENDEN ROAD

LAMBIE DEW DRIVE

3 - RECONFIGURE GLOUCESTER HOUSE BRIDGE - REFER SECTIONS & ELEVATIONS

FUTURE SBA

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PROJECT
ROYAL PRINCE ALFRED HOSPITAL
REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - PROPOSED PLAN - LEVEL 4

DRAFT

STATUS
PRELIMINARY

DRAWN	DESIGNED
RR	RR/MR
CHECKED	APPROVED
VH	CY

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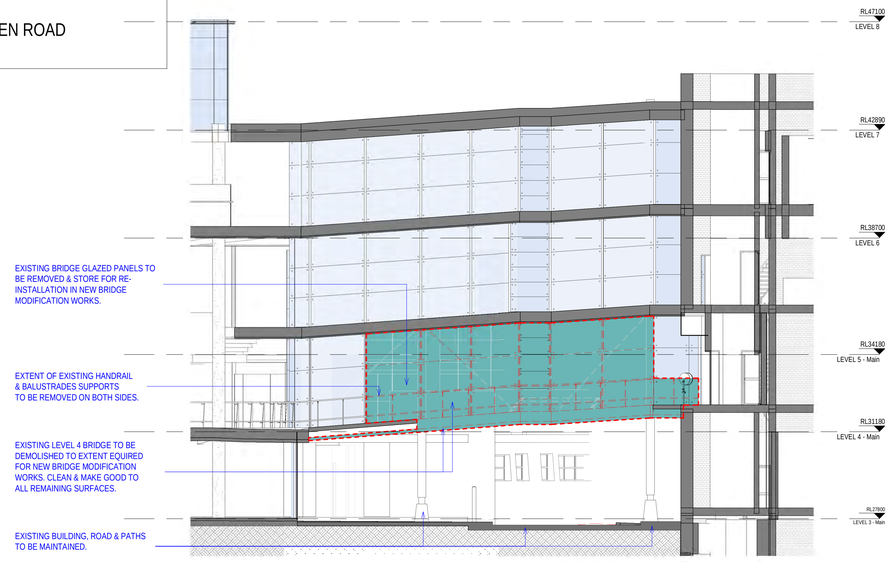
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REVISION
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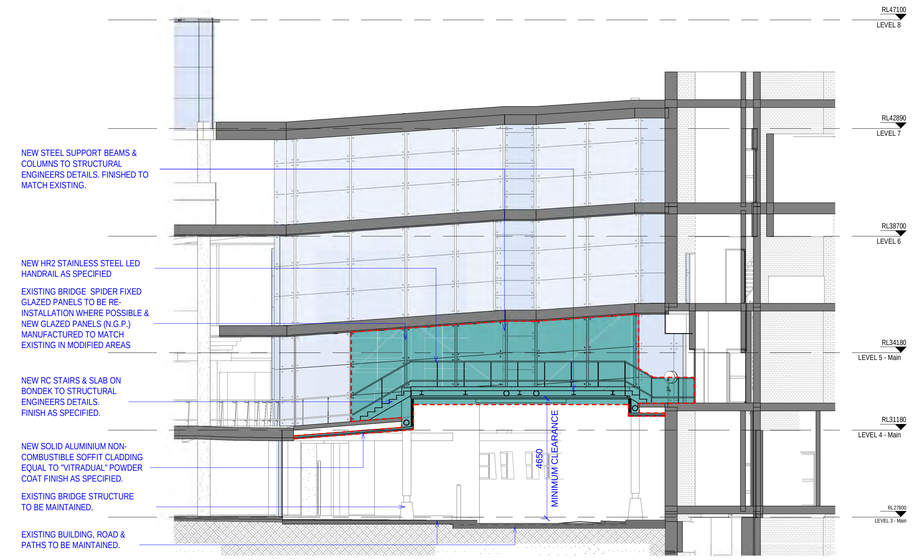
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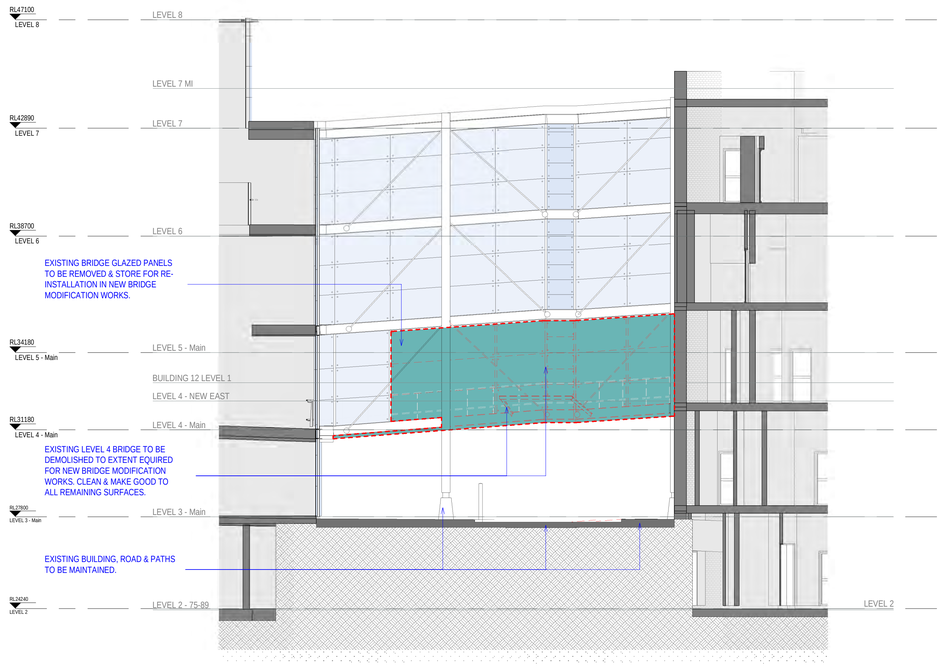
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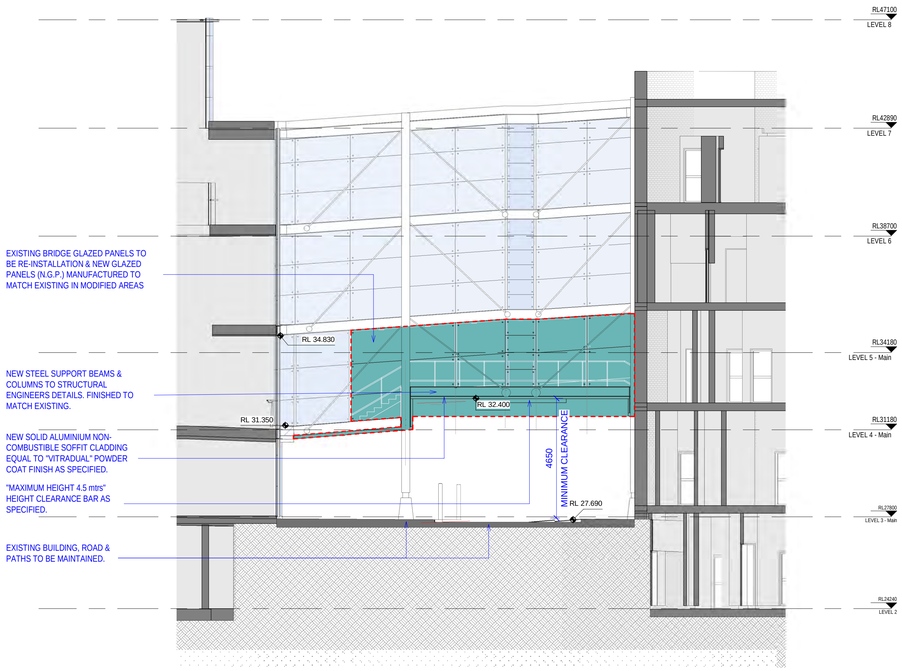
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1 : 100



2 GHB_REF2_PROPOSED SECTION
1 : 100



3 GLOUCESTER HOUSE BRIDGE LINK - EAST ELEVATION_EXISTING & DEMO
1 : 100



4 GLOUCESTER HOUSE BRIDGE LINK - EAST ELEVATION_PROPOSED
1 : 100

NOTES

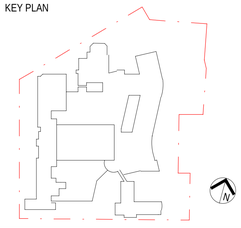
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PROJECT
ROYAL PRINCE ALFRED HOSPITAL
REDEVELOPMENT STAGE 1

PROJECT NO.
IA0251300

DRAWING TITLE
REF2 - ELEVATION / SECTIONS

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STATUS
PRELIMINARY

DRAWN	DESIGNED
NZ	RR/MR

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VH	CY

SCALE @ B1
As indicated

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REVISION
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28/04/2022 5:25:08 PM

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : RPAH east

Client Service ID : 682848

Architectus

Date: 13 May 2022

25 Martin Place
Sydney New South Wales 2000

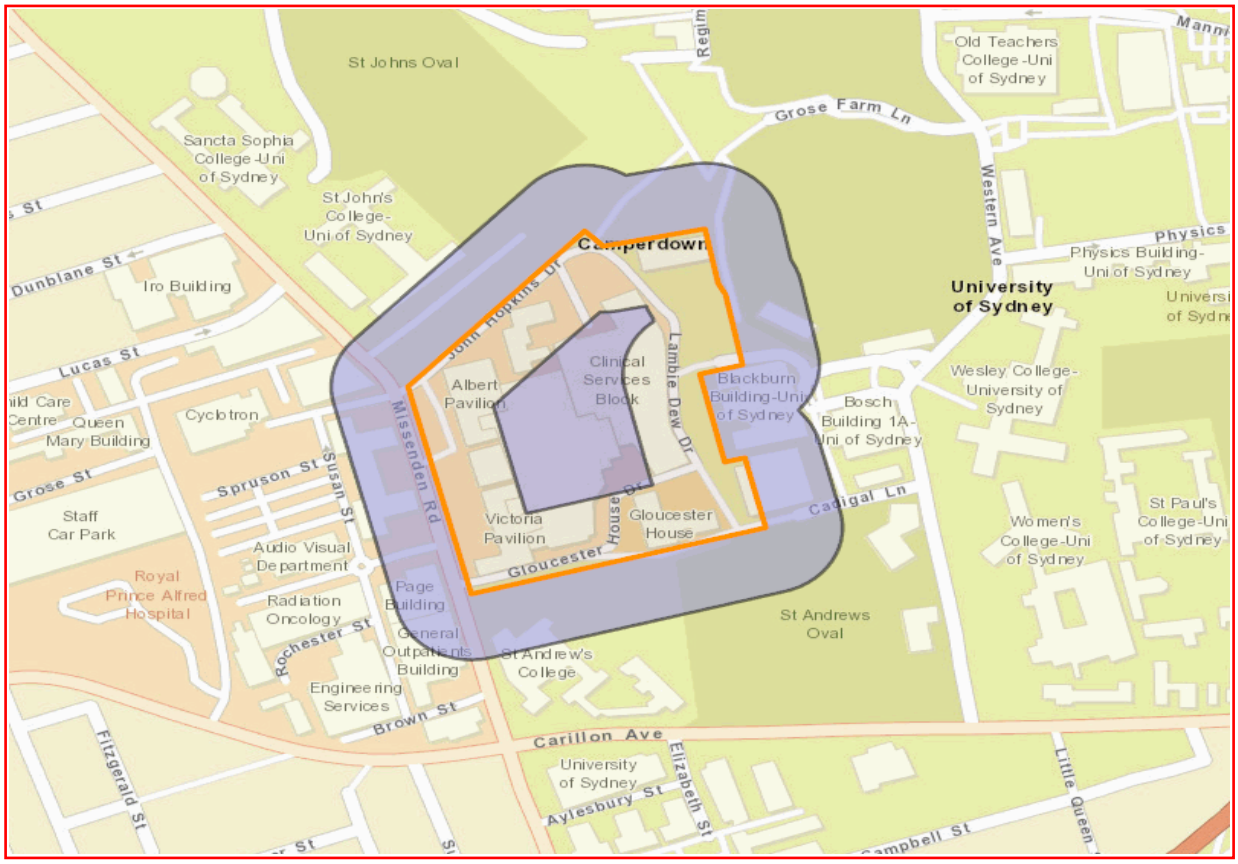
Attention: Genevieve Hastwell

Email: genevieve.hastwell@architectus.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 1000, DP:DP1159799, Section : - with a Buffer of 50 meters, conducted by Genevieve Hastwell on 13 May 2022.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Level 6, 10 Valentine Ave, Parramatta 2150
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Tel: (02) 9585 6345

ABN 34 945 244 274
Email: ahims@environment.nsw.gov.au
Web: www.heritage.nsw.gov.au



Martin Peacock Tree Care
Arboricultural & Horticultural Consultancy

Arboricultural Impact Assessment Report

Royal Prince Alfred Hospital
Camperdown

Prepared by: Martin Peacock Tree Care

Date: 20th May 2022

Phone: 0405 221 056

Email: martin@martinpeacocktreecare.com.au

Web: www.martinpeacocktreecare.com.au

1.0 Introduction

1.1 This Arboricultural Impact Assessment Report has been commissioned by TSA on behalf of Sydney Local Health District in relation the *Review of Environmental Factors (REF) Stage 2 - Early Works* within the Royal Prince Alfred Hospital, Camperdown campus. For the purposes of this report the area subject to development (the site) is located between Johns Hopkins Drive (to the north), Gloucester House Drive (to the south), the RPA Hospital/Sydney University boundary (to the east) and Missenden Road to the (west).

1.2 In accordance with Australian Standard: *AS4970 - 2009 Protection of trees on development sites* (AS490) this report provides an assessment of the impact of the proposed development on the trees located within, and adjacent to the site.

1.3 Martin Peacock (Martin Peacock Tree Care) visited the site on the 23rd September 2021 and assessed the subject trees and their growing environment. The trees located within the site are identified using the numbers allocated in the previous Tree Survey Report which was prepared for the RPA Hospital Camperdown campus by Martin Peacock Tree Care (06.11.20). Trees located within the University campus are identified as per the numbered tags affixed to the trees' trunks. An additional tree located with the St Andrews College campus to the south of the site is also included in this report and has been identified alphabetically.
(Refer: Appendix A - Tree Location Plan)

1.4 The impact of the proposed enabling works upon the trees are based on the following plans:

- Architectural Drawings - REF2-000 – REF2–3231 (Rev C) - prepared by Jacobs (04.05.22)
- Statement of Heritage Impact - prepared by Heritage 21 (May 2022)

2.0 Tree Impacts

2.1 The supplied plans show that the REF 2 works include:

- Reconfiguration of Lambie Dew Drive turning bay
- Removal of tree group 58 (hedge) and four (4) trees within tree group 59 (6x palms)
- Reconfiguration of Gloucester House bridge and associated road works
- Gloucester House Road hump adjustment
- Pruning of tree A, St Andrews College

2.2 Tree group 58 comprises of a hedge of *Syzygium australe* (Lilly Pilly) and tree group 59 comprises of six (6) *Howea forsteriana* (Kentia Palm). The groups of trees are growing in separate, island garden beds at the eastern end of Gloucester House Drive. All of these trees have low landscape value and have been allocated a Retention Value of Consider for Removal. These trees are relatively recent plantings and have no heritage significance.

The supplied plans show tree group 58 and four (4) specimens within tree group 59 are to be removed as part of the reconfiguration of Gloucester House Road. The loss of amenity and canopy cover at the site resultant from tree removal can be readily offset with the planting of advanced size, new trees in an appropriate location(s) within the Hospital campus.

The two (2) retained palms within tree group 59 will be subject to encroachment (as per AS4970) within their Tree Protection Zone (TPZ) areas from the reconfiguration of Gloucester House Drive.

The proposed works represent a Major Encroachment (>10% of the TPZ) within the TPZ area of the trees. However, as palm species continually produce non woody roots from the Root Initiation Zone at the base of the trunk and are therefore highly tolerant of root loss, the works should not significantly impact the trees.

2.3 Tree 46 - *Camellia sasanqua* (Camellia), Trees 47 and 48 – *Jacaranda mimosifolia* (Jacaranda) and Tree 49 *Flindersia australis* (Crows Ash) will be subject to encroachment (as per AS4970) within their Tree Protection Zone (TPZ) areas from the reconfiguration of the Lambie Dew Drive turning bay and footpath installation.

The turning bay area represents a Minor Encroachment (<10% of the TPZ) within the TPZ areas of the trees only, and the works should not significantly impact the trees. However, to minimise further impacts the proposed footpath should be installed at, or above existing grade using tree sensitive methods.

2.4 Tree A - *Ficus microcarpa* var. Hillii (Hills Fig) is located at the junction of Gloucester House Drive and Missenden Road within the St Andrews College campus adjacent to the south-western corner of the site. Being located outside of the site the tree has not been fully assessed.

The lower crown of the tree extends over the carriageway of Gloucester House Drive and there is insufficient vertical clearance to allow for unimpeded high sided vehicle access. The proposed development works include Crown Lifting of Tree A to provide 4.5m (approx.) of vertical clearance above the carriageway. The pruning works represent less than 5% of the trees total crown volume and will not impact the health or amenity value of the tree.

2.5 Although no works are proposed within the TPZ areas of trees 43-45, 50, 53, 56, 57, 128, 130 and 131, being located within the vicinity of the proposed works the trees are vulnerable to accidental damage. Therefore, the establishment of Tree Protection Zone (TPZ) areas comprising of either TPZ fencing or trunk and ground protection will be required. Specific tree protection requirements should be determined through consultation between the Project Manager and the Project Arborist during the site establishment phase of the project.

3.0 Recommendations

3.1 The removal of tree group 58, four (4) specimens within tree group 59 and pruning of Tree A shall be undertaken by a qualified Arborist (minimum AQF level 3) in accordance with *AS4373 (2007) Pruning of Amenity Trees*.

The arboricultural contractor shall be covered by adequate third party, public liability insurance. Arborists and ground staff shall comply with the *Work Cover Code of Practice for the Amenity Tree Industry*: Pruning works are detailed in the pruning specification contained within this report.
(Refer: Appendix E - Photographs)

3.2 A combination of TPZ fencing and trunk and ground protection shall be installed for trees 43-50, 53, 56, 57, 59 (2x trees retained from group), 128, 130 and 131 as part of the site establishment works. The TPZ area required for each tree is detailed in the TPZ column of the Tree Assessment Schedule (refer: Appendix C, column 13). The TPZ is measured as a radial distance taken from the centre of the trunk at ground level.

Where TPZ areas overlap, fencing may be combined to form a single larger TPZ area. Fencing may be setback to allow for demolition and construction access where ground protection is installed to unfenced areas of the TPZ.

Individual tree protection requirements shall be determined through consultation between the Project Manager and the Project Arborist prior to installation.

Fencing/ground protection shall remain in place for the duration of the project and shall not be modified unless approved by the Project Arborist.
(Refer: Appendix F – Tree Protection Specification)

3.3 Demolition of existing pavements, kerbs and pits within the TPZ areas of trees 47, 59 (2x trees retained from group) and A shall be supervised by the Project Arborist and avoid disturbance of the surrounding soil profile.

3.4 Excavation for the turning bay within the TPZ area of tree 47 shall avoid over excavation beyond the turning bay footprint. Excavation shall be supervised by the Project Arborist and root pruning undertaken as required along the line of excavation within the TPZ.

3.5 The proposed footpath within the TPZ areas of trees 46-49 shall be installed above existing grade (including sub base layers). Alternatively, the footpath footprint can be excavated by hand and finished levels determined by the depth of significant roots which must be retained (as determined by the Project Arborist).

Where required, sub base layers below pavements in TPZ areas shall be thinned to allow for the retention of significant roots. Compaction of the sub grade and sub base below the footpath shall be undertaken using a pedestrian operated plate compactor, with hand tools to be used for compaction around roots.

Where the footpath is installed above grade, adjacent garden bed levels may be raised along the edge of the footpath to eliminate trip hazard. Raising of ground levels in the trees' Structural Root Zone areas shall be avoided.

3.6 Trenching for underground services and relocation of pits within TPZ areas shall be undertaken using tree sensitive methods (hand/hydrovac excavation/compact excavator guided by a spotter) and be supervised by the Project Arborist. All roots greater than 25mm diameter shall be retained and protected with services diverted under or around roots unless root pruning is approved by the Project Arborist.



Martin Peacock
BSc (hons.) Arboriculture (UK)
Higher National Diploma Arboriculture (UK)
National Diploma Horticulture (Arb.) (UK)
Diploma Horticulture (Landscape Design) (AUS)

Caveats & Limitations

The subject trees were inspected from the ground only, using the methodology detailed in this report.

The findings of this report are based on the observations made at the time of inspection (23/09/21), and from the information contained within plans/documentation provided by the client.

The report reflects the subject trees as found on the day of inspection. There is no warranty or guarantee, expressed or implied, that problems or deficiencies with the site or the subject trees may not arise in the future. Any changes to development proposals or tree management works beyond those recommended in this report may alter the findings of the report.

Appendix A - Methodology

The methodology used in this report follows the procedures detailed in *Australian Standard: AS 4970—2009. Protection Of Trees On Development Sites*. This report also references the *British Standard BS: 5837 (2005) Trees In Relation To Construction – Recommendations.*

The methodology used in this report provides the following information:

1. Tree species - botanical and common name.
2. Age class - Juvenile, semi-mature, mature, senescent.
3. DBH – Diameter at breast height (mm)*
4. Height – estimated total height (m)
5. Crown spread – estimated, average radial crown spread in meters (m)
6. Physiological condition - good, fair, poor
7. Structural condition - good, fair, poor
8. Useful Life Expectancy - <5, 5–15, 15–40, >40 (years)**
9. Quality & Value – A, B, C, D ***
10. Retention Category - Priority for Retention, Consider for Retention, Consider for Removal, Priority for Removal****
11. SRZ – Structural Root Zone radius (m)
12. TPZ – Tree protection Zone radius (m)
13. Comments / Preliminary Management Recommendations

*DBH (Diameter at Breast Height) - Stem /trunk diameter measured at 1.4m above ground level. On sloping ground, measurements will be taken at the mid slope point at the base of the tree. Where a tree stem / trunk branches at less than 1.4m above ground, a combined stem diameter is calculated using the formula:
Total DBH = $\sqrt{}$ $DBH^2 + DBH^2 + DBH^2$

**Useful Life Expectancy – The estimated lifespan of the tree over which it will positively contribute to the amenity of the area and to the local environment, in a safe, healthy condition.

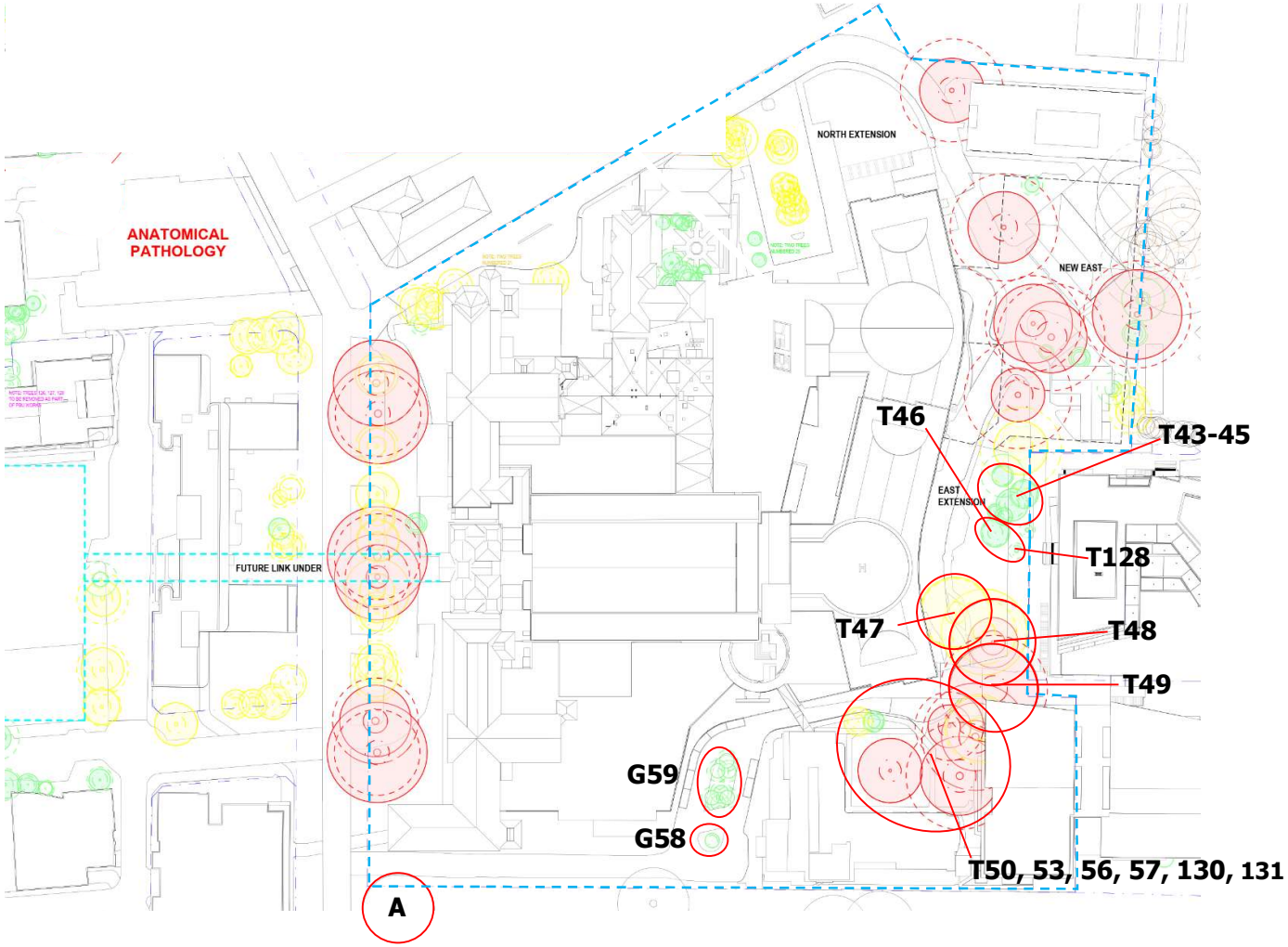
***Quality & Value – The quality of the tree when compared to an idealised example of the species and the values which the tree provides to the site and local area (see Cascade Chart for Assessment of Tree Quality & Value).

****Retention Category – The subject tree is allocated one of four categories based on a combination of its Quality and Value and Useful Life Expectancy.

An assessment of the trees condition is made using the Visual Tree Assessment (VTA) method (Mattheck & Breoler, 1994).

Tree assessment results are recorded in the Tree Assessment Schedule (see section 6.0 Results). Note: for trees outside of the site only the species and DBH is recorded for the purposes of calculating the SRZ/TPZ.

Appendix B - Tree Location Plan



Appendix C - Tree Assessment Schedule

RPA Tree Survey Data – 14.09.21

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	Age Class	ULE (years)	L/Sign	Retention Value	Radial TPZ (m)	Radial SRZ (m)
30	*Cinnamomum camphora* (Camphor Laurel)	1200	19	9	Good	Good	Ivy on trunk. Cut and poison ivy - low priority. Small (<25mmø) & medium (25-75mmø) deadwood in low volumes.	Late Mature	15-40	High	Priority for Retention	14.4	3.7
31	*Cinnamomum camphora* (Camphor Laurel)	1500	26	9	Good	Good	Remove deadwood - low priority. Small (<25mmø), medium (25-75mmø) & large (>75mmø) deadwood in low volumes.	Late Mature	15-40	High	Priority for Retention	15.0	4.1
32	*Livistonia australis* (Cabbage Tree Palm)	300	7	3	Good	Good	Partially suppressed.	Mature	15-40	Low	Consider for Removal	4.0	n/a*
33	*Plumeria acutifolia* (Frangipani)	372	6	3	Good	Good	Partially suppressed. Wound(s), early signs of decay.	Mature	15-40	Low	Consider for Removal	4.5	2.3
34	*Cinnamomum camphora* (Camphor Laurel)	400	10	5	Good	Good	Prune for building clearance - low priority. Partially suppressed.	Mature	15-40	Moderate	Consider for Retention	4.8	2.3

35	*Celtis sinensis* (Chinese Nettle Tree)	492	12	5	Good	Fair	Prune for building clearance - low priority. Partially suppressed. Co-dominant inclusions, major.	Mature	15-40	Moderate	Consider for Retention	5.9	2.6
36	*Acmena smithii* 'Minor' (Dwarf Lilly Pilly)	200	6	3	Good	Good	Prune for building clearance - low priority. Crown density 50-75%. Partially suppressed.	Mature	15-40	Low	Consider for Removal	2.4	1.8
37	*Cinnamomum camphora* (Camphor Laurel)	1792	26	10	Good	Good	Remove deadwood and crown lift over chapel - medium priority. Small (<25mmø), medium (25-75mmø) & large (>75mmø) deadwood in low volumes.	Late Mature	15-40	High	Priority for Retention	15.0	4.4
38	*Persea americana* (Avocado)	106	5	2	Good	Good	Partially suppressed.	Semi-mature	15-40	Low	Consider for Removal	2.0	1.5
39	*Cinnamomum camphora* (Camphor Laurel)	1118	23	11	Good	Good	Remove deadwood - medium priority. Small (<25mmø), medium (25-75mmø) & large (>75mmø) deadwood in low volumes. Partially suppressed.	Late Mature	15-40	High	Priority for Retention	13.4	3.6

40	*Cinnamomum camphora* (Camphor Laurel)	1600	25	14	Good	Good	Remove deadwood - medium priority. Small (<25mmø), medium (25-75mmø) & large (>75mmø) deadwood in low volumes.	Late Mature	15-40	High	Priority for Retention	15.0	4.2
41	*Ficus microcarpa var.* 'Hillii' (Hills Weeping Fig)	1246	24	10	Good	Good	Crown lift for building and road clearance and remove deadwood - low priority. Small (<25mmø), medium (25-75mmø) & large (>75mmø) deadwood in low volumes. Wound(s), various stages of decay.	Mature	15-40	High	Priority for Retention	15.0	3.8
42	*Jacaranda mimosifolia* (Jacaranda)	950	16	11	Good	Good	Small (<25mmø) & medium (25-75mmø) deadwood in low volumes. Small (<25mmø), medium (25-75mmø) & large (>75mmø) epicormic growth in low volumes. Partially suppressed. Wound(s), various stages of decay.	Mature	15-40	Moderate	Consider for Retention	11.4	3.4
43	*Melia azedarach* (White Cedar)	125 175 200	8	4	Good	Good	Co-dominant inclusions, major.	Early mature	5-15	Low	Consider for Removal	3.6	2.0

44	*Magnolia grandiflora* (Bull Bay Magnolia)	125	5	2	Good	Good	-	Mature	40+	Low	Consider for Removal	2.0	1.5
45	*Camellia sasanqua* (Camellia)	500	5	3	Good	Good	Wound(s), various stages of decay. Trunk cavity(s), minor.	Late Mature	15-40	Low	Consider for Removal	6.0	2.6
46	*Camellia sasanqua* (Camellia)	300	5	3	Good	Fair	Prune for light pole clearance - low priority. Co-dominant inclusions, minor. Wound(s), various stages of decay.	Mature	15-40	Low	Consider for Removal	3.6	2.1
47	*Jacaranda mimosifolia (Jacaranda)*	800	15	10	Good	Good	Small (<25mmø) & medium (25-75mmø) epicormic growth in moderate volumes. Partially suppressed. Wound(s), various stages of decay. First order branch cavity, minor.	Mature	15-40	Moderate	Consider for Retention	9.6	3.1
48	*Jacaranda mimosifolia* (Jacaranda)	750	18	12	Good	Good	Small (<25mmø) & medium (25-75mmø) epicormic growth in low volumes. Partially suppressed. Wound(s), various stages of decay. Phototrophic lean, moderate.	Mature	15-40	Moderate	Consider for Retention	9.0	3.1
49	*Flindersia australis (Crow's Ash)*	1000	25	7	Good	Good	-	Mature	15-40	High	Priority for Retention	12.0	3.4

50	*Platanus x acerifolia* (London Plane Tree)	1300	27	10	Good	Good	Remove deadwood - low priority (undertake works when in leaf). Small (<25mmø) & large (>75mmø) deadwood in low volumes.	Mature	15-40	High	Priority for Retention	15.0	3.8
51	*Corymbia citriodora* (Lemon Scented Gum)	800	22	9	Good	Good	Remove deadwood - high priority. Large (>75mmø) deadwood in low volumes. Wound(s), various stages of decay.	Mature	15-40	Moderate	Consider for Retention	9.6	3.1
52	*Cinnamomum camphora* (Camphor Laurel)	2000	20	8	Good	Fair	Carry out IDT - low priority. Wound(s), various stages of decay. Trunk cavity(s), major. Internal diagnostic testing recommended.	Late Mature	15-40	High	Priority for Retention	15.0	4.6
53	*Cedrus atlantica* (Atlantic Cedar)	800	22	6	Good	Good	Remove dead wood. Low priority. Small (<25mmø) & large (>75mmø) deadwood in low volumes. Partially suppressed. Co-dominant inclusions, minor. Wound(s), no visible sign of decay.	Mature	15-40	High	Priority for Retention	9.6	3.1

54	*Cinnamomum camphora* (Camphor Laurel)	2000	22	11	Good	Good	Small (<25mmø) & medium (25-75mmø) deadwood in low volumes. Wound(s), various stages of decay.	Late Mature	15-40	High	Priority for Retention	15.0	4.6
55	*Jacaranda mimosifolia (Jacaranda)*	750	16	9	Good	Good	Remove deadwood - low priority. Small (<25mmø) & medium (25-75mmø) deadwood in low volumes.	Mature	15-40	High	Priority for Retention	9.0	3.1
56	*Waterhousia floribunda* (Weeping Lillypilly)	225	9	3	Good	Good	Partially suppressed.	Mature	15-40	Low	Consider for Removal	2.7	1.8
57	*Harpullia pendula (Tulipwood)*	250	9	4	Good	Fair	Partially suppressed. Co-dominant inclusions, minor.	Mature	15-40	Moderate	Consider for Retention	3.0	1.9
126	*Polyscias elegans* (Celery Wood)	75	5	1	Good	Good	Partially suppressed.	Semi Mature	15-40	Low	Consider for Removal	2.0	1.5
127	*Camellia japonica* (Japanese Camelia)	150	2	2	Good	Good	Shrub	Mature	15-40	Low	Consider for Removal	2.2	1.5
128	*Camellia japonica* (Japanese Camelia)	150	2	2	Good	Good	Shrub	Mature	15-40	Low	Consider for Removal	2.2	1.5

129	*Polyscias elegans* (Celery Wood)	125	7	2	Good	Good	Partially suppressed	Semi Mature	15-40	Low	Consider for Removal	2.0	1.5
130	*Melia azedarach* (White Cedar)	250 175 125	8	4	Good	Fair	Co-dominant inclusions, major.	Early mature	5-15	Low	Consider for Removal	3.6	2.0
131	*Melia azedarach* (White Cedar)	200	7	3	Good	Good	Bark inclusion(s), minor.	Early mature	15-40	Low	Consider for Removal	2.4	1.7
585	*Cupressus sp.* (Cypress species)	400					University tree. Outside of site.					4.8	2.3
586	*Cupressus sp.* (Cypress species)	250					University tree. Outside of site.					3.0	1.9
587	*Cupressus sp.* (Cypress species)	400					University tree. Outside of site.					4.8	2.3
590	*Cinnamomum camphora* (Camphor Laurel)	1600					University tree. Outside of site.					15.0	4.1
591	*Cinnamomum camphora* (Camphor Laurel)	1100					University tree. Outside of site.					12.0	3.4

593	*Ficus microcarpa var. Hillii* (Hills Fig)	700					University tree. Outside of site.					8.4	2.9
594	*Cinnamomum camphora* (Camphor Laurel)	300 275					University tree. Outside of site.					4.8	2.3
595	*Ficus microcarpa var. Hillii* (Hills Fig)	1500					University tree. Outside of site.					15.0	4.0
596	*Ficus microcarpa var. Hillii* (Hills Fig)	1800					University tree. Outside of site.					15.0	4.3
597	*Cinnamomum camphora* (Camphor Laurel)	1100					University tree. Outside of site.					13.2	3.5
598	*Cinnamomum camphora* (Camphor Laurel)	1100					University tree. Outside of site.					13.2	3.5
1191	*Cupaniopsis anacardioides* (Tuckeroo)	125					University tree. Outside of site.					2.1	1.5

1237	*Cupaniopsis anacardioides* (Tuckeroo)	200					University tree. Outside of site.					2.4	1.7
1238	*Cupaniopsis anacardioides* (Tuckeroo)	275					University tree. Outside of site.					3.3	2.0
1239	*Cupaniopsis anacardioides* (Tuckeroo)	275					University tree. Outside of site.					3.3	2.0

58	*Syzygium australe* (Brush Cherry Lilly Pilly)	75	4	2	Good	Good	Hedge	Semi-mature	15-40	Low	Consider for Removal	2.0	1.5
59	*Howea forsteriana* (Kentia Palm)	150	7	2	Good	Good	Group of 6 trees	Mature	5-15	Low	Consider for Removal	3.0	n/a*
A	*Ficus microcarpa var.* 'Hillii' (Hills Weeping Fig)	1200					St Andrews Collage tree. Outside of site.					14.4	3.7

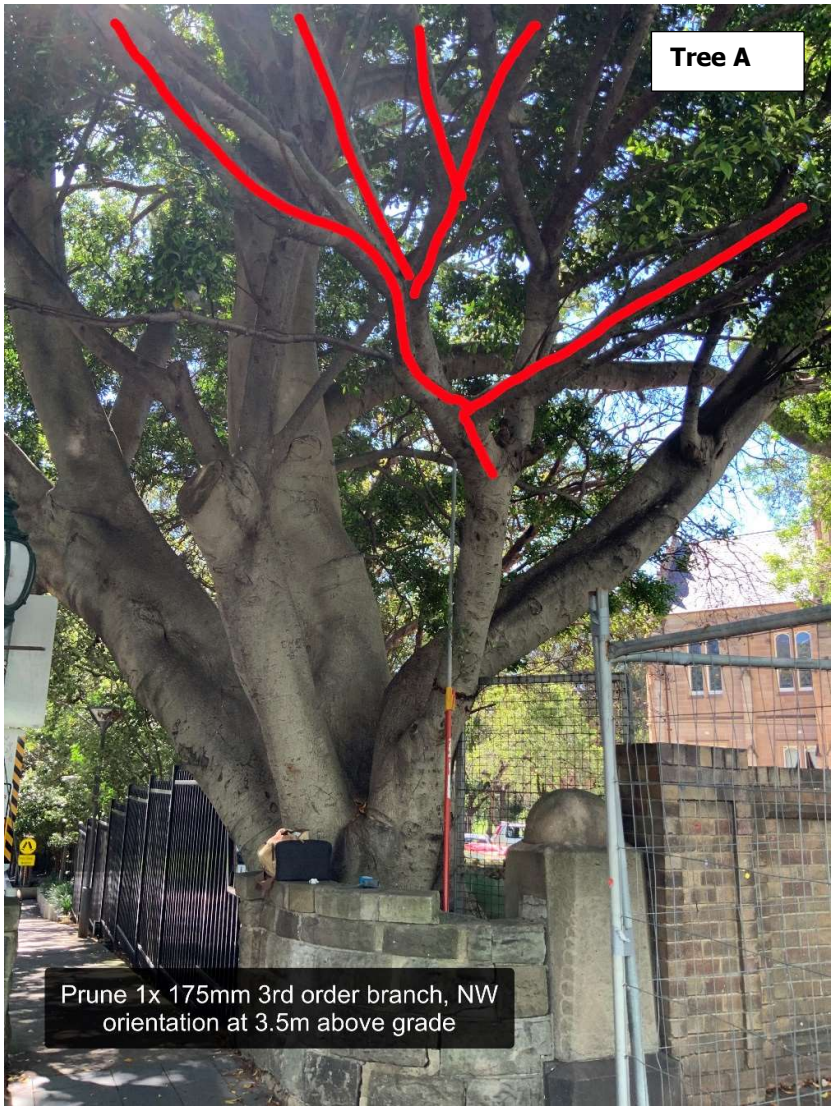
Note: The allocation of a Retention Category is a requirement of AS4970 and provides and overview of the quality and value of trees on site. Retention Categories are a guide only and do not take into account design considerations/constraints relating to the development proposal. It should be noted that Retention Categories are not a schedule for tree removal or retention.

*as per AS4970 the TPZ of palms, cycads and tree ferns is measured at 1m beyond crown projection and the SRZ does not apply

Appendix D - Cascade Chart for Assessment of Tree Quality & Value

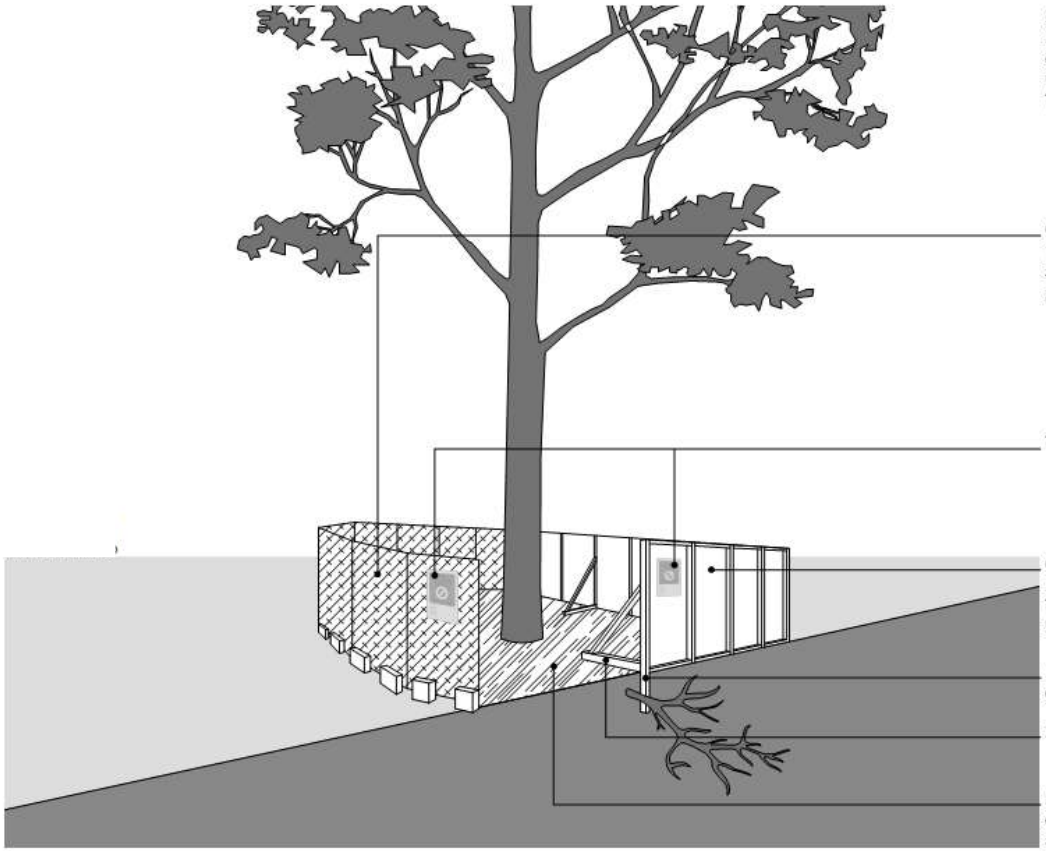
RETENTION CATEGORY & DEFINITION	CRITERIA - SUBCATEGORIES			IDENTIFICATION IF SHOWN ON A PLAN
	1. Mainly Arboricultural values	2. Mainly landscape values	3. Mainly cultural values, including conservation	
Category A **High Quality & Value:** Those in such a condition as to be able to make a substantial contribution for a minimum of 40 years. Highly significant trees or trees listed on a significant tree register regardless of life expectancy (excluding hazardous trees). **Priority for retention.**	Trees that are particularly good examples of their species, especially if rare or unusual or essential components of groups or of formal or semi-formal Arboricultural features (e.g. The dominant and / or principal trees within an avenue). Trees that provide a definite contribution to the amenity of the locality.	Trees, groups or woodlands which provide a definite screening or softening effect to the locality in relation to views into or out of the site, or those of particular visual importance (e.g. Avenues or other Arboricultural features assessed as groups).	Trees, groups, remnant bushland or forest of significant conservation, historical, Aboriginal, commemorative or other value. Note: independent ecological/aboriginal/heritage assessment may be required.	GREEN
Category B **Moderate Quality & Value:** Those in such a condition as to make a significant contribution for a minimum of 15 years. **Consider for retention.**	Trees that might be included in the high category, but are downgraded because of impaired condition (e.g. presence of remediable defects including unsympathetic past management and minor storm damage).	Trees situated mainly internally to the site, therefore individually having little visual impact on the wider locality or, trees present in numbers, usually as groups or woodlands, such that they from distinct landscape features, thereby attracting higher collective rating than they might as individuals but which are not, individually essential components of formal or semi formal Arboricultural features (e.g. trees or moderate quality within an avenue that includes better A category specimens).	Trees with clearly identifiable conservation or other cultural benefits.	BLUE
Category C **Low Quality & Value:** Those in such a condition as to make a contribution for a minimum of 5 years. **Consider for removal.**	Trees not qualifying in higher categories. Juvenile, semi mature or small tree species which are considered easily replaceable.	Trees present in groups or woodlands, but without this conferring on them significantly greater landscape value, and / or trees offering low or only temporary screening benefit.	Trees with very limited conservation or other cultural benefits.	ORANGE
Category D **Not worthy of retention:** Those in such a condition that any existing value would be lost within 5 years and which should in current context, be removed for reasons of sound Arboricultural management. **Priority for removal**.	Trees that have a serious, irremediable structural defect, such that their early loss is expected due to failure, including those that will become unviable after removal of other trees (i.e. where, for whatever reason the loss of companion shelter cannot be mitigated by pruning). Trees that are dead or are showing signs of significant, immediate and irreversible overall decline Trees infected with a pathogen of significance to the health and/or safety of other trees nearby, or very low-quality trees suppressing adjacent trees of better quality. Trees causing significant damage to structures, where no viable alternatives exist for remedial tree management / modification of structures to enable tree retention. Trees considered a weed species or those listed as noxious weeds. **NOTE:** Dead or dying trees with hollows or cavities may be of ecological importance. These trees are to be identified and assessed independently of the criteria in this cascade chart. Where category D trees are removed habitat reinstatement may be appropriate.			RED

Appendix E – Photographs





Appendix F - Tree Protection Specification



Note:
No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.

Option 1 - Fencing
1.8m high chain wire mesh panels with shade cloth attached (if required), held in place with concrete feet.

Tree Protection Zone (TPZ) sign

Option 2 - Fencing
Plywood or wooden panel paling fence. This type of fencing material also prevents building materials or soil entering the TPZ.

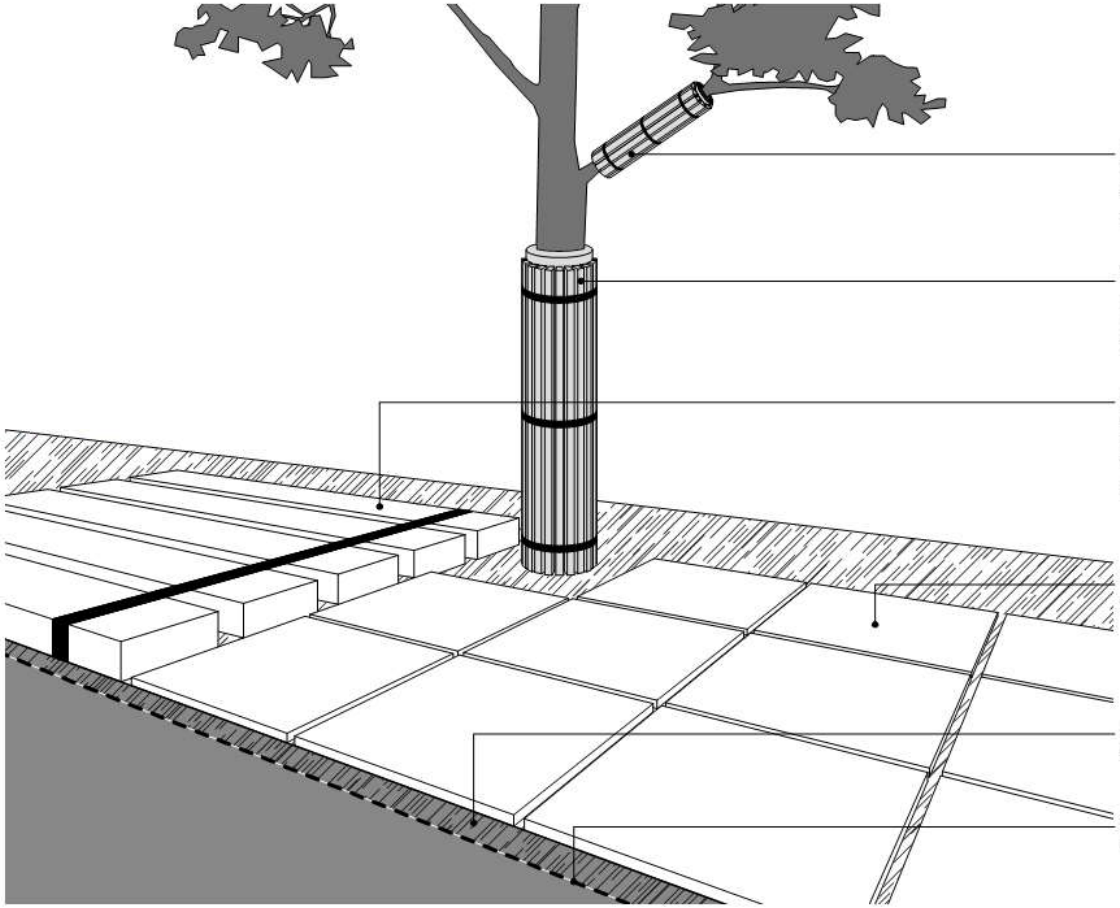
Installation of supports should avoid damaging roots.

Bracing is permissible within the TPZ.

Maximum 100mm and minimum 50mm depth mulch or aggregate layer installed across surface of TPZ.

Tree Protection Fencing Not to Scale

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Examples of Branch, Trunk and Ground Protection Not to Scale

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15th June 2022

Narla Environmental Pty Ltd (Narla) was engaged by TSA Management c/- Health Infrastructure to undertake an Ecological Assessment to accompany the second Review of Environmental Factors (REF 2) of the redevelopment of the Royal Prince Alfred Hospital East Campus, Camperdown NSW 2050, hereafter referred to as the 'Subject Property' (**Figure 1**). The proposed activity involves the following (Jacobs 2022):

- Reconfiguration of Lambie Dew Drive turning bay and Gloucester House bridge, along with associated roadworks;
- Gloucester House road hump adjustment;
- Removal of trees; and
- Tree pruning on St Andrew's College Site.

All areas associated with the proposed activity (including tree removal) are hereafter referred to as the 'Subject Site' (**Figure 1**).

Narla have produced this report in order to assess any potential impacts associated with the proposed activity on terrestrial ecology (biodiversity), particularly threatened species, populations and ecological communities listed under the Biodiversity Conservation Act 2016 (BC Act) and Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Methodology

A thorough literature review of local information relevant to the Sydney Local Government Area was undertaken. Searches using NSW Wildlife Atlas (BioNet; DPE 2022a) and the Commonwealth Protected Matters Search Tool (DAWE 2022) were conducted to identify all current threatened flora and fauna, as well as migratory fauna records within a 10km x 10km cell centred on the Subject Site. These data were used to assist in establishing the presence or likelihood of any ecological values as occurring on or adjacent to the Subject Site, and helped inform our Ecologist on what to look for during the site assessment. In addition, soil landscape and geological mapping was examined to assist in determining whether any threatened flora or ecological communities may occur within the Subject Site (Bannerman and Hazelton 2011).

A site assessment was undertaken on Wednesday the 8th of September 2021. During the site assessment, vegetation communities were identified and mapped, and a comprehensive flora and fauna species list was compiled. In addition, targeted surveys for threatened flora and fauna were conducted, and any significant habitat features were noted (with no threatened species or habitat identified within the Subject Site).

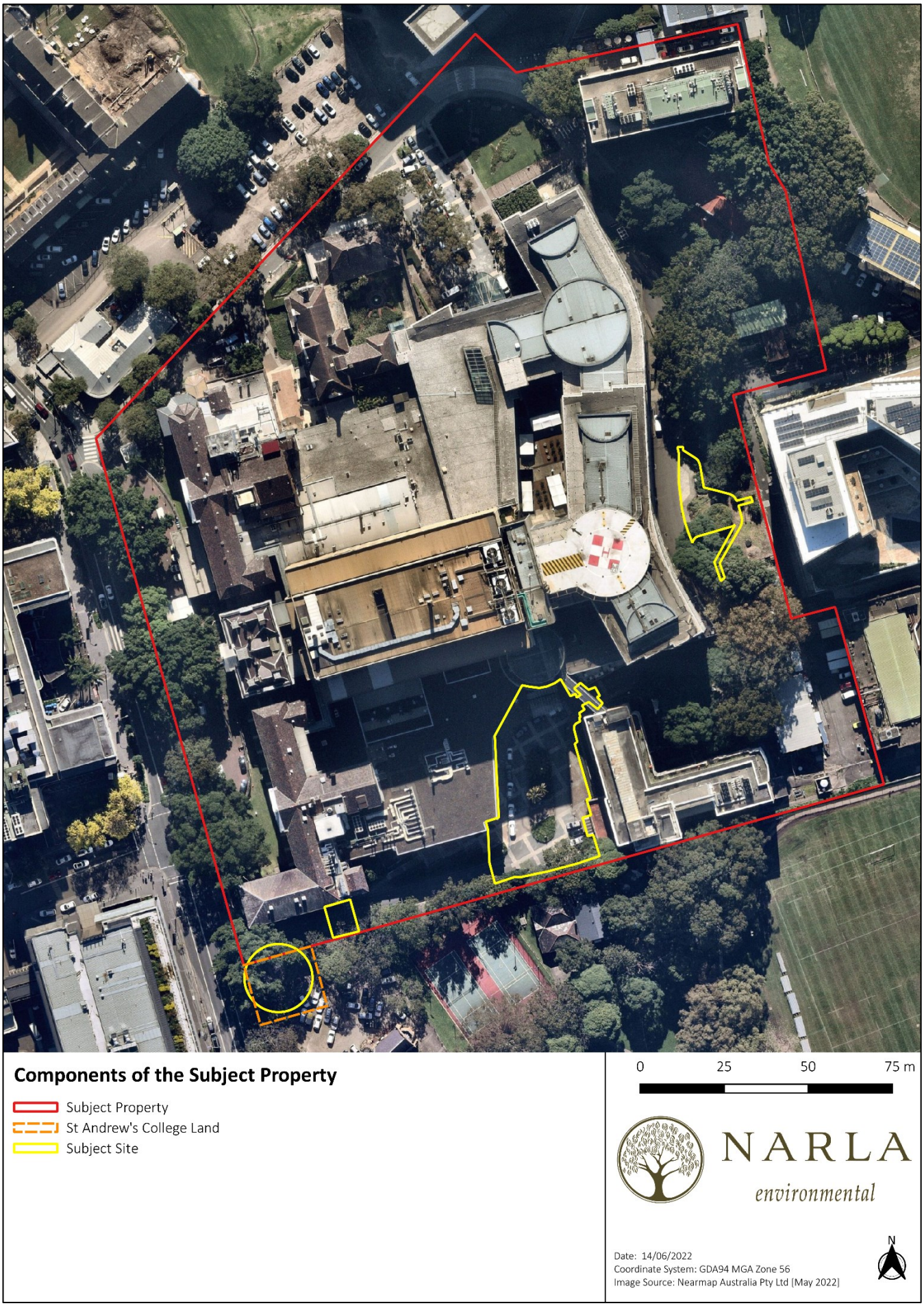


Figure 1. Components of the Subject Property including the Subject Site.

Results

Vegetation communities

Historical Vegetation Mapping (OEH 2016a) indicates the presence of Urban Exotic/Native vegetation within the Subject Site. The results of the site assessment confirmed the vegetation within the Subject Site best conformed to Urban Exotic/Native vegetation (**Figure 2**).

The vegetation within the Subject Site was comprised of planted vegetation (**Plate 1**). Natives canopy species identified within the Subject Site included historically planted *Corymbia citriodora* (Lemon-scented Gum), *Flindersia australis* (Crow's Ash), *Lophostemon confertus* (Box Brush) and *Livistona australis* (Cabbage-tree Palm). The canopy was dominated by the following exotic species: *Ficus macrocarpa* (Curtain Fig), *Cinnamomum camphora* (Camphor Laurel), *Jacaranda mimosifolia* (Blue Jacaranda) and *Cupressus* spp. (Cypress).

The mid-storey was relatively sparse throughout, made up mostly of exotic species such as *Camelia japonica* (Common Camelia), *Celtis sinensis* (Chinese Celtis), *Magnolia grandiflora* (Southern Magnolia), *Rhaphiolepis indica* (Indian Hawthorn) and *Ricinus communis* (Castor Oil Plant). The Priority Weeds, *Cestrum parqui* (Green Cestrum) and *Opuntia stricta* (Prickly Pear) were also present. Mid-storey natives included minor occurrences of *Acmena smithii* (Common Lilly Pilly), *Harpullia pendula* (Tulipwood), *Waterhousea floribunda* (Weeping Lilly Pilly) and planted *Callistemon citrinus* (Crimson Bottlebrush). The ground layer was dominated by exotic species *Liriope muscari* (Lily Turf), *Agapanthus* spp. (Agapanthus), *Clivia miniata* (Bush Lily) and *Cenchrus clandestinus* (Kikuyu). Native ground layer species include *Dianella revoluta* (Blue Flax-lily), *Lomandra longifolia* (Spiky-headed Mat-rush) and *Solanum americanum* (Black Nightshade).

The vegetation within the Subject Site consisted primarily of exotic vegetation with a number of planted native species present. As the vegetation in this area contained exotic and native species that did not conform to any locally occurring native vegetation communities, it has been classified as Urban Exotic/Native.



Plate 1. Urban Exotic/Native vegetation identified within the Subject Site.

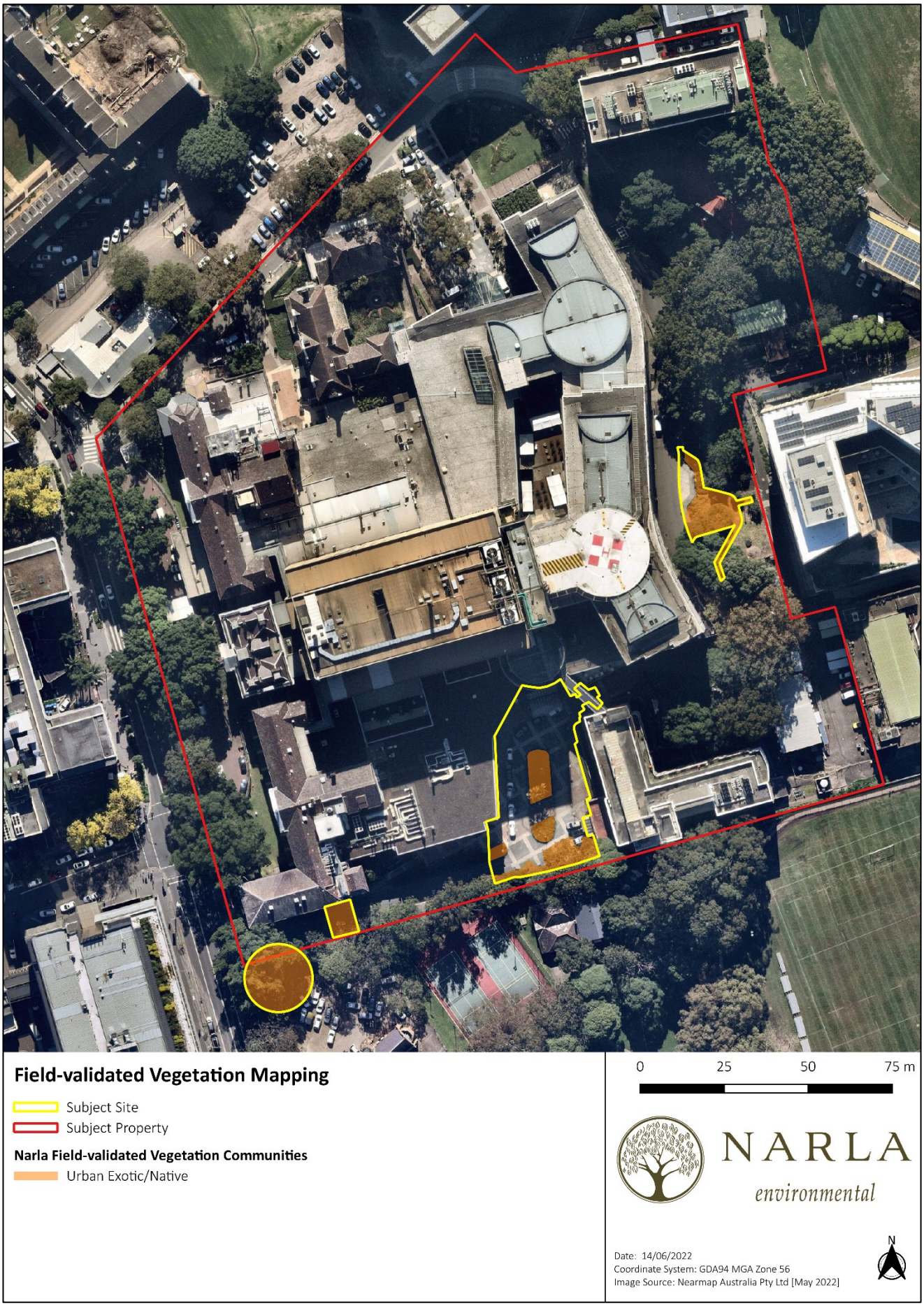


Figure 2. Narla field-validated vegetation communities within the Subject Site.

Threatened Ecological Communities

No BC or EPBC Act listed Threatened Ecological Communities (TECs) are associated with the vegetation identified within the Subject Site.

Threatened Flora and Fauna

No threatened flora or fauna species listed under the BC Act or EPBC Act were identified within the Subject Site during the site assessment. Although hollow-bearing trees were identified within the greater Subject Property, none occur within the Subject Site. Furthermore, no areas of outstanding biodiversity values occur within the Subject Site. It was therefore determined that a further impact assessment (Test of Significance; 5-Part Test) is not required for any locally occurring threatened species.

Impact Summary and Mitigation Measures

The proposed development for Stage 2 is limited to the removal of exotic vegetation (Martin Peacock Tree Care 2022), including four (4) exotic *Howea forsteriana* (Kentia Palm) and the pruning of a *Ficus macrocarpa* (Hills Weeping Fig). No impacts to native vegetation or native fauna habitat are anticipated as a result of the proposed development.

The following impact mitigation and minimisation recommendations have been proposed to minimise impacts (both direct and indirect) on ecological values as a result of the proposed development:

- Tree Protections: Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970) outlines that a Tree Protection Zone (TPZ) is the principal means of protecting trees on construction sites. It is an area isolated from construction disturbance so that the tree remains viable. All works should be avoided within the TPZ;
- Erosion and Sedimentation: Adequate erosion and sediment measures must be in place at all times during construction activity. Always follow best practice guidelines (Landcom 2004); and
- Storage and Stockpiling (Soil and Materials): All storage, stockpile and laydown sites must be positioned away from trees that are to be retained. Appropriate erosion and sediment control should be erected around soil stockpiles to avoid incurring indirect impacts on biodiversity values.

Conclusion

The site assessment revealed that the vegetation within the Subject Site was highly degraded, comprising exotic groundcovers and planted garden species. The proposed development for REF 2 will occur entirely within exotic vegetation. No direct or indirect impacts are expected to occur to native flora or fauna species. The mitigation measures outlined in this assessment will ensure no direct or indirect impact ecologically sensitive features surrounding the Subject Site.

Sincerely,

Polina Zadorojnaya
Project Manager/ Ecologist
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References

Australian Government Department of Agriculture, Water and the Environment (DAWE) (2022) Protected Matters Search tool. http://environment.gov.au/epbc/protected-matters-search-tool

Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970)

Bannerman and Hazelton (2011) Soil Landscapes of the Penrith 1:100,000 Sheet report, digital reprint, Office of Environment and Heritage, Sydney

Department of Planning and Environment (DPE) (2022a) NSW BioNet. The website of the Atlas of NSW Wildlife http://www.bionet.nsw.gov.au/

Department of Planning and Environment (DPE) (2022b) eSPADE v2.0 https://www.environment.nsw.gov.au/eSpade2Webapp#

Government Spatial Services (SIX Maps) (2022) NSW Government Land & Property Information Spatial Information Exchange map viewer, https://six.nsw.gov.au/

Jacobs (2022) Architectural Drawings - REF2-000 – REF2–3231 (Rev C)

Martin Peacock Tree Care (2022) Arboricultural Impact Assessment Report, Royal Prince Alfred Hospital Camperdown

Nearmap Australia Pty Ltd (2022) Royal Prince Alfred Hospital, Camperdown

Office of Environment and Heritage (OEH) (2016a) The Native Vegetation of the Sydney Metropolitan Area. Version 3.1. VIS_ID 4489

Office of Environment and Heritage (OEH) (2016b) The Native Vegetation of the Sydney Metropolitan Area. Volume 2: Vegetation Community Profiles. Version 3.0. NSW Office of Environment and Heritage, Sydney.

PlantNET (2022) The NSW Plant Information Network System, Royal Botanic Gardens and Domain Trust, Sydney. http://plantnet.rbgsyd.nsw.gov.au

Robinson (2003) Field Guide to the Native Plants of Sydney, Third Edition, Kangaroo Press



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Genevieve Hastwell

From: Liam Hearne <liam.hearne@tsamgt.com>
Sent: Monday, 6 June 2022 3:38 PM
To: Genevieve Hastwell; Tim McNair
Subject: FW: St Andrews College Tree Pruning

CAUTION: External emails may be unsafe.

Hi Genevieve – success – see below

Liam Hearne
Project Manager

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Land of the Gadigal people of the Eora nation
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liam.hearne@tsamgt.com / www.tsamgt.com

I acknowledge the Traditional Owners and Custodians of the lands on which I live and work and pay my respect to Elders past, present and future.

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From: Adam Ward <workshop@standrewscollege.edu.au>
Sent: Monday, 6 June 2022 3:32 PM
To: Liam Hearne <liam.hearne@tsamgt.com>
Cc: Bill Wallis <works@standrewscollege.edu.au>; Ian Smith <bursar@standrewscollege.edu.au>
Subject: RE: St Andrews College Tree Pruning

Thankyou Liam,

Hope your well also.

The college approves of the tree pruning as per our discussion, all specifications, OHS and other mandatory requirements are meet.

Apologies for the delay.

If you require any more information please reach out.

Kind regards
Adam

Adam Ward
Facilities Coordinator
St Andrew's College
within the University of Sydney
19 Carillon Ave Newtown 2042

P: (02) 9565 7309
E: workshop@standrewscollege.edu.au
W: www.standrewscollege.edu.au

From: Liam Hearne
[mailto:liam.hearne@tsamgt.com]
Sent: Monday, 6 June 2022 2:07 PM
To: Adam Ward <workshop@standrewscollege.edu.au>
Subject: RE: St Andrews College Tree Pruning

Hi Adam,

Hope you're well.

Just following up on this – any chance you could outline your satisfaction with our proposals?

Cheers,

Liam Hearne
Project Manager

Level 15, 207 Kent Street, SYDNEY, NSW 2000
Land of the Gadigal people of the Eora nation
M:+61 403 867 501 / O:+61 2 9276 1400
liam.hearne@tsamgt.com / www.tsamgt.com

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From: Liam Hearne
Sent: Wednesday, 25 May 2022 10:28 AM
To: Adam Ward <workshop@standrewscollege.edu.au>
Cc: Tim McNair <tim.mcnair@tsamgt.com>
Subject: RE: St Andrews College Tree Pruning

Hi Adam,

Hope you're well.

Are you able to provide me with written confirmation of St Andrew's approval for the tree pruning as discussed and as described in the tree pruning specification?
Our planner has requested this for inclusion in our REF application.

Apologies for the late request but we would need this from you this week if possible.

Kind regards,

Liam Hearne
Project Manager

Level 15, 207 Kent Street, SYDNEY, NSW 2000
Land of the Gadigal people of the Eora nation
M:+61 403 867 501 / O:+61 2 9276 1400
liam.hearne@tsamgt.com / www.tsamgt.com

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From: Liam Hearne
Sent: Tuesday, 8 March 2022 10:45 AM
To: Adam Ward <workshop@standrewscollege.edu.au>
Cc: Christopher Batch (Sydney LHD) <Christopher.Batch@health.nsw.gov.au>; Jon Gowdy (Sydney LHD) <jon.gowdy@health.nsw.gov.au>; Kristina Zarkos (Sydney LHD) <kristina.zarkos@health.nsw.gov.au>; Katherine Bennett (Sydney LHD) <Katherine.Bennett1@health.nsw.gov.au>; Bill Wallis <works@standrewscollege.edu.au>; prue.tarmizi@health.nsw.gov.au; Tim McNair <tim.mcnair@tsamgt.com>; Greg Barlow <greg.barlow@tsamgt.com>; martin@martinpeacocktreecare.com.au; shane.oakes@health.nsw.gov.au; Michael Smytheman (Health Infrastructure) <Michael.Smytheman@health.nsw.gov.au>
Subject: RE: St Andrews College Tree Pruning

Morning Adam,

Thank you for meeting with Chris Batch and I yesterday morning in the rain.

Attached is the arborist's tree pruning specification. The report outlines in written and diagrammatic format the tree pruning proposed.
I have also copied in Martin Peacock, our arborist.

As discussed yesterday, it is our intention to include this tree pruning with other RPA development works under a Review of Environmental Factors (REF) rather than a separate pruning permit application to City of Sydney.

Please feel free to reach out if you have further queries.

Kind regards,

Liam Hearne
Project Manager

Level 15, 207 Kent Street, SYDNEY, NSW 2000
Land of the Gadigal people of the Eora nation
M:+61 403 867 501 / O:+61 2 9276 1400
liam.hearne@tsamgt.com / www.tsamgt.com

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From: Adam Ward <workshop@standrewscollege.edu.au>
Sent: Thursday, 3 March 2022 6:11 AM
To: Liam Hearne <liam.hearne@tsamgt.com>
Subject: St Andrews College Tree Pruning

Good morning Liam
This is Adam I am currently looking after bills position while his on a short break .
Friday 5 should be fine my phone number is 0499887040
If you would like a chat over the phone otherwise please give me a call when you are here.
Covid safe practices are also still in place at our college.
Please bring or know the scope of works given to you from St Andrews as this is the first I am hearing of this and would like to have a look.

Kind regards
Adam

St Andrew's College
CELEBRATING 150 YEARS
Born of the Scottish Enlightenment

Adam Ward
Facilities Coordinator
St Andrew's College
within the University of Sydney
19 Carillon Ave Newtown 2042

P: (02) 9565 7309
E: workshop@standrewscollege.edu.au
W: www.standrewscollege.edu.au

Martin Peacock Tree Care
Arboricultural & Horticultural Consultancy

Attn: Liam Hearne
TSA Management
Level 15/207 Kent Street
SYDNEY
NSW 2000

10th February 2022

Re: Pruning Specification – RPA Hospital Access

This Pruning Specification has been commissioned by TSA Management on behalf of Sydney Local Health District in relation to the pruning of one (1) *Ficus microcarpa var. Hillii* (Hills Fig) growing within the St Andrews College campus at the University of Sydney. The tree is located in the north-western corner of the campus at the junction of Missenden Road and Gloucester House Drive (refer Appendix A – Tree Location Plan). The crown of the tree extends over Gloucester House Drive and there is insufficient vertical clearance to allow for high sided vehicle access. Of particular concern is impediment to fire engine access in the event of an emergency.

This Pruning Specification provides details of the pruning works required to achieve a vertical crown clearance of 4.5m above Gloucester House Drive in order to allow for high sided vehicle access. Images and details of the branches recommended for pruning are contained with Appendix B – Pruning Specification. It should be noted that the pruning works will require approval form both the St Andrews College and the City of Sydney Council.

All pruning works should be undertaken by a qualified Arborist (minimum AQF level 3) in accordance with Australian Standard *AS4373 (2007) Pruning of Amenity Trees*. The arboricultural contractor shall be covered by adequate third party, public liability insurance. Arborists and ground staff shall comply with the *Work Cover Code of Practice for the Amenity Tree Industry*. The branches recommended for pruning represent less than 5% (estimated) of the trees total crown volume.

It should be noted that a large diameter second order branch which supports a significant portion of the trees crown and therefore cannot be pruned, projects slightly into the space above Gloucester House Drive and reduces the vertical clearance within

500mm (approx.) of the kerb on the southern side of the road to 4.3m (approx.). Although the retention of this branch should not impede high sided vehicle access, to prevent potential accidental impact damage when turning in and out of Gloucester House Drive, reflective marker(s)/signage should be attached to the branch at the 4.3m point and markings applied to the road surface below to indicate that high sided vehicles should swing wide of the kerb when turning in or out. The reflective marker(s) /signage should be installed under the supervision of a qualified arborist (AQF level 5). Stainless steel screws of sufficient length to allow for the future growth of the tree should be used to attach the reflective marker(s)/signage. The installation of screws into the tree should cause only very minor, localised tissue damage and should not impact either the health or structural condition of the tree. It should be noted that a similar, low branch marking strategy has been adopted for a row of heritage Fig trees along Fisher Road within the University of Sydney campus.

Please do not hesitate to contact me if you have any questions.

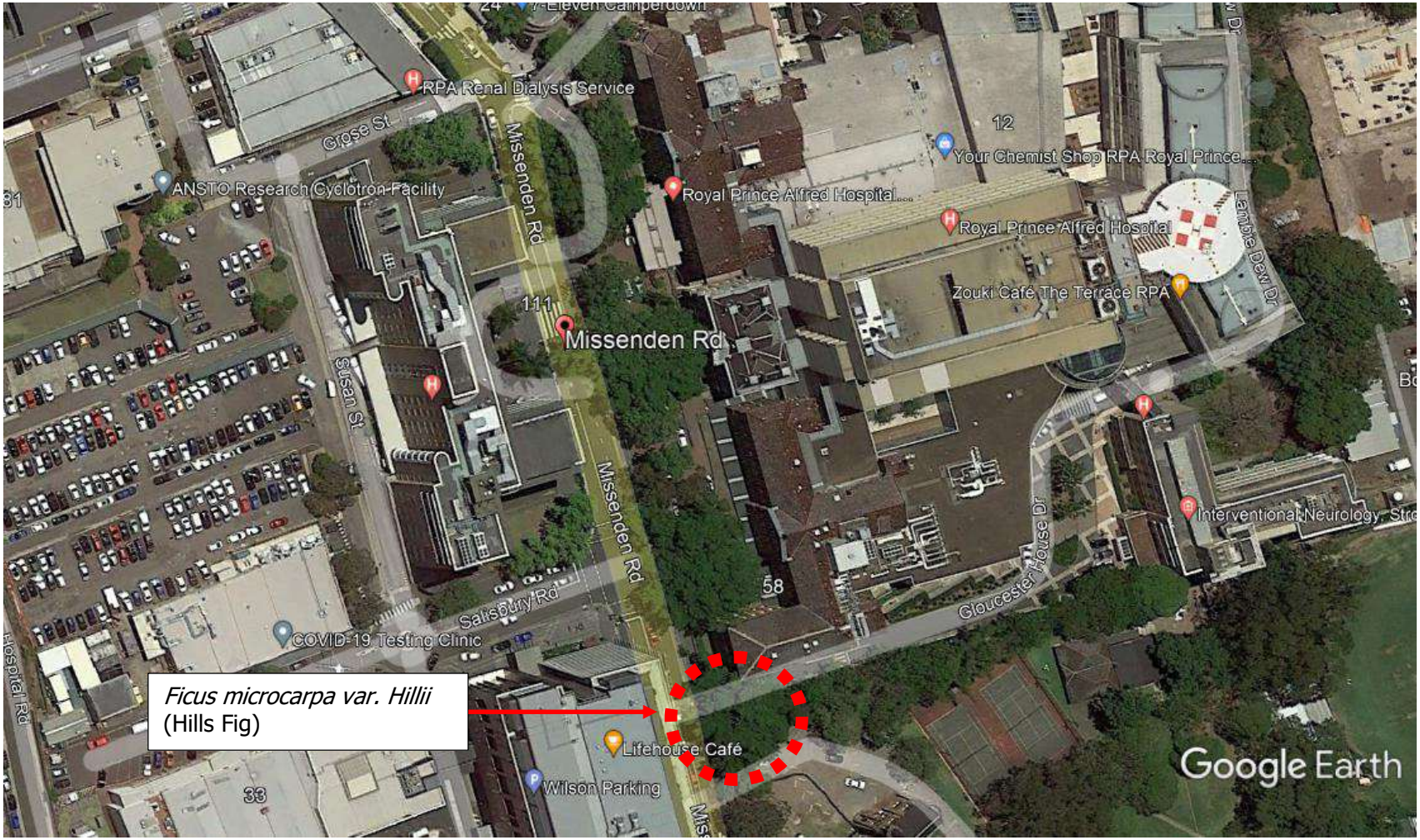


Martin Peacock

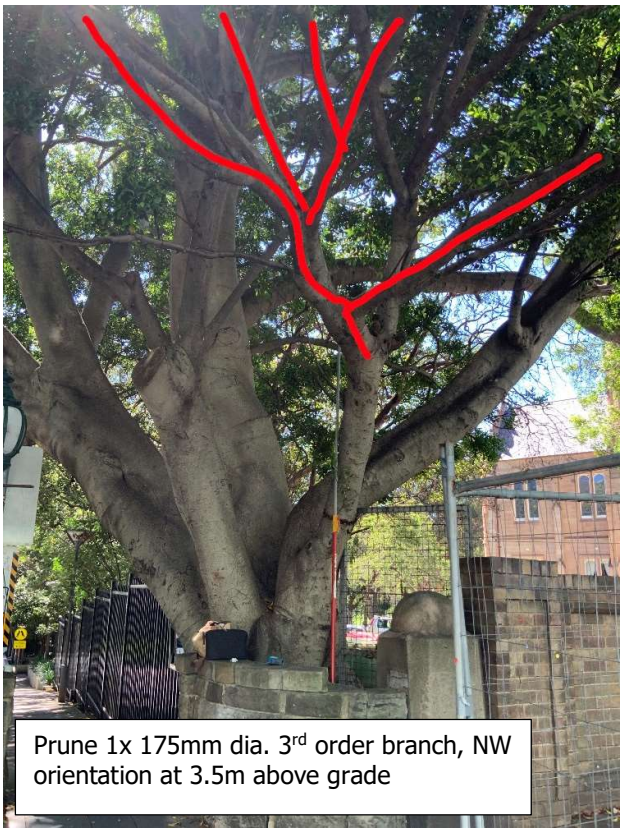
BSc (hons.) Arboriculture (UK)
Higher National Diploma Arboriculture (UK)
National Diploma Horticulture (Arb.) (UK)
Diploma Horticulture (Landscape Design) (AUS)



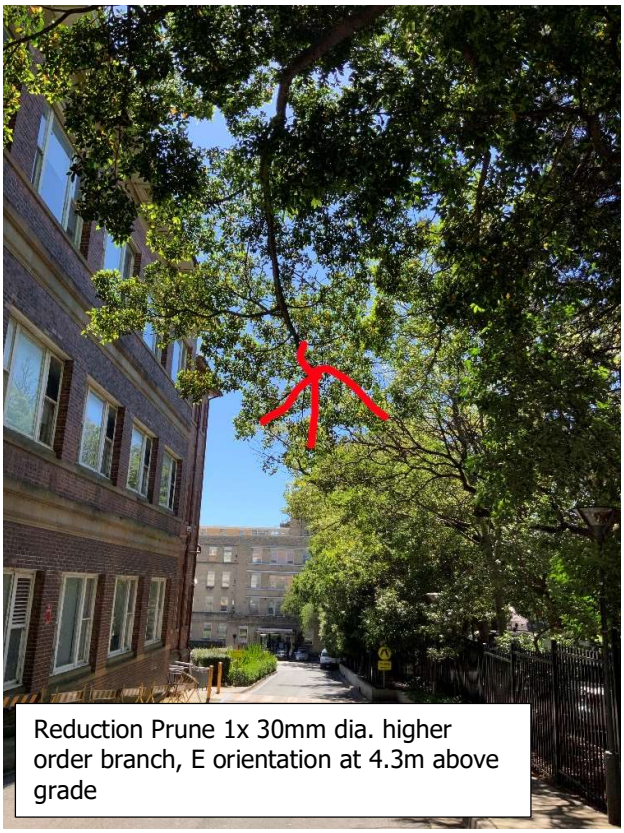
Appendix A – Tree Location Plan



Appendix B – Pruning Specification



Prune 1x 175mm dia. 3rd order branch, NW orientation at 3.5m above grade



Reduction Prune 1x 30mm dia. higher order branch, E orientation at 4.3m above grade

Preliminary Construction Management Plan – Gloucester House Bridge and Road Works

June 2022 \ DRAFT

Revision History

Revision No.	Date	Issued	By
DRAFT	07/06/2022	Architectus	Liam Hearne
v.0.2	09/06/2022	Architectus	Liam Hearne

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Document Control

Prepared for issue:	Liam Hearne	Date:	09/06/2022
Approved for issue:	Tim McNair	Date:	09/06/2022

Contents

1. Purpose of the Report 4
2. Introduction 5
3. Key Participants / Stakeholders 7
4. Indicative Programme 7
5. Operating Hours and Contacts 8
6. Construction Methodology 8
7. Business Continuity Principles 10
8. Site Management 11
9. Traffic Management 13
10. Work Health and Safety 14
11. Environmental Health and Safety 14
12. Infection Control Management 15
13. Services Diversions 16
14. Dilapidation Report 16

APPENDIX A – ACOUSTIC REPORT 17

1. Purpose of the Report

This Preliminary Construction Management Plan has been prepared to support a Review of Environmental Factors (REF) on behalf of Health Infrastructure for the package of works outlined in Section 2.1 as part of the Royal Prince Alfred (RPA) Hospital Redevelopment.

This Report has been drafted to outline preliminary parameters for site management practices during construction and is intended to provide sufficient information to support the REF, prior to engagement of a suitably qualified and experienced contractor.

It is noted that it is the responsibility of the Contractor to prepare detailed Environmental and Site Management Plans in accordance with the REF, for approval and implementation during construction.

2. Introduction

2.1 Overview and Proposed Works

The proposed activity is part of a suite of campus wide infrastructure upgrades to occur in the near future.

A summary of the proposed activity within this REF is provided below.

Bridge and walkway (within the Gloucester House building):

- Demolition of existing lower level (Level 4) bridge/walkway; and
- installation of new, stepped access way to Level 4 to provide a 4.5 metres clearance to the roadway.

Associated road works to Gloucester House Drive

- Reconfiguration of the traffic island and road surface at Main Patient Entrance
- Provision of a traffic management system to control access of delivery vehicles
- Adjustments to humps, footpaths and kerb lines, tree pruning
- Installation of a turning bay adjacent to the loading dock on Lambie Dew Drive to facilitate access for delivery vehicles approaching from Gloucester House Drive
- Pruning of one (1) Ficus macrocarpa var. Hilli (Hills Fig) growing on the St Andrews College campus at the University of Sydney.

2.2 Site and Locality Description

The RPA campus is located in Sydney's inner west suburb of Camperdown. It is situated between Sydney University to the east and the residential area of Camperdown to the west. The campus is divided by Missenden Road, which runs north to south dividing the campus into two distinct portions, called East Campus and West Campus. The northern boundary of the campus is defined by the Queen Elizabeth II Rehabilitation Centre and the southern extent of the campus is defined by Carillon Avenue.

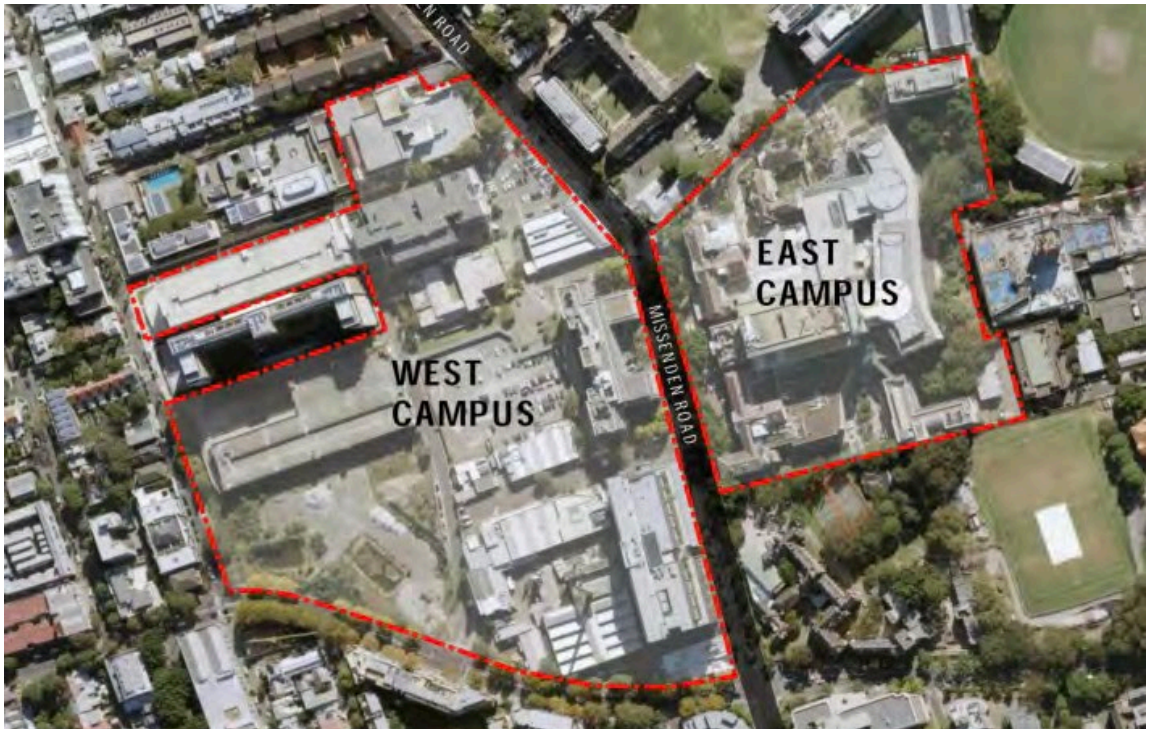


Figure 1 RPA Hospital campus

RPA incorporates a diverse range of operations including research, education, student housing, acute quaternary health services, as well as healthcare in both private and public domains. The larger precinct is defined by the Greater Sydney Commission as the Camperdown Health, Education and Research Precinct (CHERP) and is identified as an innovation and economic development zone for NSW.

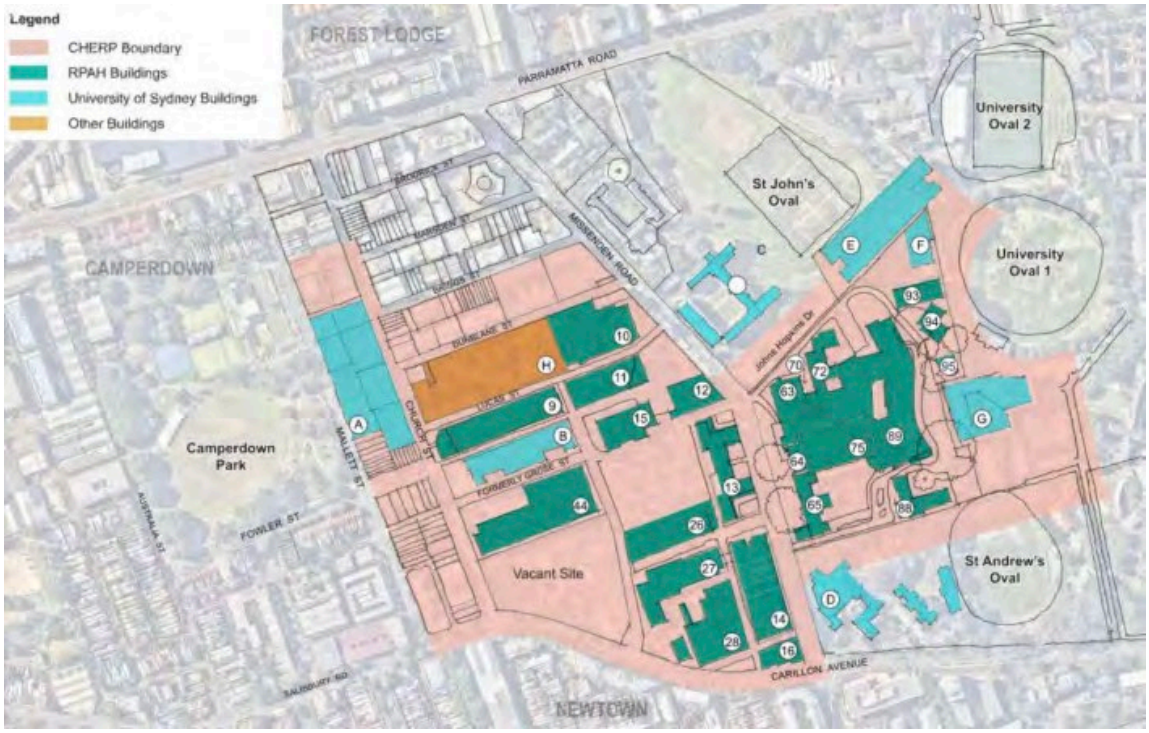


Figure 2 RPA Hospital buildings in relation to the CHERP

3. Key Participants / Stakeholders

The Project Organisational chart is as follows:

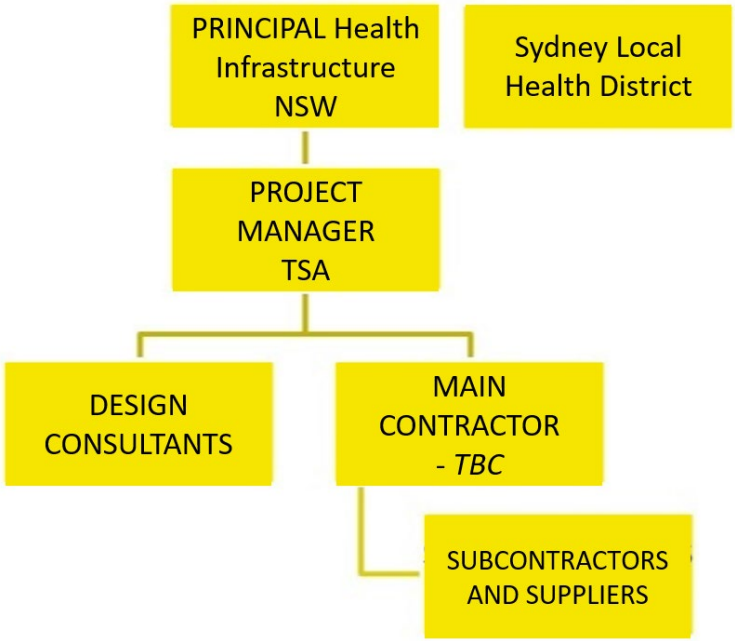


Figure 3 Project Organisational Structure

4. Indicative Programme

An indicative programme for the Works outlined in Section 2.1 is noted below. The Contractor will provide a detailed programme.

Milestone	Construction Duration	Indicative Program
Gloucester House Bridge and Roadworks	24 weeks	August 2022 - February 2023

5. Operating Hours and Contacts

5.1 Proposed Site Working Hours

Due to the nature of the scope, the work is proposed to be completed with extended working hours as below:

Day	Standard Construction Hours	Proposed Construction Hours
Mon-Fri	7am to 6pm	7am to 6pm + OOHW as required for access
Saturday	8am to 1pm	7am to 1pm + OOHW as required for access
Sunday and Public Holiday	No work	No work other than OOHW as required for access

Some works such as connecting and disconnecting services and works that are considered disruptive may need to be completed during certain hours, beyond the limitations above, to ensure minimal impact on hospital operations. These works are to be planned in consultation with stakeholders and subject to Disruption Notice applications to ensure all aspects of the works are clearly understood by all parties to minimise disruption.

5.2 Contact Details

The Principal Contractor will identify the key points of contact that will be co-coordinating all on site construction related activities. The point of contact for the Project Manager is:

Liam Hearne – Project Manager, TSA Management

Phone: 0403 867 501

Email address: liam.hearne@tsamgt.com

5.3 Complaints / concerns

Complaints or concerns that residents, hospital users/staff or members of the public have with the site or any construction-related activity should be raised with the Project Manager.

6. Construction Methodology

This plan has been compiled for a REF application to provide a high-level overview of the delivery of the works. The plan will be further developed by the Principal Contractor to respond to detailed site planning prior to commencing works. The CMP will then remain a 'live' document reflecting the site delivery parameters for the duration of the project. The Plan covers the below areas of management.

- Business Continuity Principles;
- The operations of site management when undertaking the works;
- Traffic/pedestrian management for the duration of the works;

- Work Health and Safety;
- Environmental Health and Safety;
- Infection Control Management;
- Services diversions;
- Dilapidation report.

7. Construction Activities

The proposed materials and estimated quantities are outlined in the table below:

Material	Unit	Qty
Gloucester House Bridge		
Concrete floor	m3	4
Mesh	m2	21
Bondek Floor Decking	m2	21
Structural Steel	t	3
Balustrade/Handrail	m	25
Glazing (new)	m2	23
Soffit Lining	m2	35
Floor Vinyl	m2	38
Electrical – LED's	No.	31
Gloucester House Road & Lambie Dew Drive		
Bulk Excavation	m3	46
Backfilling – Imported material	m3	72
Backfilling – cut material	m3	46
Concrete kerbs	m	197
150mm compacted sub-base	m2	1,140
100mm compacted sub-base	m2	502
200mm thk concrete pavement	m2	1,140
125mm thk concrete pavement	m2	502
Brick pavers	m2	1,329
Metal balustrade	m	9
Tactile indicators	m2	72
Landscaping turfing	m2	44

8. Business Continuity Principles

The Works will be undertaken within a live health care environment. The Contractor will be responsible for the staging and sequencing of construction works in order to minimise the impact to the existing operations of the RPA Hospital and greater campus.

Key principles include:

- The works will be taking place in an operating hospital environment for the duration of the works. Enable the continuation of hospital operations on the RPA Hospital campus to continue to operate at full capacity during the construction works

- Separation of construction works from hospital operations to ensure:
    - The safety of hospital staff, patients and visitors
    - Segregation of construction activities to minimise impacts to hospital operations including departments above and below proposed works
- The hospital operations shall not be disrupted through the works. This shall be completed through the staging and sequencing of works in order to maintain hospital operations at all times.
- Early Notice of Disruptions – where disruptions such as noise, vibration, dust, services shutdowns, closure of pedestrian or vehicle paths/ access points, etc. are necessary, early notice must be provided to the Principal in accordance with the Disruption Notice process. The Contractor will provide minimum 10 working days' notice of disruption, however, shall socialise disruptions well in advance. Consultation will occur with the Principal, RPA/SLHD and all other relevant stakeholders to confirm an acceptable time/date/methodology for disruptions. Disruptions may be required to be completed outside of normal working hours.
- Infection Control – ensure the infection control of the hospital is maintained. This includes external construction works on the campus and any locations of construction in the existing hospital environment. The infection control of existing facilities must not be compromised by construction works. Refer Section 13 of this document for more on Infection Control Management.
- Provision of temporary services/ measures to support disruptions – where major disruptions are required such as service shut downs, or change of entry points, temporary arrangements such as alternative entry points, back up services, etc. shall be provided to the satisfaction of the Principal/ SLHD to facilitate the continued operation of the hospital. Refer Section 14 of this document for more on services diversions.
- Maintaining the compliance of all existing facilities during the works interface or connection with existing buildings or engineering system will be required. The Contractor must ensure the compliance and occupation of all existing facilities is maintained at all times.
- Maintain compliant access and egress pathways and if unable to do so, develop alternative pathways and the related documentation and notification of changes (e.g. update egress maps if fire/ evacuation pathways are altered).

9. Site Management

The works will be undertaken by a Principal Contractor. All statements and proposals documented in this Preliminary Construction Management Plan will be further detailed at the time of contract award for the Works to ensure alignment with the proposed methodologies and construction staging of the Contractor. This includes details of site layout, and logistics, construction zones, plant equipment and machinery.

9.1 Legislative and Regulatory Requirements

The Works will be undertaken in accordance with the following legislative requirements and any others that must be complied with, as required:

- National Construction Code 2011 comprising the Building Code of Australia;
- Applicable Australian Standards;
- Protection of the Environment Operations Act and Regulations;
- Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA);
- Environmentally Hazardous Chemicals Materials Act 1985;
- Protection of the Environment Administration Act and Regulations;

- Work, Health and Safety Act 2011 and relevant codes of practice and Standards;
- Work Health and Safety Regulation 2017;
- Code of Practice for the Safe Removal of Asbestos (NOHSC:2002(1998));
- Resource and Recovery Act 2001;
- Environmental Planning and Assessment Act 1987;
- Heritage Act 1997;
- Local Government Act 1993;
- Soil Conservation Act 1938;
- Threatened Species Conservation Act 1995 and Regulation;
- Biodiversity Conservation Act 2016;
- Native Vegetation Conservation Act 1997; and
- Australian Standard 4970-2009: Protection of Trees on Development Sites

9.2 Site Fencing, Public and Property Protection

The general principle is to separate construction areas of work from the public, hospital staff and visitors. Where there is a cross-over, this will be managed to ensure safety of all persons and equipment.

Appropriate hoarding/fencing (as specified in Australian Standards and SafeWork NSW requirements) will be installed to prevent public and staff access and to maintain security for the various areas of the works.

Site Notices will be erected at the boundary of the site. The site notices will include details of; Principal Contractor details, name of Site Manager and 24-hour contact number, approved hours of work, and details of the Principal and other appropriate stakeholders. Safety related statutory signage will also be erected on the boundary of the site in accordance with WorkCover requirements.

Site, precinct information and pedestrian signage and any temporary pedestrian measures required will be installed and maintained for the duration of the Works.

These public and property protection measures will be reviewed at the time of contract award and during regular PCG meetings, to ensure alignment with proposed preferred methodologies and construction stage and to ensure that the safety of the public and staff is maintained at all times during the works.

Potential nuisance will be minimised to the occupiers of adjacent areas of the Hospital. Typically, works will be hoarded off and completely segregated from public interaction. When interacting with adjacent spaces, the Contractor will ensure strict compliance with pre agreed operational methodologies.

9.3 Disruption Notices

Any planned disruptions to hospital operations will be managed through the process of Disruption Notices (DNs). For such stoppages, the DN will describe the applicable works, timetable, issues and risk management plans.

DNs are submitted by the contractor to the project manager and SLHD stakeholders for approval in advance of works commencing (minimum three days).

The Contractor shall (in consultation with the Project Manager) provide positive planning and communication through this process, including establishing a “Disruption and Shutdown Approval” process with an agreed format and regular meetings, communicated formally via email.

The Contractor shall give the Principal sufficient written notice of any operational service and infrastructure interruption or significantly noisy works (such as use jackhammers etc on Site), relating to or arising from the Works. The Contractor’s responsibility or obligation to comply with all relevant codes will remain unaffected by the giving of any such notice.

9.4 Site Access and Accommodation

Site access is to be controlled by the Principal Contractor at all times.

The site accommodation will be temporarily positioned in an unobstructed area and will avoid causing damage to existing trees. It is proposed that the contractor can position site accommodation in a landscaped area to the east of the Lambie Dew Drive loading dock.

10. Traffic Management

10.1 Traffic and Pedestrian Management Plan

Prior to construction works commencing, the Principal Contractor will develop a Construction Pedestrian and Traffic Management Plan which will detail how traffic, pedestrian and cyclist access will be managed during the construction works.

Traffic flows and vehicle/pedestrian separation are a major consideration and pedestrian routes are to be maintained throughout construction. Traffic control personnel will be provided by the Principal Contractor during operating hours, or as advised by the Principal Contractor within their Construction Pedestrian and Traffic Management Plan.

Key issues for traffic, pedestrian and cyclist management during construction to be considered in the Construction Pedestrian and Traffic and Management Plan include, but is not limited to:

- Provide safe and uninterrupted access for pedestrians and vehicles accessing the construction site, hospital site;
- Ensure maximum safety of site personnel, pedestrians, cyclists, commuters, and drivers;
- Minimise environmental nuisance and impact as a result of construction traffic;
- Ensure construction traffic does not unduly interrupt existing traffic flows on the local road network;
- Safe operation of buses and other transport services during construction in adjacent roads;
- Have no vehicles arrive at the site, without prior arrangement, outside the approved working hours;
- Encourage site workers to utilise local public transport system and car sharing wherever possible;
- Timely and effective implementation of traffic management measures;
- Maintain access at all times for hospital and stakeholder's deliveries.

Pedestrian and vehicular movements into and around the site will be maintained, or alternate routes determined where necessary, and be defined by clear signage. Where necessary, physical traffic management personnel will be used to guide pedestrians and vehicles safely. The contractor may be required to plan for night works to Gloucester House Bridge.

Temporary hoarding appropriate to the interaction between pedestrians and construction works (as per relevant codes and standards) will be constructed to prevent unauthorised access to the construction site. These hoardings and fences may be staged to allow for appropriate construction methodologies to be planned.

Deliveries to within the site will be managed through the existing road within the hospital as agreed with the Project Manager and SLHD. Relevant management controls to be implemented as required.

Materials will be staged and stored in such a way to promote a clear and safe work site. At all times, materials are to be stored safely within the work area or site compound. While loading and unloading vehicles, it will be clearly stated that vehicles must not obstruct roads, driveways and paths of egress from surrounding buildings or fire protection equipment.

11. Work Health and Safety

11.1 General

The Contractor is responsible for the construction work at all times until the work is completed under the Contract and is engaged as principal contractor and manager and controller of the premises for the construction work under Clauses 293 and 298 of the Work Health and Safety Regulations (NSW) 2017 (WHS Regulations). The Contractor is authorised to exercise such authority of the person conducting a business or undertaking that is commissioning the construction project as is necessary to enable it to discharge the responsibilities of principal contractor and manager and controller of premises imposed by the Work Health and Safety Act (NSW) (WHS Act) and Chapter 6 of the WHS Regulations.

The Contractor will maintain accreditation under the Australian Government Building and Construction WHS Accreditation Scheme (the Scheme) established by the Building and Construction Industry Improvement Act 2005 (BCII Act) while building work (as defined in section 5 of the BCII Act) is carried out. The Contractor must comply with all conditions of Scheme accreditation.

11.2 Design

The Contractor will consult with the Authorised Person to identify any risks to health and safety arising from the design.

11.3 WHS Management Plan

A Project WHS Management Plan NSW Government Work Health and Safety Management Systems and Auditing Guidelines 5th Edition (WHSMS Guidelines) and WHS Regulation will be implemented prior to commencing works.

11.4 Incident Reporting

Compliance with the WHS Act 2011 regarding incident reporting protocols will be maintained. The Principal will be notified immediately of any WHS Incidents.

12. Environmental Health and Safety

12.1 Environmental Impacts

An Environmental Management Plan (EMP) that complies with environmental legislation will be developed by the Principal Contractor. The EMP will describe the environmental strategy, methods, controls, and requirements for the execution of the Works. It will stand alone as the master document for site environmental activities.

The primary aim and objective of the EMP will be to provide a framework of procedures to minimise the impacts of the construction of the project on the environment. The environmental performance of the contractor will be monitored throughout the Works.

12.2 Incident Reporting

Ensure compliance with the notification and other requirements of the Protection of the Environment Operations Act 1997 (NSW) (POEO Act).

The Principal will be immediately notified of any pollution incident that may cause material harm to the environment, providing evidence that notification requirements of the POEO Act have been met, where applicable.

Details of any waste removed from the Site and not disposed of at a lawful facility will be reported immediately.

When requested, Contractor will provide an incident investigation report, including identification of the cause of the incident and corrective actions taken, in the form directed

12.3 Noise and Vibration Management

Note: This section is to be read in conjunction with the Noise and Vibration Impact Assessment in **Appendix A** prepared by Arup.

Noise from the construction site shall not exceed the limits set out in the Interim Construction Noise Guidelines, EPA and Australian Standards. No machine work will occur outside the approved working hours set unless approval has been given through the DN process.

The noise and vibration from the use of any plant equipment and/or building services associated with the premises shall not give rise to an offensive noise as defined under the provisions of the Interim Construction Noise Guidelines, EPA and Australian Standards.

As part of noise mitigation for the project, the contractor will be responsible for the management, checking of compliant maintenance regimes and statutory supervision of all equipment.

Guidelines for operational limits, identification of at-risk receivers and implementation of mitigation measures will be provided in a project Construction Noise and Vibration Management Plan. The objectives of the Construction Noise and Vibration Management Plan will be to:

- Ensure that construction works do not significantly impact background noise levels around the hospital precinct, and that applicable guidelines and regulations are met;
- Ensure all equipment operates within the applicable noise levels;
- Ensure that construction works do not cause sufficient vibration to damage surrounding buildings, and comply with the applicable guidelines and regulations;
- Vibration does not affect occupiers of the adjoining buildings; and
- Ensure construction methodologies adopted minimise the impact of noise, dust and vibration.

Reasonable methods (having regard to the use and operation of existing health facilities in close proximity to the *Site*) of noise suppression on all compressors, jack-hammers and other machinery of whatsoever will be implemented to ensure that the noise levels emanating from the Site during the Works are minimised.

12.4 Odour/ Fumes Control

Any potential odours, fumes/smoke associated with demolition and construction for the site will be assessed and minimised.

12.5 Waste Management and Recycling Principles

The Contractor will be required to recycle and reuse materials where possible. The contractor will be required to arrange for the sorting and recycling of waste materials and packaging to ensure maximum recycling is achieved. The contractor will be committed to achieving compliance with the EPA guidelines.

13. Infection Control Management

Infection prevention and control strategies must be implemented throughout the hospital campus that are consistent with national guidelines, including the availability of hand gels, ready access to personal protective equipment and attention to finishes.

The Contractor will develop an Infection Control Management Plan to ensure that all members of the construction team have a full appreciation of the project, the risks of infection posed by construction activities and how to manage these risks. The Infection Control Management Plan will outline the Contractor's approach to identifying any infection control risks and details the measures required to address the risk of infection resulting from the construction works.

The Contractor will regularly consult with the Principal to identify any infection control measures required to address the risk of infection resulting from the construction works.

14. Services Diversions

During the works, services diversions will be undertaken. In general, the following principles must be followed when diverting services:

- Any required services diversions/disruptions will be undertaken with full coordination, development and input with relevant HI, SLHD and authority stakeholders and will only proceed with approval, via a Disruption Notice process and appropriate consultation with the relevant service providers.
- Impacts on the hospital will be kept to the absolute minimum, which may result in 'Out of Hours' work.
- At all-times patient care will be paramount and staff and visitor safety, access and security maintained.

15. Dilapidation Report

Prior to commencing the works onsite and at completion, the appointed Principal Contractor will generate a Pre and Post Dilapidation Report. It is the Contractor's responsibility to ensure the report considers all areas reasonably impacted by the works. At a minimum the reports will consider the following areas:

- Infrastructure and services within reasonable proximity to the works; and
- Property, Buildings, or structures within reasonable proximity to the works including site sheds. This includes but is not limited to existing taxi rank, existing grass area adjacent ambulance bay and hospital street corridor adjacent works zones.

The full extent of the Dilapidation reports will be agreed with the Principal prior to investigations proceeding.

APPENDIX A – ACOUSTIC REPORT

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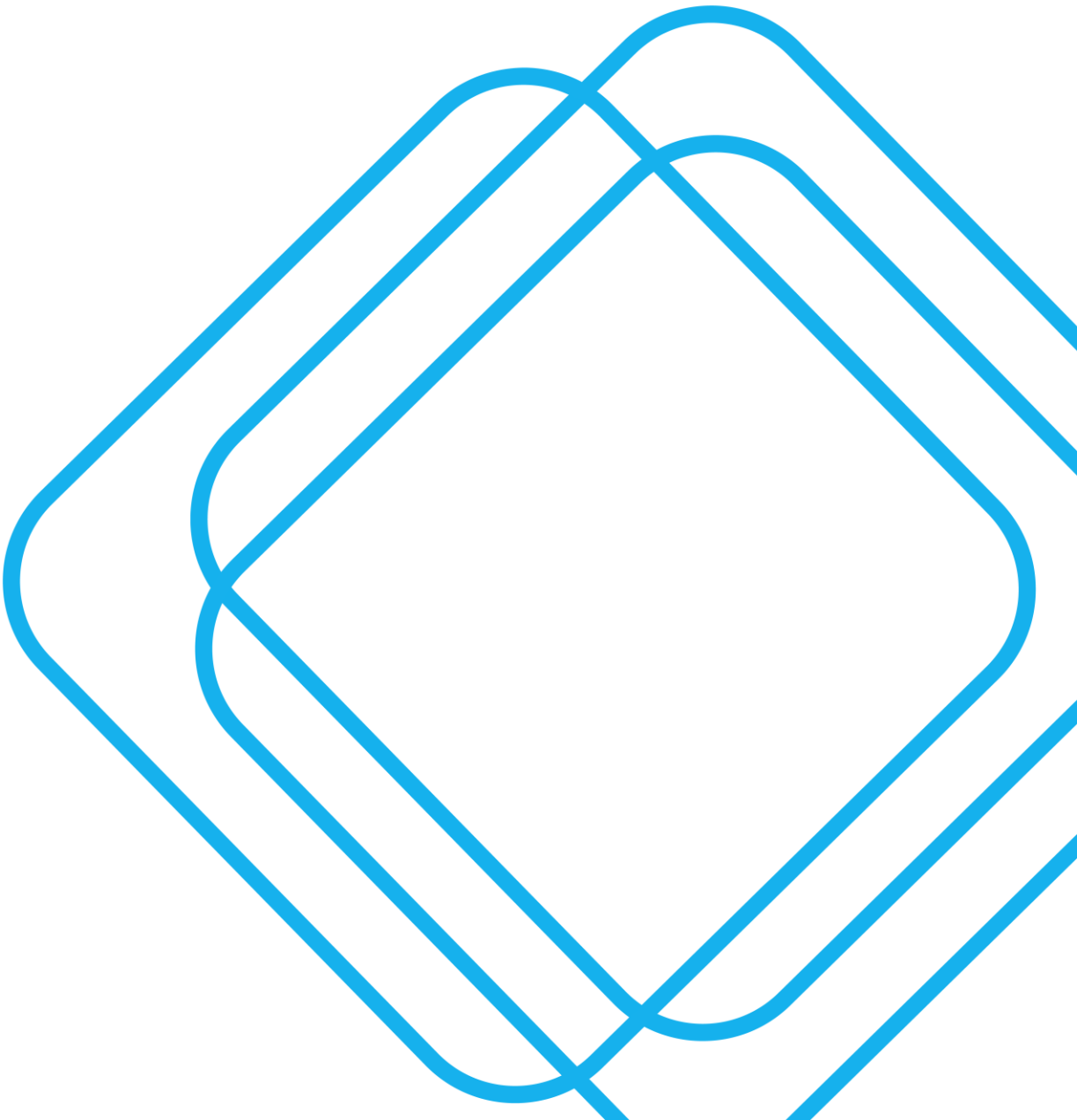
SCT Consulting



RPA HOSPITAL REDEVELOPMENT EARLY WORKS PACKAGE 2 REF

Traffic Impact Statement

2 JUNE 2022



Quality Assurance

Project:	RPA Hospital Redevelopment Early Works Package 2 REF		
Project Number:	SCT_00228		
Client:	Health Infrastructure	**ABN:**	89 600 377 397
Prepared by:	SCT Consulting PTY. LTD. (SCT Consulting)	**ABN:**	53 612 624 058

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Reviewed:	Jonathan Busch, Associate Director
Authorised:	Andy Yung, Director

Revision	Revision Date	Details
1.0	8 March 2022	Draft TIS for REF 2
2.0	18 May 2022	Removal of Lambie Dew Drive and services works
3.0	02 June 2022	Update of background context

Contents

1.0 Introduction 1
1.1 Background context 1
1.2 Scope of early works package 2 1
1.3 Purpose of this report 2
1.4 Structure of this report 2

2.0 Existing conditions 3
2.1 Travel behaviour 3
2.2 Road network 4
2.2.1 Missenden Road 4
2.2.2 John Hopkins Drive 5
2.2.3 Lambie Dew Drive 6
2.2.4 Gloucester House Drive 6
2.3 Main loading dock 8
2.4 Ausgrid easement arrangement 10
2.5 Servicing activities 11
2.6 Parking 11
2.7 Ambulance activity 12
2.8 Public transport 12
2.9 Active transport 13
2.9.1 Walking 13

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2.9.2 Cycling 14

3.0 Description of Proposal 15
3.1 Lambie Dew Drive works 16
3.1.1 Expansion of loading dock manoeuvring area 16
3.2 Gloucester House Drive works 17
3.2.1 Gloucester House Bridge 17
3.2.2 Gloucester House Plaza 18
3.2.3 Adjustment to raised crossing 18
3.2.4 Traffic Signals 19

4.0 Traffic Impact Assessment 20
4.1 Construction impacts 20
4.1.1 Lambie Dew Drive works impact 20
4.1.2 Gloucester House Drive works impact 20
4.1.3 Disruption to private property access 20
4.1.4 Parking impact during construction 20
4.1.5 Parking for construction workers 21
4.2 Operations impacts 22
4.2.1 Road network impacts 22
4.2.2 Public transport impacts 22
4.2.3 Active transport impacts 22
4.2.4 Parking impacts 22
4.2.5 Pick-up/drop-off impacts 22
4.3 Mitigation measures 23
4.3.1 Night-time works to minimise disruption to hospital operations during day 23
4.3.2 Managed loading dock access 23
4.3.3 Managed arrival times for daytime works 23
4.3.4 Signage for Gloucester House Plaza users 23

5.0 Construction traffic management plan 24

6.0 Conclusion 25

1.0 Introduction

1.1 Background context

In March 2019, the NSW Government announced a significant expansion of the Royal Prince Alfred (RPA) Hospital with the $750 million RPA Redevelopment Stage 1 Project ('the Project'). The Project will include the development of clinical and non-clinical services infrastructure to expand, integrate, transform and optimise current capacity at the RPA to provide contemporary patient-centered care that is evidence based including expanded and enhanced facilities and services for:

– Emergency Department (ED)
– Intensive Care Unit (ICU)
– Operating Theatres (OT)
– Interventional Cardiology
– Adult Acute Inpatient accommodation
– Medical imaging services (including Intervention)
– Clinical and non-clinical support services

The Project has currently completed Feasibility Development, with refinement of site wide infrastructure requirements and identification of a Preferred Service Configuration Option for further design development. The Project has identified opportunities to provide early capacity ("early works") or activities which are required to be complete before main works commences ("enabling works").

A summary of the enabling and early works as proposed within this REF is listed below.

1.2 Scope of early works package 2

Early works package 2 will allow Heavy Rigid Vehicle (HRV) / Fire Tender access to the main loading docks via Gloucester House Drive. The works involved include:

– Expansion of the loading dock manoeuvring area / turning bay
– Reconfiguration of the Gloucester House Bridge
– Reconfiguration and resurfacing of the Gloucester House Plaza area
– Adjustment to the road hump along Gloucester House Drive to enable HRV access

1.3 Purpose of this report

This Traffic Impact Statement was prepared in support of the Review of Environmental Factors (REF) for Early Works Package 2 as part of the RPA Hospital Redevelopment. This report presents the results of the following tasks undertaken:

– Existing conditions – review of the site location and existing traffic, parking, servicing, public transport, active transport facilities and conditions.

– Early works proposal – description of proposed early works and associated traffic changes.

– Transport and parking impact assessment – review of likely impact on traffic, parking, servicing, public transport, active transport facilities and conditions.

– Construction traffic management plan (CTMP) – preliminary overview of a CTMP to be used during construction works.

1.4 Structure of this report

This report has been structured into the following sections:

– Section 2 presents an overview of the existing traffic and transport conditions in the study area.

– Section 3 provides an overview of the proposal

– Section 4 presents a qualitative assessment of the construction, operational traffic impacts and suggested measures for mitigation

– Section 5 provides a preliminary overview of a construction traffic management plan to be used during construction works

– Section 6 concludes with a summary of the expected impacts.

2.0 Existing conditions

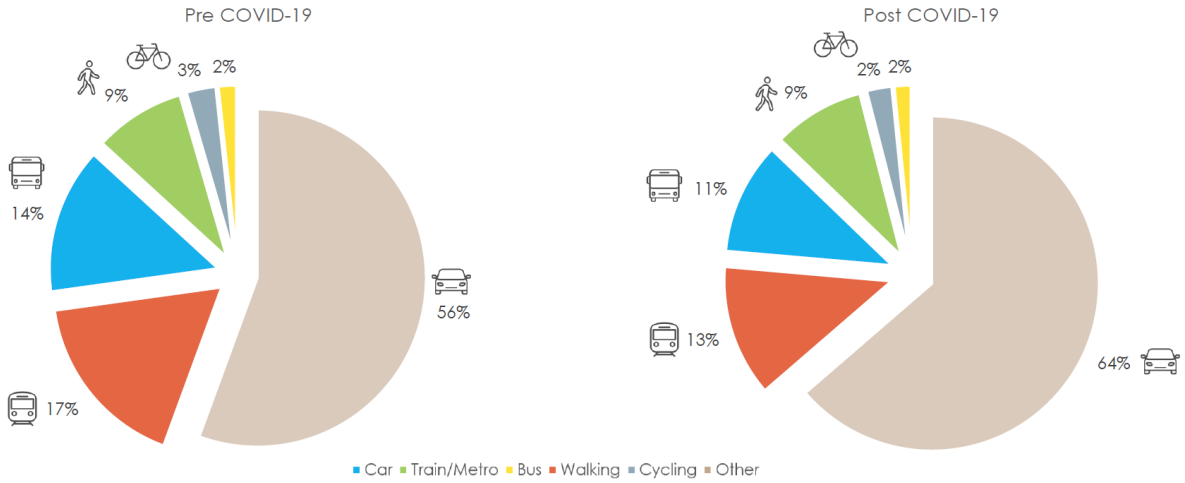
This section of the report discusses the existing traffic and transport context of the network that may be impacted by the proposed works of this Early Works Package.

2.1 Travel behaviour

A staff travel survey was conducted by SCT Consulting in June 2021 to determine the travel behaviour of staff and their and propensity to change travel modes. The survey had 1199 respondents, which is approximately 25% of staff.

The survey found that 64% of staff currently drive or are driven to the hospital, showing a significant increase from before COVID-19. Public transport is the next most common mode of transport, though a significant amount of these shifted to car use after the pandemic began.

Figure 2-1 Mode shares of workers in the RPAH and University of Sydney Travel Zones

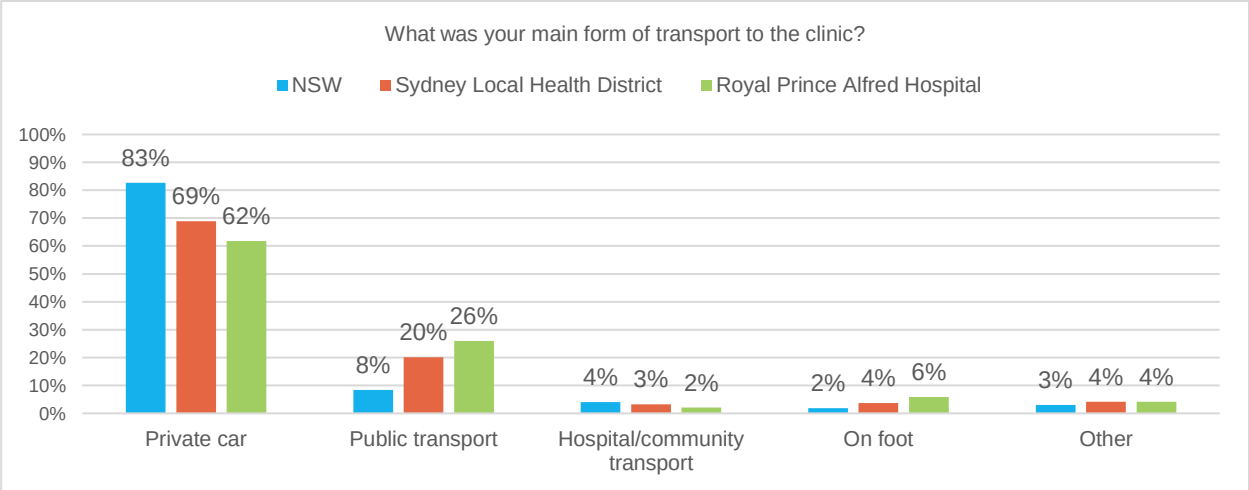


The shift to car use was liking driven by the recommendation from NSW Health to avoid taking public transport, as well as assistance provided by RPAH and City of Sydney to support drivers through free parking. Despite the roll-back of these assistance measures at the end of 2020, car use continued to remain higher than pre-COVID-19 levels.

RPAH had over 140,000 admissions in the 2017/18 financial year. While there is no formal travel survey for patients, the Bureau of Health Information (BHI) runs regular patient surveys across NSW that include questions on travel.

Patients at RPAH are less dependent on cars and are more likely to use public transport than the state average, as shown in **Figure 2-2**.

Figure 2-2 Mode shares of outpatients



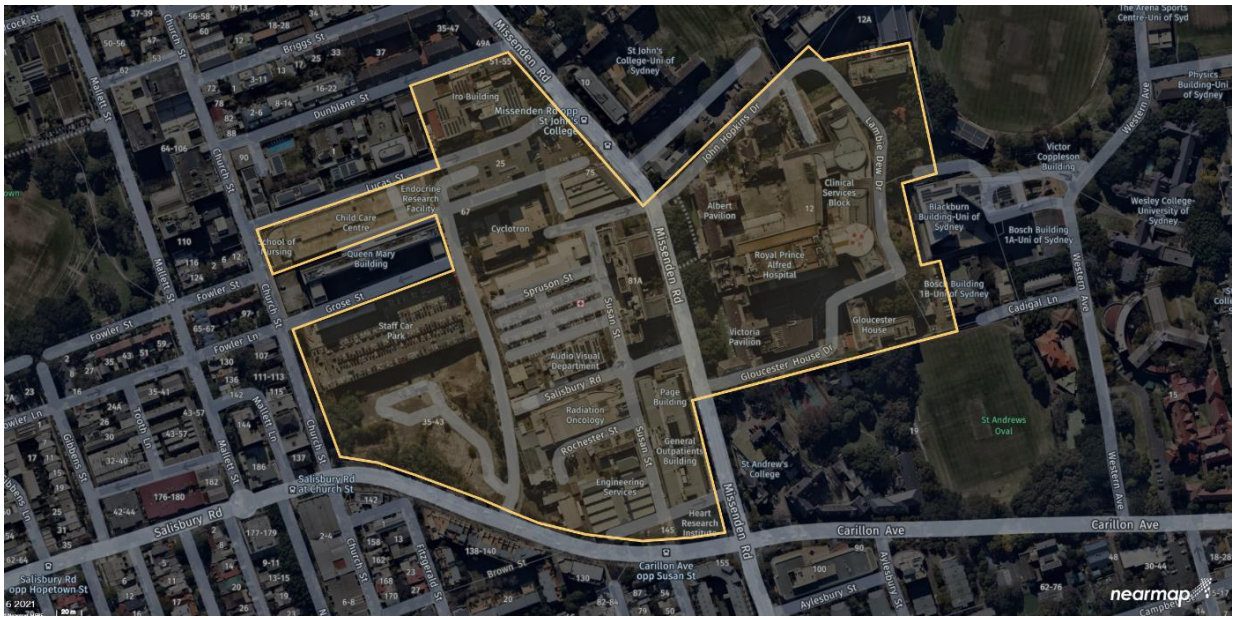
Source: Bureau of Health Information, 2016 Outpatients survey

Despite being lower than the state average for car use, the majority of hospital users still travel by car, meaning that parking facilities are currently an important resource for both staff, patients and visitors.

2.2 Road network

The hospital is serviced primarily by Missenden Road, which provides the hospital access to Parramatta Road and Carillon Avenue. This is supplemented by access on Church Street which runs along the western border of the hospital campus. A map of the hospital grounds and surrounding road network is presented in **Figure 2-3**.

Figure 2-3 Hospital boundary and road network



Base map source: Nearmaps, 2021

Missenden Road is the only access route for the eastern campus, which includes the main hospital building. A loop road, consisting of John Hopkins Drive to the north, Gloucester House Drive to the south and Lambie Dew Drive on the east services the eastern campus. This loop road provides vehicle access to critical hospital functions including the ambulance bay, women and babies, the main loading docks and patient pick-up and drop-off. This “eastern loop” has been the main access route for the Redevelopment investigations to date.

The western campus is located between Church Street and Missenden Road, which provide north-south access. Between these are, Salisbury Road, Brown Street, Grose Street, Lucas Street, and the staff car park access which run east-west. The western campus has the hospital’s main car parks and additional hospital facilities such as the administrative buildings, IRO, Renal dialysis, and radiation oncology.

2.2.1 Missenden Road

Missenden Road is the access corridor to the ED, the maternity ward and most other hospital buildings, while also being the primary north-south link through the area. Right-turn bans are in place from Parramatta Road eastbound onto the adjacent Mallett Street and Church Street, making Missenden Road the main north-south traffic corridor through the precinct.

Missenden Road has traffic calming treatments such as single lanes and on-street parking in both directions, wide pedestrian footpaths and multiple zebra crossings. This gives pedestrians a good level of priority along and crossing Missenden Road but could be an issue for ambulances and other patient transport in urgent situations.

There is a relatively constant flow of traffic on Missenden Road on the weekday (approximately 700 to 800 vehicles an hour in both directions between 7AM and 6PM). Flow may be disrupted by turning movements and pedestrian crossings, especially at the single-lane sections on Missenden Road. This is particularly important as pedestrian flows are relatively constant throughout the day with only relatively small peaks in the AM, PM and mid-day shift changeover.

Figure 2-4 Missenden Road, viewed from the north



2.2.2 John Hopkins Drive

John Hopkins Drive services the north of the main hospital building including mothers and babies, Kerry Packer Education Centre, the ambulance bay, and provides access to Lambie Dew Drive to the east. The road is located at the northern boundary of hospital land and cannot be widened due to St Johns College land to the north, and the main hospital building and Kerry Packer Education Centre to the south.

John Hopkins Drive is critical as it serves as the only route to the loading dock for large servicing vehicles as well as fire and rescue vehicles (due to clearance limits on Gloucester House Drive).

In addition to this, John Hopkins Drive also forms a key east-west pedestrian route into USYD. This route is part of a strategy to strengthen east-west pedestrian connections from Camperdown Park to Victoria Park through the creation of a green spine.

Figure 2-5 John Hopkins Drive, viewed from the east



2.2.3 Lambie Dew Drive

Lambie Dew Drive is the eastern portion of the loop road around the main hospital building. It provides vehicle access to Centenary Building, the level 2 car park and mortuary access, Building 94 (Tissue Pathology and Diagnostic Oncology), the Chapel, Ausgrid easement access, level 1, the main loading docks, and access to Cadigal Lane.

Key pinch points along the roadway are between the Centenary Building and the Main Hospital Building, and between Building 94 and the ramp up to the level 2 car park. Lambie Dew Drive also has a lot of trees that line the path, which would need to be removed if the roadway was to be widened. The pinch points limit the viability of pedestrian footpaths, which are mostly absent from Lambie Dew Drive. Instead, the road is currently signposted as a 10km/h shared zone to provide for pedestrian access.

Lambie Dew Drive is relatively narrow despite serving freight vehicles up to the size of HRVs. Due to bends in the road, traffic is sometimes restricted to one way movement when larger freight vehicles pass through, such as the bend outside Building 94 and the corner of Lambie Dew Drive and John Hopkins Drive. This is often exacerbated by delivery vehicles parking along Lambie Dew Drive during peak delivery hours where vehicles exiting must wait for parked vehicles to complete their delivery before further movement is possible.

Due to clearance limits on Gloucester House Drive, freight vehicles need to turn around on Lambie Dew Drive and exit via John Hopkins Drive. No turn around bays or turning heads are currently provided, with most freight vehicles using the delivery bays to complete the turnaround manoeuvre. The manoeuvre is particularly difficult for HRVs due to the length of these vehicles, especially if they are parked in Dock 2 which faces southward. Smaller rigid vehicles such as MRVs often drive to the southern end of Lambie Dew Drive where they can complete the turn around away from the loading dock.

Figure 2-6 Lambie Dew Drive, viewed from the north

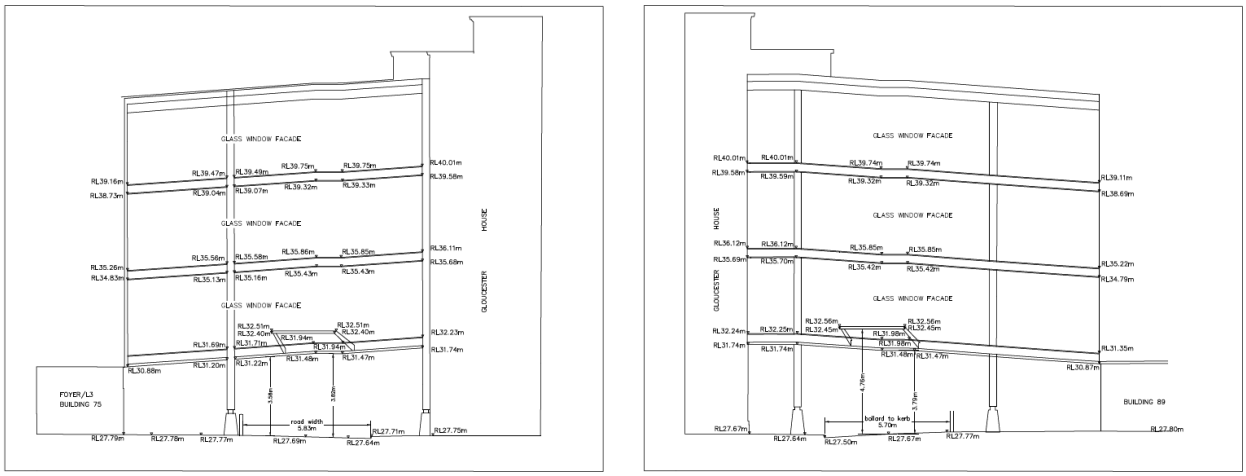


2.2.4 Gloucester House Drive

Gloucester House Drive services Gloucester House and the south side of the main hospital building and joins Missenden Road to Lambie Dew Drive. It includes a plaza area that provides short term parking for patient pick-up / drop-off, and some accessible parking spaces.

A triple level pedestrian bridge joins the main hospital building to Gloucester House on the east side of Gloucester House Drive, marking the beginning of Lambie Dew Drive. At this location, the road width is 5.7m with a clearance limit of 3.3m. A survey of the bridge height and a photo are provided in **Figure 2-7** and **Figure 2-8**.

Figure 2-7 Survey of Gloucester House connection to Main Hospital Building



Source: RPS Australia East, 2021

Figure 2-8 Photo of Gloucester House connection to Main Hospital Building from Lambie Dew Drive



The clearance available under the bridge does not permit thoroughfare of most freight vehicles (SRVs have a clearance height requirement of 3.5m) or fire and rescue vehicles (minimum 4.5m). The roadway width is also insufficient for two-way movement. In addition to the bridge above the roadway, a service tunnel also joins Gloucester House Drive to the Main Hospital Building below the roadway. The ceiling of the tunnel is approximately 1.1m below the surface of the road.

It was determined that the clearance height would have to be increased for Gloucester House Drive to support freight traffic, resulting in either the demolishing of the service tunnel below or the bottom floor of the pedestrian connection above.

Being designed mainly for patient and visitor access, the existing roadway paving, centre traffic island configuration as well as the raised pedestrian crossings on Gloucester House Drive are not suitable for movement of large vehicles such as HRVs and Fire Appliances. These would likely be blocked by parked cars in the plaza, or scrap the bottom of the vehicle on raised pedestrian crossings.

2.3 Main loading dock

The main loading dock is located on the south-east of the main hospital building, fronting on Lambie Dew Drive (**Figure 2-9** Main loading dock on Lambie Dew Drive, viewed from the south). This loading dock will be retained as the main loading dock after the redevelopment.

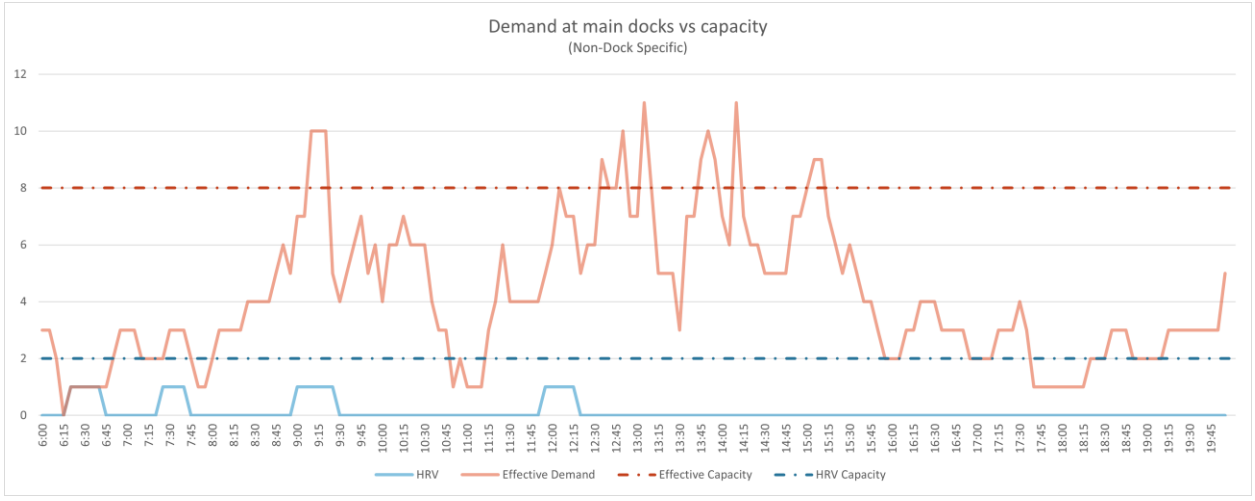
The loading docks are currently unmanaged and dock activity is highest between 9AM and 4PM. Vehicles accessing the loading dock range from small courier vehicles to HRVs.

Figure 2-9 Main loading dock on Lambie Dew Drive, viewed from the south



The demand for loading dock bays exceeds capacity during the peak periods. A survey of loading dock activity was undertaken in April 2021 and analysis shows the peak demand exceeding capacity by up to 3 bays. The loading dock demand is charted against capacity in **Figure 2-10**.

Figure 2-10 Main loading dock demand vs capacity, Wednesday 28 April 2021



Delivery vehicles that do not have a loading bay park along Lambie Dew Drive instead, restricting movement along the road. This is exacerbated by vehicles needing to turn around on Lambie Dew Drive (due to clearance limits on Gloucester House Drive) and is particularly evident when HRVs exit the loading docks. Due to limited manoeuvring room, a HRV would require multiple movements, usually 5-point turns or more, and sometimes use other empty loading bays to complete a turn around. A photo of the congestion at peak periods is shown in **Figure 2-11**.

Figure 2-11 Congestion on Lambie Dew Drive due to limited docking capacity



Courier vehicles are one of the main vehicle types delivering at RPAH. These vehicles only require a parking space to complete their delivery but are currently using the delivery bays as there are no other parking spaces available along Lambie Dew Drive. Alternatively, they are parking along the kerb to allow larger freight vehicles to use the available bays.

Advice from the logistics consultants suggested that a short-medium term solution for rapid expansion in loading dock capacity was to provide parking spaces for courier vehicles near the loading dock. This would allow the main delivery bays to be reserved for larger freight vehicles and retain space on Lambie Dew Drive for movement.

2.4 Ausgrid easement arrangement

Ausgrid has an easement agreement to be able to access the Susan Wakil chamber substation from Lambie Dew Drive. This is currently provided by the access road that links Lambie Dew Drive to the lane-way on the west of the Susan Wakil Building. An illustration of the access route is shown in **Figure 2-12**.

Figure 2-12 Ausgrid easement to Susan Wakil via Lambie Dew Drive



Ausgrid's access to the chamber substation must be maintained, or a suitable alternative provided. Ausgrid's access requirements, as listed in the NS113 are:

- All access ways must be located to ensure egress and ingress from or onto a public street or an all-weather heavy duty access roadway which complies with the BCA egress and ingress requirements.
- Must enable Ausgrid access at all times 24 hours a day, 7 days a week
- 4m wide minimum (increased width at bends and in manoeuvring area adjacent to the substation where lifting operations will be carrier out. Presumably we are not reducing the available area outside of the substation.)
- 4m high minimum
- All weather
- Heavy Duty access suitable for a 20T Franna.
- Must not be blocked by loading dock vehicles or equipment
- The surface grade along the Right of Way should not exceed 1:8
- The surface area in the transformer handling area should not exceed 1:20 (presumably we are not impacting the area outside of the substation.

The new Susan Wakil Building has provided additional vehicle access to the substation via the Susan Wakil loading dock but it has not been determined if there have been arrangements with USYD for the chamber substation to be accessed through the university ground.

2.5 Servicing activities

The main medical gas cylinder and bulk oxygen storage are located behind the engineering building off Susan Street. The existing location requires a challenging manoeuvre for service vehicles that have to navigate narrow service lanes to deliver gas cylinders or top up the bulk oxygen.

A secondary bulk oxygen container is located at the end of Cadigal Lane at the south-eastern corner of the hospital site. Cadigal Lane is a single lane access route that connects to, a road on USYD grounds, and is currently serviced by a vehicle reversing up to the container. Servicing also occurs at the Centenary Institute

Bulk liquid nitrogen is stored in tanks outside the Centenary building and serviced from the driveway to the main entrance.

Medical gas is serviced by bulk oxygen refill trucks (12.5m length) and medical gas cylinder delivery trucks (10.1m length).

2.6 Parking

Off-street car parks around the hospital are all paid facilities and are mostly located on the west side of the hospital campus. This includes the multistorey staff car park and the multistorey secure car park on hospital road which are the largest off-street car parks available near the hospital. The locations of these car parks are shown by capacity in **Figure 2-13**.

Figure 2-13 Carpark capacity by location



On-street parking is available along most surrounding streets, however, these have extensive time restrictions and prioritise residents. An occupancy check on weekdays revealed street parking was heavily utilised, at over 90%. parking capacity and therefore not relied on for hospital parking.

During the start of the COVID-19 pandemic, the hospital assisted its staff by providing free parking for staff at its car parks. The City of Sydney Council also assisted by giving the hospital 100 on-street parking permits to exempt hospital staff from on-street parking restrictions. Combined with the lower risk of contracting COVID-19 while driving (as opposed to public transport), a significant portion of staff started to drive.

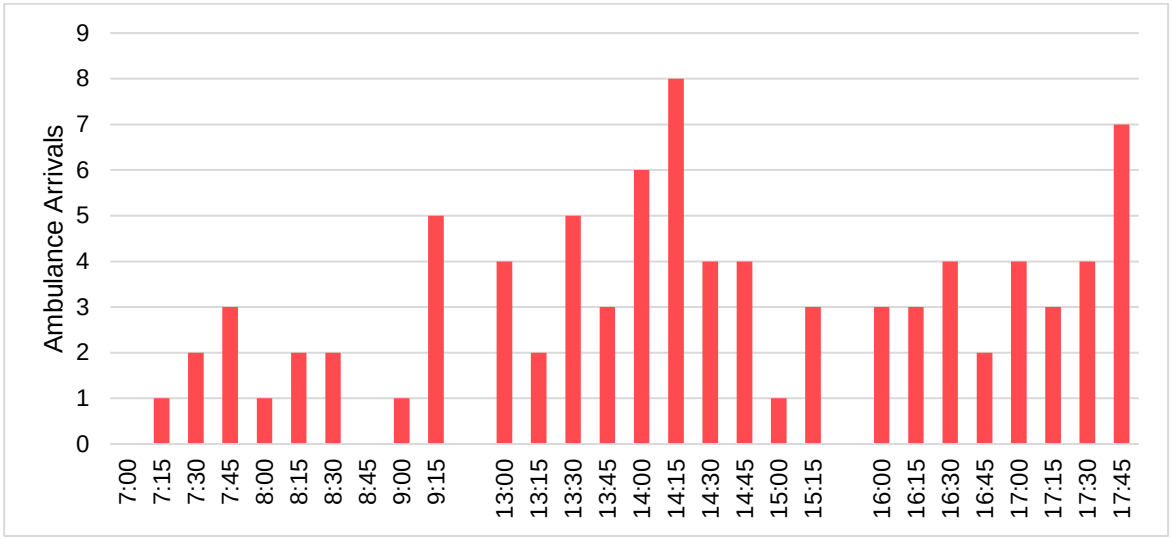
A staff travel survey conducted in June 2021 showed 7% of all hospital staff had moved away from public transport and into cars because of the pandemic. The current estimate of parking demand in 2021 is 2,086, approximately 78% of off-street parking capacity. However, the actual utilisation could be higher as some of the available spaces are not exclusive for hospital use.

2.7 Ambulance activity

According to the Bureau of Health Information, RPAH had 6,405 ambulance arrivals in the July-September quarter this year, representing a 10.3% increase from 2018[1]. This equates to approximately 70 ambulances a day. Ambulance arrivals at RPAH on Thursday 14th November are presented below in **Figure 2-14**, for the hours surveyed.

As mentioned above, the ambulance bay for the ED is located in the traffic calmed portion of Missenden Road and therefore may be blocked behind single lane congestion. The increase in expected ED presentations and the associated ambulance arrivals could therefore see more conflicts between ambulances and through traffic.

Figure 2-14 RPAH ambulance arrivals in 15-minute intervals, Thursday 14th November



Source: Traffic counts undertaken by Matrix / SCT Consulting, 2019

2.8 Public transport

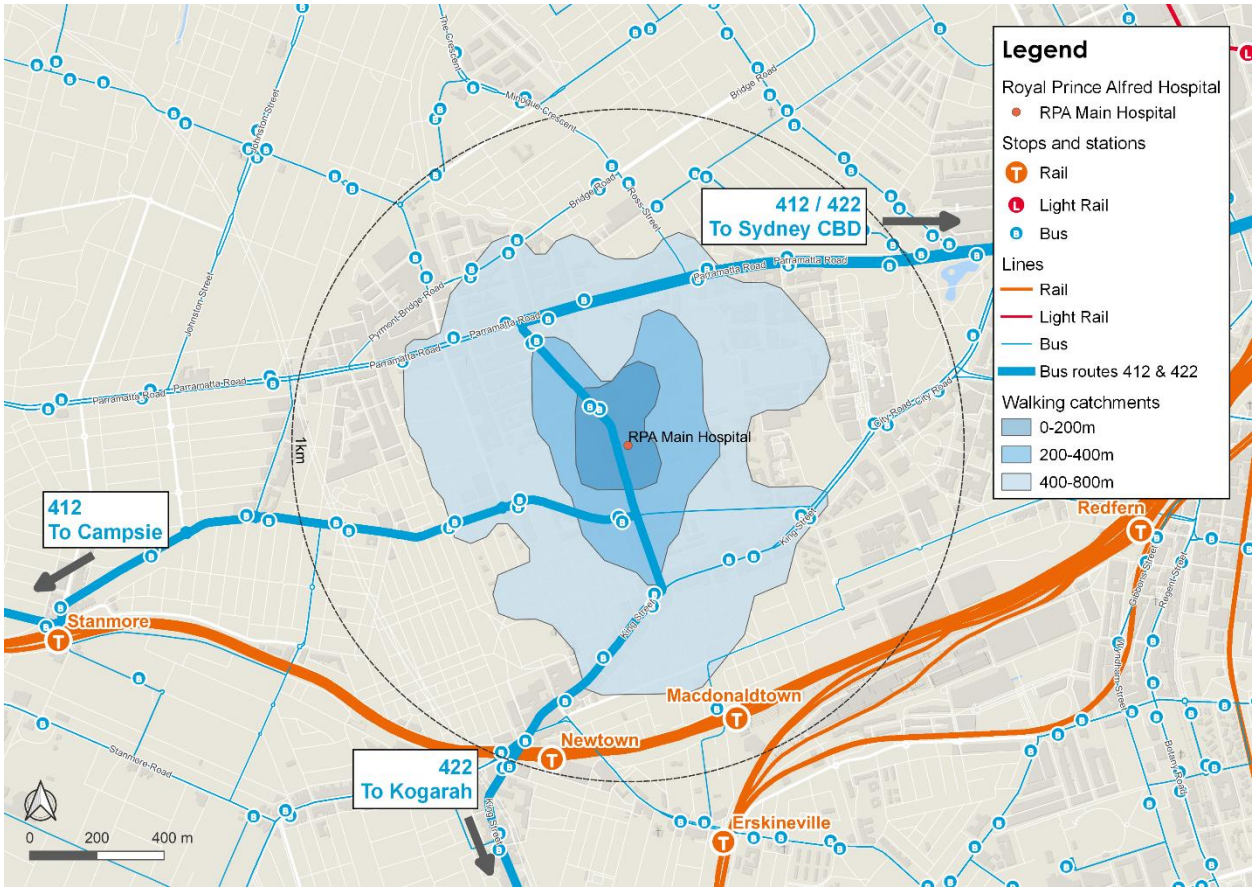
Figure 2-15 shows the public transport services available in the study area, and the walking distance to the main hospital building. The closest available public transport are the bus stops on Missenden Road, approximately 150m north of the main hospital building. These stops are serviced by bus routes 412 (City to Campsie via Petersham and Earlwood) and 422 (City to Kogarah via St Peters). Bus routes 412 and 422 are highlighted in **Figure 2-15**.

In addition to these two bus routes, a wide range of bus services is available both on Parramatta Road to the north, and on King Street to the south. However, both of these major bus corridors are more than 400m, or more than 5 minutes, away from the main hospital building. This is likely to deter some staff and visitors, and particularly patients, from using the bus to travel to the hospital.

The nearest train station is Macdonaldtown, which is approximately 1km away from the main hospital building. The distance from the hospital limits the attractiveness of the rail option; for example, from Central station, it is usually faster to travel to the hospital by bus. Macdonaldtown is also only served by all-stops services on the T2 line. Redfern station is served by all major train lines to Central and the CBD, but it is a 2km walk (approximately 25 minutes) away from the main hospital building.

[1] Bureau of Health Information (2019), Quarterly performance results for emergency departments: Apr-Jun 2019

Figure 2-15 Walking distances to public transport



Source: HERE Technologies, TfNSW General Transit Feed Specification timetables (August 2019), OpenStreetMap

For an inner-city location, public transport provision to RPA Hospital is poor. Other major Sydney hospitals such as Westmead, Royal North Shore and Prince of Wales are all connected by mass transit in the form of train or light rail.

Although there are very frequent bus services on Parramatta Road and King Street, both are more than 400m away from the main hospital building. The two bus routes on Missenden Road run only between Sydney CBD and the south-west. As a result, large numbers of workers and patients in suburbs such as Ashfield and Earlwood cannot access the hospital within 30 minutes on public transport.

2.9 Active transport

2.9.1 Walking

Pedestrian infrastructure is available but not complete around the hospital campus. Footpaths are provided on both sides along Missenden Road and most streets on the western side of the campus, except for Grose Street which does not have footpaths. The eastern campus loop has less pedestrian infrastructure, with footpaths on a single side only along John Hopkins Drive and Gloucester House Drive, and no connected footpaths on Lambie Dew Drive. Lambie Dew Drive is signposted as a shared zone that allows pedestrians to walk to and from the eastern exits of the main hospital building.

There are two zebra crossings joining the east and west campus, and a signalised crossing at Salisbury Road. Nearly all pedestrian groups need to cross Missenden Road. This is expected as Missenden Road runs through the middle of the precinct, and most of the parking supply is on the western part of campus while the main hospital building is located on the east. The zebra crossing north of John Hopkins Drive is heavily used by staff, patients, and visitors, as well as university students who use it to enter USYD from the entrance between the Centenary Institute and Charles Perkins Centre.

2.9.2 Cycling

There is a poor provision of cycling infrastructure in the vicinity of the hospital as well as a low cycling mode share (2% of all RPA Hospital workers).

As seen in **Figure 2-16**, cyclists share the road with motorists on Missenden Road. There are a range of paths marked as “Low traffic street or bike lane” on the map, particularly to and from the University of Sydney campus, but most of these are not continuous and do not join up with surrounding residential neighbourhoods. The primary movement corridors near the hospital, such as Parramatta Road and King Street, also have very poor provision for cyclists.

The City of Sydney’s 2018 Cycling Strategy Action Plan marks Missenden Road as part of a planned Regional Bike Network route.

Figure 2-16 Sydney Cycling Map

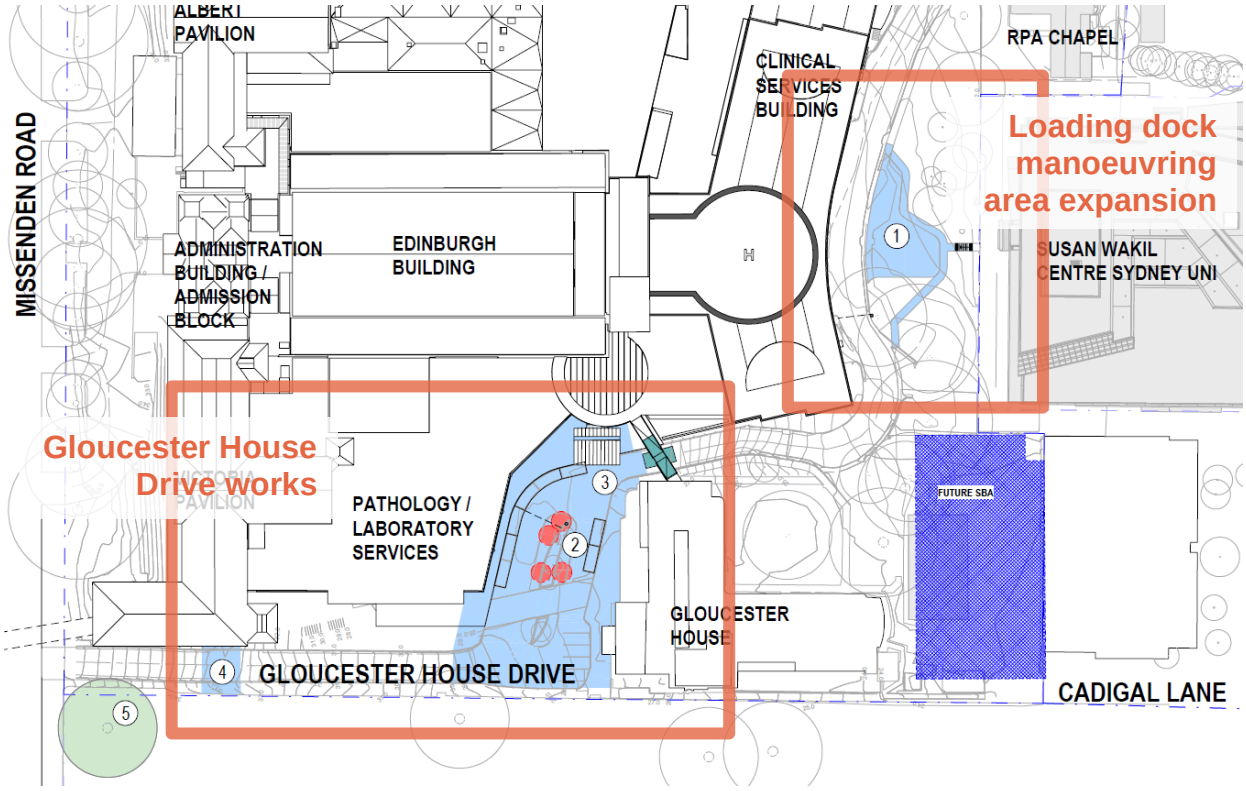


Source: City of Sydney, 2019

3.0 Description of Proposal

The proposed works involve Gloucester House Drive and Lambie Dew Drive next to the main loading docks. This section describes the proposed works by location, illustrated in figure **Figure 3-1**.

Figure 3-1 Site plan for proposed works



Source: Jacobs, 2022

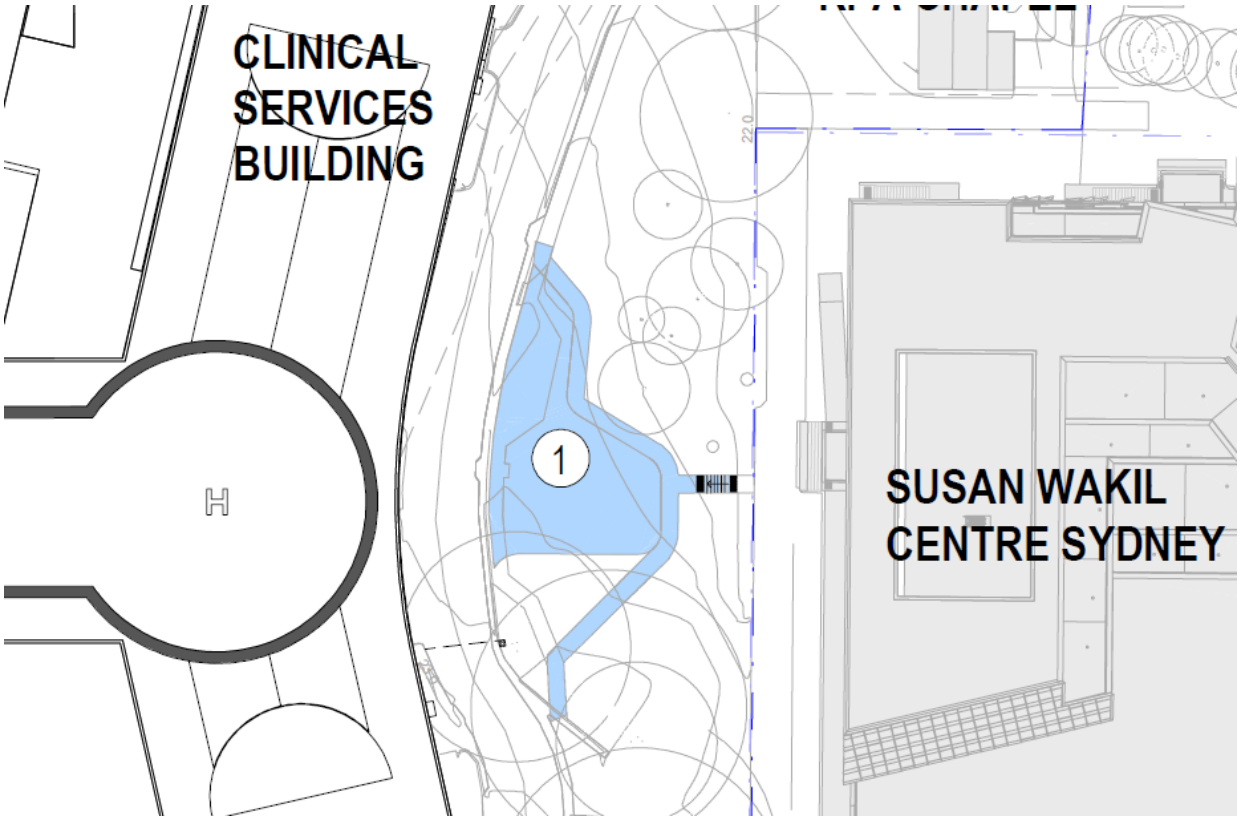
3.1 Lambie Dew Drive works

3.1.1 Expansion of loading dock manoeuvring area

The proposed expansion of the loading dock manoeuvring area is to improve the ability for freight vehicles to turn around, particularly HRVs. The expanded footprint is based on swept paths analysis that will allow HRVs to enter and exit with a maximum of a 3-point turn manoeuvre which is a significant improvement to existing conditions. The expansion is illustrated in **Figure 3-2**.

A stop line and traffic signal will be added to the south of the loading dock which will work in conjunction with a stop line and traffic signal in Gloucester House Plaza. This will regulate movement between the main loading docks and Gloucester House Plaza. This is detailed in **Section 3.2.4**.

Figure 3-2 Proposed expansion of Loading Dock manoeuvring area



Source: Jacobs, 2022

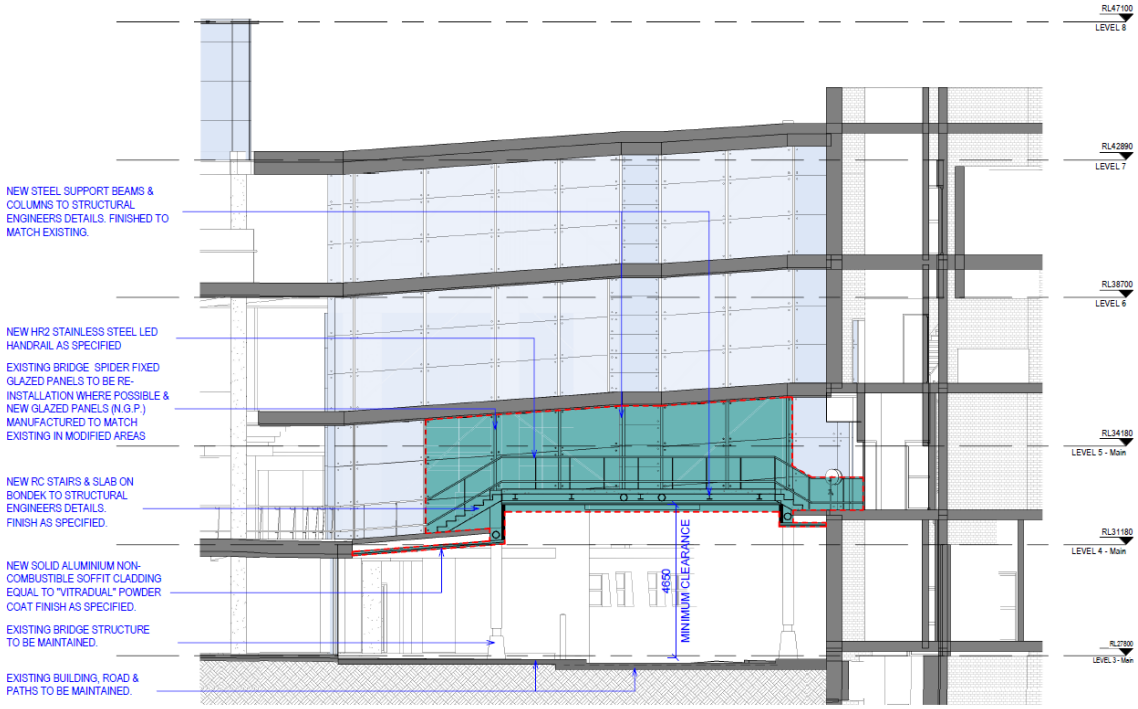
3.2 Gloucester House Drive works

As detailed in **Section 2.2.4**, Gloucester House Drive is not suitable for HRV access. The objective of these modifications is to enable HRV access to Lambie Dew Drive via Gloucester House Drive (the south of the main hospital building). This is necessary to provide fire brigade and loading dock access while the existing access (around the north of the main hospital building) is closed for future construction works.

3.2.1 Gloucester House Bridge

The proposed plan will modify the lowest level of the bridge to increase the clearance height below it from 3.3m to 4.5m. An illustration of the proposal is illustrated in **Figure 3-3**.

Figure 3-3 Gloucester House Bridge proposed configuration

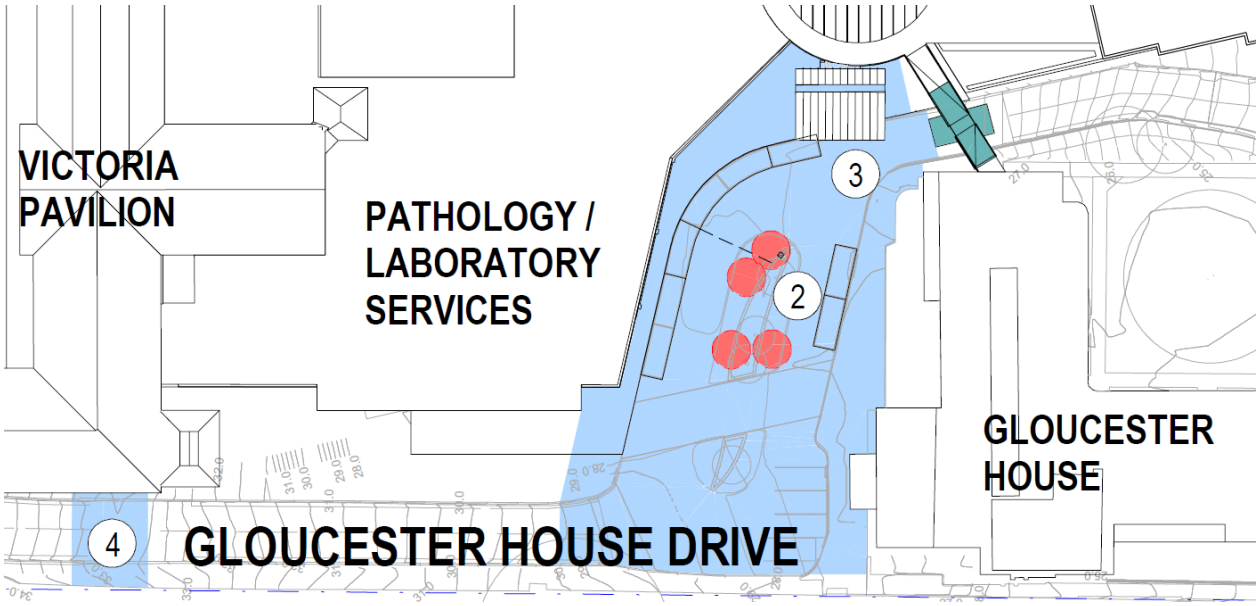


Source: Jacobs, 2022

3.2.2 Gloucester House Plaza

To retain the functionality of the pick-up/drop-off area while facilitating the passageway of HRVs, the centre traffic island needs to be trimmed, and the pavement replaced with material that is suitable for heavy vehicles. An illustration of proposed layout is overlaid on the existing layout in **Figure 3-4**.

Figure 3-4 Proposed reconfiguration of Gloucester House Plaza and Gloucester House Drive



Source: Jacobs, 2022

3.2.3 Adjustment to raised crossing

Gloucester House Drive slopes downward from Missenden Road until Gloucester House Plaza. This sloped section has a raised pedestrian crossing connecting to a fire escape from the Main Hospital Building. This crossing is too high for the envelope of HRVs and will therefore require adjustment. The location of the crossing is illustrated in **Figure 3-4** and photographed in **Figure 3-5**.

Figure 3-5 Raised pedestrian crossing on Gloucester House Drive

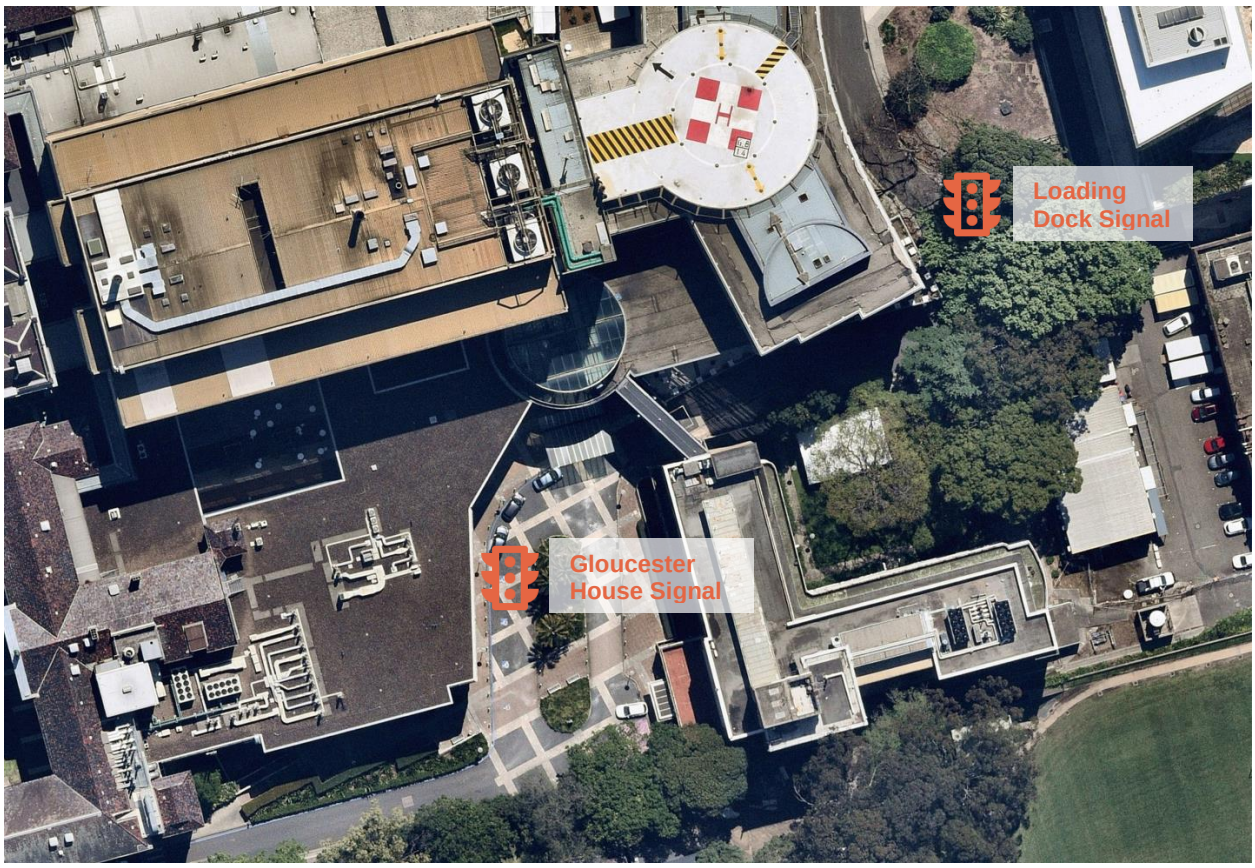


3.2.4 Traffic Signals

Due to the narrow roadway width and the bends in the road, the connection between Gloucester House Plaza and the main Loading Docks cannot support two-way traffic for any vehicle larger than an SRV. Traffic signals will be installed to prevent any head-to-head conflicts that may result in large freight vehicles reversing through a narrow roadway.

Signals will be installed at the southern point of the main loading docks, and the northbound roadway in Gloucester House Plaza. The locations of the signal pair is marked on **Figure 3-6** and illustrated previously in **Figure 3-2** and **Figure 3-4**.

Figure 3-6 Suggested Gloucester House Drive / Lambie Dew Drive traffic signals



Base map source: Nearmaps, 2021

To minimise impact on Gloucester House Plaza circulation and the functionality of the patient pick-up/drop-off area, it can be clearly indicated to drivers that the traffic signals apply to vehicles heading under the Gloucester House Bridge (towards Loading Docks) only.

For example, the Gloucester House Signal can be an “always green” signal that switches to red when a vehicle is departing the loading docks. The Loading dock signals would be “always red” until a vehicle waits to depart. Once an adequate “all red” time has passed to clear the roadway of any current traffic, the exiting vehicle will receive a green light.

4.0 Traffic Impact Assessment

4.1 Construction impacts

Lambie Dew Drive and Gloucester House Drive does not serve as an active or public transport route and the impact on these transport modes are limited. However, the trafficable portion of Lambie Dew Drive also serves some pedestrian movement due to the area being a shared zone. The provision of safe routes for pedestrians and cyclists during construction, minimising any impacts on public transport access and staging of road closures (where required) will be confirmed as part of the Construction Traffic Management Plan (CTMP) that will be prepared prior to start of any construction. The extent of closures and access difficulties will be dependent on the volume and types of construction vehicles used during the works. **Section 5.0** provides more details of construction impacts that would be further considered in the CTMP.

4.1.1 Lambie Dew Drive works impact

Freight vehicles / Loading Dock

The loading dock must continue to operate during the construction period, including the expansion of the loading dock manoeuvring area. Construction operations must not impede access of freight vehicles to the loading dock and provide enough room for manoeuvring in and out of the bays.

4.1.2 Gloucester House Drive works impact

Gloucester House Drive's primary purpose is to provide vehicle access to the Gloucester House Plaza patient pick-up/drop-off area and to Gloucester House itself. It also provides an alternate access to Lambie Dew Drive for vehicles shorter than 3.3m in height. The planned works on Gloucester House Drive will disrupt access for these users.

Patient pick-up/drop-off

The Gloucester House patient pick-up/drop-off area is a key access location into the main hospital building, as well as for the Gloucester House building itself. Therefore, a functioning pick-up/drop-off area needs to be maintained in this location, even if it is reduced in size compared to the existing provision. There are approximately 10 accessible long term accessible parking spaces in the Plaza area, a portion of which should be retained during construction.

In the case that long term accessible parking is displaced by the construction work, additional accessible parking is available in the main hospital car park on Hospital Road. Ideally, accessible parking is maintained in the Plaza area, as the distance from the main hospital car parks to this location is significant.

Gloucester House Plaza (under the Gloucester House Bridge) can be closed off to through traffic to alleviate pressure on pick-up/drop-off circulation during construction. Vehicles bound for the loading dock, or the east side of the main hospital building can be redirected via John Hopkins Drive.

Heavy vehicle movement, construction and noise

Construction and vehicle movements will be in proximity to hospital patient pick-up and drop off as well as accessible parking spaces. Coordination with the hospital will be required to ensure that vulnerable users have been adequately accounted for.

4.1.3 Disruption to private property access

Access to surrounding properties is not expected to be disrupted by Early Works Package 2 construction work.

4.1.4 Parking impact during construction

Parking displaced by the construction work will include:

– Approximately 5-10 accessible parking spaces in Gloucester House Plaza (depending on space required by construction work and the ability to retain a portion for use during construction).

4.1.5 Parking for construction workers

The existing secure car parks on Hospital Road and at St Johns College are expected to be able to service construction workers who drive. Impact to on-street parking is minimal as it is already near maximum capacity and the time restrictions are not suitable for most workers.

4.2 Operations impacts

4.2.1 Road network impacts

The proposed works will improve performance of Lambie Dew Drive and add redundancy to the eastern loop. Adding an access option for large vehicles via Gloucester House Drive, creating a dedicated turn-around bay for HRVs outside the loading dock and allowing for more logistics vehicles to park away from the through lanes will improve congestion that is currently experienced in the area.

4.2.2 Public transport impacts

There is no impact on the public transport as a result of Early Works Package 2.

4.2.3 Active transport impacts

There is no impact on the active transport network as no changes are proposed to the provision of footpaths or cycling infrastructure.

4.2.4 Parking impacts

There is no net change in parking provided as a result of Early Works Package 2.

4.2.5 Pick-up/drop-off impacts

The inclusion of a traffic signal in Gloucester House Plaza may increase wait time for patients being dropped off at the southern drop-off point. This is dependent on loading dock activity as delays would be a result of opposing logistics vehicle traffic.

Given that wait times are short and the drop-off is not being used as Emergency or Mothers and Babies access, the impact on pick-up/drop-off is considered minimal.

4.3 Mitigation measures

The following mitigation measures should be further considered by the contractor and covered in the CTMP.

4.3.1 Night-time works to minimise disruption to hospital operations during day

Gloucester House Plaza and the main loading dock function primarily during the day, with minimal activity after hours. After-hours and night-time construction will minimise disruption of hospital operations and may provide the contractor more space to conduct operations.

During the day, road plates could be considered to provide access to buildings where the roadway has been dug up.

4.3.2 Managed loading dock access

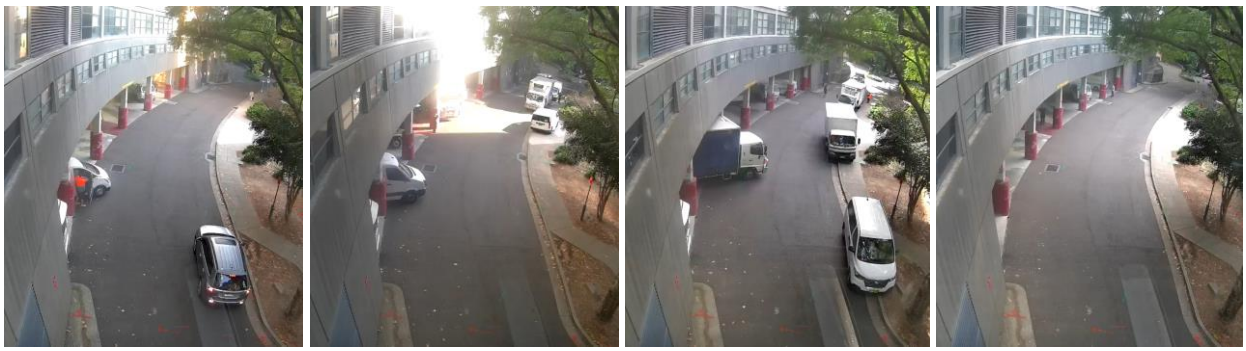
The loading dock schedule should be managed under a booking system to flatten the curve in demand, minimising spikes that cause congestion and conflicting movements. This is something that should be implemented in the long run of the hospital, and will assist the operation of the proposed traffic signals which manage the roadway between Gloucester House Plaza and the Loading Dock

4.3.3 Managed arrival times for daytime works

For construction work occurring during daytime work hours, operations should avoid the peak loading dock hours, which restrict movement along Lambie Dew Drive. Loading dock activity peaks on weekdays between 9:00AM and 3:30PM according to observations taken on Wednesday, April the 28th 2021. Outside of these hours, as shown in **Figure 4-1**, loading dock activity does not overflow onto Lambie Dew Drive, and volumes are low enough such that construction vehicles parked to the side of the road would not cause congestion, though it may reduce through traffic to a temporary one-way movement.

One way traffic movement is already experienced on Lambie Dew Drive during peak hours and at the bend outside building 94, and parking construction vehicles along Lambie Dew Drive outside of the peak hours would not cause traffic flow to be worse than currently experienced. Construction operations requiring the presence of multiple large vehicles should be timed to be outside the loading dock peak periods.

Figure 4-1 Loading dock at 8AM, 10AM, 2PM, and 5PM respectively on Wednesday April 28th 2021



4.3.4 Signage for Gloucester House Plaza users

Signage should be placed in Gloucester House Plaza notifying drivers leaving Gloucester House Plaza to give way to Heavy Vehicles coming from the loading docks at all times. This right of way is already observed in the current configuration, except that vehicles coming from the loading docks are courier vehicles and SRVs only.

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5.0 Construction traffic management plan

A detailed Construction Traffic Management Plan (CTMP), which would include a construction traffic control plan would be prepared, separate to this report by the contractors. This would be done prior to commencement of construction and in accordance with the Traffic Control at Work Sites Technical Manual (2010).

The CTMP will address the overall traffic management of the site during the construction phase, including details of the following:

– Description of construction activities
– Working hours
– Construction vehicle movements and expected routes to and from the site
– Provision for vehicle, pedestrian and cyclist access and management
– Parking for construction vehicles and workers
– Emergency access management
– Appropriate wayfinding.

The overarching strategy of the CTMP would be to:

– Ensure all stakeholders are considered during all stages of construction
– Provide safe routes for pedestrians and cyclists during construction
– Minimise any impact on public transport access
– Communicate changes to roads or paths to the community, emergency services, public transport operators, and any other affected stakeholders
– Identify measures to manage the movements of construction-related traffic to minimise traffic and access disruptions on the public road network
– Provide a car parking strategy for construction staff.

6.0 Conclusion

This traffic impact assessment has reviewed the traffic and parking changes associated with the proposed works of this Early Works Package; the expansion of the main loading dock manoeuvring area and the reconfiguration of the Gloucester House Bridge/Plaza.

The assessment has confirmed that these changes:

– Will have minimal impact on the public and active transport networks in the vicinity of the project.

– Will have no impact on parking availability

– Will improve network performance in the vicinity of the main loading docks

– Will have minimal impact on pick-up/drop-off at Gloucester House Plaza.

It recommends the following mitigation measures:

– Use of night-time / out-of-hours construction work schedule to ensure access is maintained to all necessary facilities

– Managed loading dock access to minimise spikes in vehicle arrivals and loading dock demand

– Avoiding loading dock peak periods to minimise congestion during day-time operations.

– Signage in Gloucester House Plaza advising users to give way to Heavy Vehicles.

A detailed Construction Traffic Management would be prepared prior to commencement of construction, which would seek to minimise the impacts of the construction work.


SCT
Consulting

Waste Management Plan –
Gloucester House Bridge and Road Works

Document Administration

Version History

Version	Date	Issued to	Remarks
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Document Control

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Contents

1. Purpose 1
2. Introduction 2
3. Legislative Requirements 4
4. Waste Management Principles - Construction 6
5. Responsibilities and Training 13
6. Waste Management Principles - Operation 13
Appendix 1 – SLHD Waste Management Policy 16

Tables

Table 1: Average Volumes of Waste Produced by Different Project Types 7
Table 2: Guide to Waste Composition and Volumes - Construction 7
Table 3: Likely Waste Quantities During Construction 8
Table 4: Likely Waste Streams 10

1. Purpose

The Waste Management Plan (WMP) has been prepared to support a Review of Environmental Factors (REF) on behalf of Health Infrastructure for the package of works outlined in Section 2.1 as part of the Royal Prince Alfred (RPA) Hospital Redevelopment.

The Works will be undertaken by the Principal Contractor. All statements and proposals documented in this WMP are a guide only. At the time of contract award, it is the responsibility of the Contractor to prepare a detailed WMP for the Works and to ensure alignment with the legislation, health services requirements and project requirements. This WMP will be replaced by the Contractor's WMP once appointed.

2. Introduction

2.1 Overview and Proposed Works

The proposed activity is part of a suite of campus wide infrastructure upgrades planned to occur in the near future.

A summary of the proposed activity within this REF is listed below:

- Reconfiguration of the traffic island and road surface at the Main Patient Entrance at Gloucester House Drive
- Provision of a traffic management system to control access of delivery vehicles to the loading dock
- Adjustments to humps, footpaths and kerb lines in Gloucester House Drive
- Installation of a turning bay adjacent to the loading dock to facilitate access for delivery vehicles approaching from Gloucester House Drive;
- Removal of four (4) palm trees; and
- Pruning of one (1) Ficus macrocarpa var. Hilli (Hills Fig) located on the St Andrews College campus at the University of Sydney.

2.2 Site and Locality Description

The RPA campus is located in Sydney's inner west suburb of Camperdown. It is situated between Sydney University to the east and the residential area of Camperdown to the west. The campus is divided by Missenden Road, which runs north to south dividing the campus into two distinct portions, called East Campus and West Campus. The northern boundary of the campus is defined by the Queen Elizabeth II Rehabilitation Centre and the southern extent of the campus is defined by Carillon Avenue.

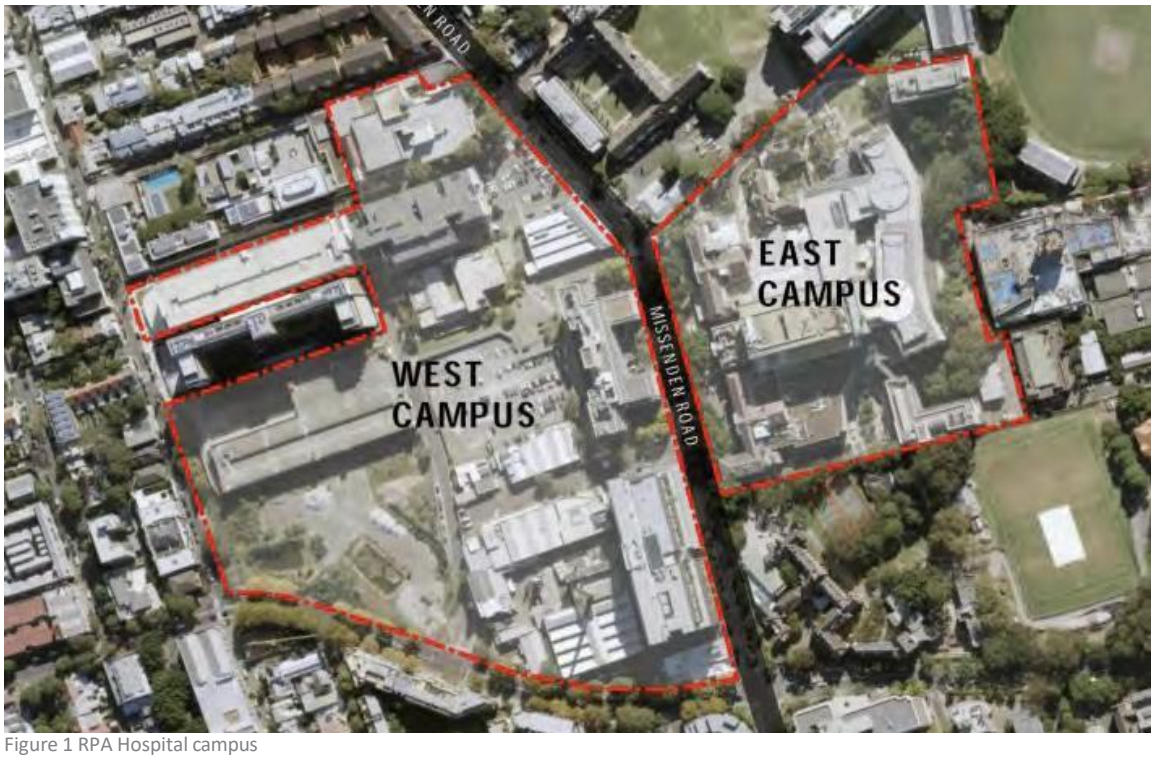


Figure 1 RPA Hospital campus

RPA incorporates a diverse range of operations including research, education, student housing, acute quaternary health services, as well as healthcare in both private and public domains. The larger precinct is defined by the Greater Sydney Commission as the Camperdown Health, Education and Research Precinct (CHERP) and is identified as an innovation and economic development zone for NSW.

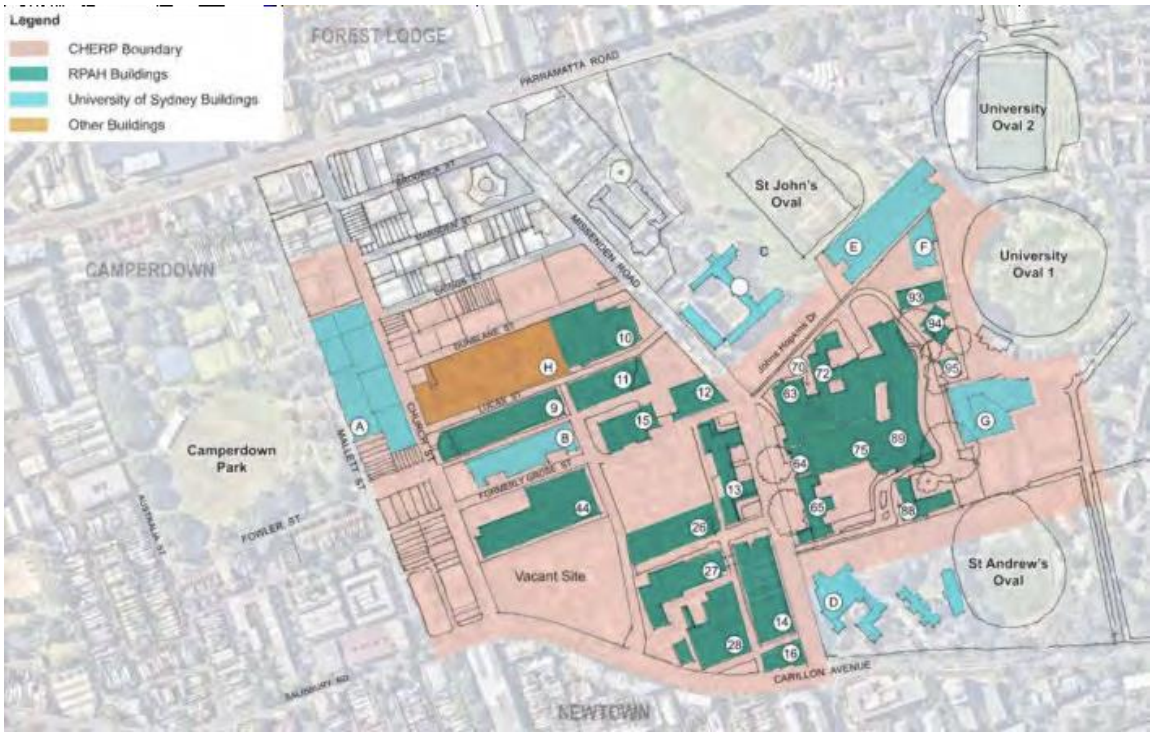


Figure 2 RPA Hospital buildings in relation to the CHERP

3. Legislative Requirements

The Works will be undertaken in accordance with the following legislative requirements relevant to the management of waste in New South Wales, and any others that must be complied with in carrying out the works as required:

- NSW Health – Waste Reduction and Purchasing Policy 2011-2014
- Waste Management Guidelines for Health Care Facilities
- NSW Occupational Health and Safety Act (2000)
- NSW OH&S Regulation (2001)
- Protection of the Environment Operations Act and Regulation
- Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA)
- Waste Avoidance and Resource Recovery Act
- Contaminated Land Management Act
- NSW EPA, 2014 – Waste Classification Guidelines
- NSW EPA, 2014 – The Excavated Natural Material Order
- NSW EPA, 2014 – The Excavated Public Road Material Order and The Reclaimed Asphalt Pavement Order
- NSW WorkCover, 2011 – How to Safely Remove Asbestos Code of Practice
- Australian Code for the Transport of Dangerous Goods by Road and Rail
- AS/NZS 4031:1992 (Non-reusable containers for the collection of sharp medical items used in health care areas)
- AS/NZS 4261:1994 (Reusable containers for the collection of sharp items used in human and animal medical applications)
- AS/NZS 3816:1998 (Management of clinical and related waste)
- AS/NZS 2161.10 Parts 1-3:2005 (Occupational protective gloves)
- AS/NZS 4123 Parts 1-7:2008 (Mobile waste containers)
- AS/NZS 2243 Part 3:2010 (Safety in Laboratories)
- RPS No.20 Safety Guide for Classification of Radioactive Waste (ARPANSA, 2010)
- Code for the Safe Transport of Radioactive Material (ARPANSA, 2014)
- Code of Practice for Radiation Protection in the Medical Applications of Ionizing Radiation (RPS14) (ARPANSA, 2008)
- Industry Code of Practice for the Management of Biohazardous Waste (including Clinical & Related Wastes) (WMAA, 2014)
- The Australian Council on Healthcare Standards (ACHS) EQuIPNational Guidelines Standard 15 (ACHS, 2012)
- Labelling of workplace hazardous chemicals Code of Practice (SafeWork NSW, 2016)
- Code of Practice: Hazardous manual tasks (SafeWork NSW, 2016)
- PD2008_004 Community Sharps Disposal by Area Health Services
- PD2013_043 Medication Handling in NSW Public Health Facilities
- Guideline for Approval of Method to Treat Clinical Waste
- PD2017_013 Infection Prevention and Control Policy
- PD2017_010 HIV, Hepatitis B and Hepatitis C - Management of Health Care Workers Potentially Exposed
- PD2007_052 Sharps Injuries - Prevention in the NSW Public Health System

- PD2012_061 Environmental Cleaning Policy
- Infection prevention and control practice handbook. Principles for NSW public health organisations (CEC, 2016)
- Environmental Cleaning Standard Operating Procedures. Module 3.4 Environment (CEC-HAI, 2012)
- Environmental Cleaning Standard Operating Procedures. Module 6 Cleaning Agents (CEC-HAI, 2012)
- Environmentally Hazardous Chemicals Act 1985
- Environmentally Hazardous Chemicals Regulation 2017
- Protection of the Environment Administration Act and Regulations
- Code of Practice for the Safe Removal of Asbestos (NOHSC:2002 (2005))
- Guide to the Control of Asbestos Hazards in Buildings and Structures (NOHSC:3002 (1998))
- Resource and Recovery Act 2001
- Environmental Planning and Assessment Act 1979
- Local Government Act 1993
- Soil Conservation Act 1938

4. Waste Management Principles - Construction

4.1 Waste Management Principles

In accordance with NSW Health requirements for health care facilities, a detailed WMP will be developed by the Principal Contractor providing detailed information regarding the nature and volume of waste generated by the development and the means of storage and disposal of waste from the site. Waste management practices will adopt the waste hierarchy established by the Waste Avoidance and Resource Recovery Act 2001 (WARR Act) of reduce, reuse, recycle, treat and dispose.



Figure 3 Waste Hierarchy (NSW, EPA 2017)

The major components of the waste management system will include:

- Avoidance and Reduction of Waste
- Recycling and Reuse
- Segregation at the source
- Waste streams
- Handling and Storage
- Waste treatment
- Waste disposal

The Works will be undertaken by a Principal Contractor. All statements and proposals documented in this WMP are a guide only. At the time of contract award, the Contractor(s) will formulate their own WMP for the Works and ensure alignment with the legislation, health services requirements and project requirements. This WMP will be replaced by the Contractor's WMP once appointed.

4.2 Waste Estimation

Indicative quantities of waste likely to be generated during construction have been set out per the below assumptions. The majority of works under this REF are civil in nature and consisting of primarily shallow excavation. Refined estimates of waste generation will be developed in further detail by the Principal Contractor during design development and once the extent of excavation required is calculated to a greater degree of accuracy. It is expected that actual waste quantities and composition will vary depending on outcomes of detailed design, materials specification and construction planning and methods.

The quantities of waste likely to be generated during demolition of the Gloucester House Bridge Link have been calculated based on benchmarks provided by the UK Building Research Establishment (BRE) (refer Table 2) and benchmarked data of waste composition developed by Sustainability Victoria (refer Table 3).

Table 1: Average Volumes of Waste Produced by Different Project Types

Project Type	**Average volume (m^3) of waste per $100m^2$**
Residential	18.1
Public buildings	20.9
Leisure	14.4
Industrial Buildings	13.0
Healthcare	19.1
Education	20.7
Commercial Other	17.4
Commercial Offices	19.8
Commercial Retail	20.9

Source: BRE (2012)

Table 2: Guide to Waste Composition and Volumes - Construction

Material	***Estimated Waste %***	**Conversion Factor (Density) (Tonne per m^3)**
Hard material	32%	1.2
Timber	24%	0.3
Plastics	15%	0.13
Cement sheet	9%	0.5
Gypsum material	6%	0.2
Metals	6%	0.9
Paper / card	4%	0.1
Vegetation	3%	0.15
Soil	1%	1.6
Other	0.3%	0.3

Source: Sustainability Victoria Waste Wise Tool Kit (2013)

Table 3: Likely Waste Quantities During Construction

Material	Average Volume/ 100m^2*	Total (m^3)	Total (Tonnes)
Hard material (32%)	6.1	2.3	2.8
Timber (24%)	4.6	1.7	0.5
Plastics (15%)	2.9	1.1	0.1
Cement sheet (9%)	1.7	0.6	0.3
Gypsum material (6%)	1.1	0.4	0.1
Metals (6%)	1.1	0.4	0.4
Paper / card (4%)	0.8	0.3	0.1
Vegetation (3%)	0.6	0	0
Soil (1%)	0.2	0	0
Other (0.3%)	0.1	0	0
Total	**19.1**	**7**	**4.3**

*based on a proposed GFA of the Gloucester House Bridge Link of 37m^2

There is an estimated total of 1,965 m^2 of civil works to be completed under this REF. At an average excavation depth of 450mm, total volume of spoil will be approximately 884 m^3, equivalent to approximately 1,400 tonnes.

Strategies will be implemented to minimise waste generation and maximise reuse and recycling.

4.3 Waste Avoidance and Reduction

The most effective strategy in the waste hierarchy is to avoid the generation of waste. Throughout the construction phase of the Project, the avoidance of waste can be achieved through a number of strategies, including but not limited to:

- Reducing materials brought to site through a thorough understanding of the design, operational requirements, required quantities and detailed project planning; and
- Inventory control, proper storage and management of materials to avoid waste from materials that are out of date or off specification and reducing the need to reorder supplies.
- Appropriate Storage and Management of materials onsite to limit the potential for damage from weather or plant which will eliminate the need for purchase of replacement products and waste generation.

4.4 Waste Recycling and Reuse

Where the generation of waste cannot be avoided, it is encouraged to promote the reuse and recycling of waste materials. This can be achieved through a variety of strategies, including but not limited to:

- Evaluating waste production processes and identifying potentially recyclable materials;
- Identifying and recycling products that can be reintroduced into the construction and operation processes;
- Separating and segregating waste, particularly recyclable material from non-recyclable;
- Proper disposal of recyclable waste such as glass, paper and aluminium; and
- Where possible, reusing materials and equipment in later stages of the construction phase and/or in different projects. For example, classifying excavated material as Virgin Excavated Natural Material (VENM) or Excavated Natural Material (ENM) to allow potential reuse off-site

The contractor's WMP will address recycling targets and monitoring strategies to enabling monthly reporting on the recycling outputs.

4.5 Waste Segregation

Segregation of various streams of waste is an important part of efficient waste management. Where possible, waste such as excavated material will be separated on-site into dedicated bins and areas for reuse and/or collection by a licensed contractor:

- General Waste – Glass, Paper & Cardboard and Aluminium
- Natural material will be classified as VENM for reuse onsite where possible or for offsite reuse.
- Excavated material (unable to be used onsite) to be sent to a recycling facility
- Waste from piling works, including waste steel and formwork

If separation is not possible on-site, the Contractor(s) shall organise the separation of waste off-site. Waste will be classified in accordance with the requirements of the NSW EPA (2014) Waste Classification Guidelines.

4.6 Waste Streaming

Throughout the construction phase of the Project, organic waste that is biodegradable will be recycled where possible. Uses of organic waste include, but are not limited to, mulch or garden compost to enhance lawns and gardens. Where reuse is not possible, organic waste will be placed in mobile bins for regular collection by a licensed contractor.

Domestic wastes such as non-biodegradable food scraps, bottles, cans and packaging – will be segregated into recyclables and non-recyclables at point of generation and collected by a licensed contractor.

4.7 Hazardous Waste

A Hazardous Building Materials Survey (HBMS) has been undertaken to the areas included within the scope of this REF. This survey comprised a detailed visual inspection and sample collection with the objective to locate and identify areas of suspected hazardous materials.

The outcomes of this survey and measures for dealing with hazardous waste are further noted within the HBMS report by Sydney Environmental Group (SEG). This includes the following measures to be undertaken by the Contractor:

- Development of a Hazardous Building Materials Management Plan to ensure all practicable steps are taken to prevent or minimise the risk of exposure to hazardous materials during works;
- Ensuring a copy of the hazardous building materials register is made readily available to all contractors conducting works on the site;
- Remove all hazardous building materials identified and recorded in the register prior to any demolition works of the structures identified within the site; and
- Should any previously unidentified suspected hazardous building materials be identified during demolition, works should cease, and the materials should be inspected by an experienced occupational hygienist prior to the recommencement of works.

4.8 Waste Handling and Storage

The Contractors WMP will identify storage and collection areas including loading zones and stockpile locations. Storage locations of waste will be planned to consider the changing nature of the site and construction phases. Clear signage will be provided to mark the location of different types of waste and materials.

Stockpile management strategies include, but are not limited to:

- Locating stockpiles in designated, marked areas and away from drainage lines and up-slope of sediment barriers;
- Locating stockpiles on hardstand surfaces or on plastic sheeting, and covering stockpiles or stabilising surfaces to reduce erosion; and
- Maximum stockpile height of 2 m (subject to Engineering advice).

Where applicable, liquid wastes will be stored in bunded areas protected from the weather. Containers will be labelled with name of the waste stream, composition and physical state, restricted properties and date of storage to ensure safe handling and management procedures are met.

Clearly marked waste containers with information such as name of waste, composition (solid/liquid), restricted properties of the waste (corrosive, ignitable) and date of the first waste deposited into the container.

All servicing arrangements will need to consider the safety of site users.

The Contractor shall ensure that the supply chain is responsible and accountable for maintaining a clean, clear and safe working environment. Rubbish bins should be provided to all work areas and be regularly removed to the central skip bin location for collection and transport from site to a waste recycle facility.

4.9 Waste Treatment

It is intended that no waste is treated on-site. Treatment of construction and general waste will be performed by a licensed contractor after proper removal of waste off the project site. This includes wastewater requiring offsite disposal.

4.10 Waste Disposal and Transport

Waste that cannot be recycled and/or reused will be disposed off-site by a licensed contractor to a licensed landfill or recycling facility.

Prior to disposal, waste will be classified in accordance with the requirements of the NSW EPA Waste Classification Guidelines.

All vehicles transporting waste off-site will have covered loads. A waste tracking record will be maintained of all disposals that records the waste facility name and address, type and identity of disposal vehicle, date of disposal, type and quantity of waste and method of treatment (where applicable). Contractor(s) will keep evidence of the proper disposal of waste to licensed facilities.

All vegetation and topsoil will be assessed for site suitability.

4.11 Waste Management Methods

A detailed Construction Waste Management Plan will be developed by the Contractor. The plan will provide further details of the management required for the waste types generated under the works associated with the Gloucester House bridge and roadworks, with a focus on waste that may generate emissions or other environmental implications.

As the design progresses, accurate estimates of quantities of building materials prior to construction will ensure that a minimum of waste is generated. Records of waste and recycling collected and disposed of will be collated throughout the construction phase by the Contractor. Unused materials in a good condition will often be collected by suppliers, facilitating the reduction of the amount of material sent to recyclers or landfill.

The Contractor will be required to achieve compliance with the EPA guidelines.

A summary of likely waste streams to be generated through Enabling Works construction are identified in the table below, a proposed method for handling, storage and reuse/disposal of each type of waste are also presented.

Table 4: Likely Waste Streams

Activity	Waste stream	Management
Site Clearing - Green Waste	Trees, shrubs, groundcover and weeds	• Reuse suitable material for mulch if it is weed free and complies with the EPA mulch exemption • Potential for offsite reuse or disposal to a green waste facility
Hazardous Waste	Hazardous materials, in-ground contamination	• Hazardous Building Materials Management Plan • Hazardous Building Materials Survey to locate suspected hazardous materials. • Removal of identified • building materials prior to demolition or construction works, guided by a Remedial Action Plan (if required).
Construction Waste	Concrete, metal, steel, timber, fittings, plastic, electrical and plumbing	• Segregation of recyclable wastes and storage onsite (within construction compounds) • Collection and transport to appropriate recycling facility
Site Office and Worksites	General Office Waste – paper, printer cartridges	• Segregation of recyclable wastes and storage on-site • Collection and transport to a recycler
	Domestic Wastes – food scraps, glass bottles, cans, packaging.	• Segregation of recyclable wastes and storage onsite
	Septic and Sanitary systems waste	• Sewerage treatment plant
Plant Maintenance and Chemicals Management	Drums and Containers	• Segregation of recyclable wastes and storage onsite (within construction compounds) • Collection and transport to a recycling facility
	Waste Oil, great, lubricants, oily rags and filters	• Segregation of recyclable wastes and storage onsite (within construction compounds) • Collection and transport to a recycling facility

The storage of waste created by the site through demolition, excavation and general construction works will be specified within the site establishment zones in the Principal Contractor's Construction Management Plan.

4.12 Hazardous Materials Management

Dangerous goods are to be managed in accordance with relevant codes of practice and standards. Material safety data sheets on all of these flammable and potentially harmful liquids will be provided by the Contractor undertaking the Works. Any hazardous materials discovered during execution of the Works should be dealt with by the Contractor in accordance with the requirements set out in the Contract.

5. Responsibilities and Training

5.1 Roles and Responsibilities

The Principal Contractor will be responsible for developing a detailed waste management plan prior to commencement of the construction works. That plan must be consistent with the approach, principles and management methods outlined in this plan.

The Contractor will also be responsible for:

- Inducting all contractors and visitors about the relevant aspects of this plan.
- Ensuring all waste management contractors have the necessary qualifications and licenses to remove waste from the site.
- Carrying out periodic audits to check compliance with the waste management plan.

5.2 Training and Induction

During construction, all site personnel and subcontractors will be inducted into the requirements of this plan in accordance to their level of responsibility. As such, the induction is expected to include the following components:

- The waste hierarchy and associated waste management principles (avoid, reuse, and recycle).
- NSW EPA Waste Classification Guidelines.
- Procedures for handling and storage of wastes.
- Location of waste disposal and storage facilities.
- Actions to be undertaken in the event of a hazardous material spill.

Staff and contractors with specific responsibilities for waste management including for the handling and disposal of hazardous waste will be given additional training as required.

6. Waste Management Principles - Operation

6.1 Waste Management Plan - Operation

Sydney Local Health District (SLHD) have a Waste Management Policy (refer Appendix 1) in place for existing SLHD facilities, including RPA Hospital. As design progresses for the Project, the existing SLHD Waste Management Policy for RPA Hospital will be updated to ensure ongoing improvements and compliance with policy and legislation in all aspects of waste management, including generation, handling, storage and disposal of all forms of waste.

6.2 Management of Clinical Waste Streams

Management of Clinical Waste Streams will be in compliance with NSW Health's PD2017_026 Clinical and Related Waste Management for Health Services (Refer Table 1 and 2):

Table 1: Management of clinical waste streams: anatomical, sharps and other clinical waste

Waste stream	Anatomical waste	Clinical sharps waste	Clinical waste (Incl. Pathological Waste)
Definition	Identifiable human body parts such as limbs, organs, placenta and recognisable or large pathological specimens resulting from investigation or treatment of a patient It does not include deceased bodies	Any clinical object capable of inflicting a penetrating injury which may or may not be contaminated with blood and or body substance. This includes needles, ampoules and any other sharp objects or instruments designed to perform penetrating procedures[1] May contain clinical material or Genetically Modified Organism (GMO)[2] waste	Clinical waste with the potential to cause injury, infection or offence: • Unrecognisable human tissue (excluding hair, teeth, nails and anatomical waste) • Bulk blood or other body fluids (or body substances) • Material and equipment visibly stained by blood or body fluids (includes incontinence pads and disposable nappies that come from an infectious patient)[3] • Lab specimens, cultures or other waste from lab investigations • Waste from medical or veterinary research • Genetically Modified Organisms (GMOs)
Bin colour	Yellow	Yellow	Yellow
Lid colour of bin	Orange	Yellow	Yellow
Plastic bin liners	Orange	N/A	Yellow
Labelling of bins and if applicable liners	Anatomical waste	Clinical sharps	Clinical waste
Symbol			
Symbol (description)	Black biological hazard	Black biological hazard	Black biological hazard
Label (if containing viable PC1 or PC2 GMOs)		Contains GMOs	Contains GMOs
Specific requirements	For incineration only	For incineration *or* autoclaving and shredding Sharps containers must be rigid-walled and meet the requirements specified in AS/NZS 4031 and AS/NZS 4261[4,5] Autoclave tape and bag indicators must be used to show autoclaving has been completed	For incineration *or* autoclaving [6] and shredding. Autoclave tape and bag indicators must be used to show autoclaving has been completed. Fluid may be able to be discharged into sewer depending on Liquid Trade Agreement between the health service and water utility All clinical waste once treated by a process acceptable to NSW Health[7] may be reclassified in accordance with the Waste Classification Guidelines[8] before recycling or disposal There are special precautions regarding disposal of waste related to cases of viral haemorrhagic fever[9]
Relevant Act/ Regulation /Australian Standard	AS/NZS 3816:1998 Management of clinical and related waste AS/NZS 4123:2008 Mobile Waste Containers	AS/NZS 3816:1998 Management of clinical and related waste AS/NZS 4123:2008 Mobile Waste Containers *Protection of the Environment Operations Act 1997* *Protection of the Environment Operations (Waste) Regulation 2014*	AS/NZS 3816:1998 Management of clinical and related waste AS/NZS 4123:2008 Mobile Waste Containers *Protection of the Environment Operations Act 1997* *Protection of the Environment Operations (Waste) Regulation 2014*
EPA licence requirements	No	No	No

Table 2: Management of Clinical waste streams: cytotoxic and pharmaceutical

Waste stream	Cytotoxic waste	Pharmaceutical waste	Radioactive waste
Definition	Material contaminated with residues or preparations containing materials toxic or otherwise harmful to cells. This includes any residual cytotoxic drug or laboratory chemical and any discarded material or clinical waste associated with the preparation or administration or excretion of cytotoxic drugs May include Genetically Modified Organisms (GMOs) or tissues containing GMOs	Pharmaceuticals or other chemical substances specified as regulated goods in the Poisons and Therapeutic Goods Act 2008. Includes any substance specified in a Schedule of the Poisons List under the Act, as well as any therapeutic good which is unscheduled Includes expired or discarded pharmaceuticals, filters or other material contaminated by pharmaceutical products	Waste material, including sharps and clinical waste contaminated with a radioisotope which arises from the medical or research use of radionuclides, e.g. during nuclear medicine, radioimmunoassay and bacteriological procedures, and may be in solid, liquid or gaseous form, and which emits a level of radiation above the level set by regulatory authorities
Bin colour	Purple	Red	Red[1]
Lid colour of bin	Purple	Red	Red
Plastic bin liners	Purple	N/A	Red
Labelling of bins and if applicable liners	Cytotoxic waste	Pharmaceutical waste	Radioactive waste plus specific requirements below
Symbol		Nil	
Symbol (description)	White telophase	Nil	Yellow background with distinctive 'trefoil' symbol in black and the lettering 'CAUTION RADIATION' in black
Label (if containing viable PC1 or PC2 GMOs)	Contains GMOs		
Specific requirements	For incineration only Collection, transport and handling only by licensed and registered waste management companies	Storage, destruction and disposal methods must comply with PD2013_043 Medication Handling in NSW Public Health Facilities[2] Pharmaceutical waste must be incinerated at a licensed controlled waste facility. Certain pharmaceuticals may only be destroyed by authorised persons under the *Poisons and Therapeutic Goods Act 1966* [3] Pharmaceutical waste bins must be lockable	Radioactive material to be stored on-site in appropriate storage area until it decays to below the thresholds of a "radioactive substance" as defined under the Radiation Control Act and Regulation Waste is to be classified with reference to the Safety Guide for the Classification of Radioactive Waste[4] and in accordance with the EPA Waste Classification Guidelines[5] Radioactive waste must be labelled with the substance, activity level and the date at which it is measured Handling and storage to comply with a Radiation Management Plan in accordance with the Code of Practice for Radiation Protection in the Medical Applications of Ionizing Radiation (ARPANSA 2008)[6] Radioactive sharps – see page 9 [7] When radioactive waste is to be transported, health services must comply with the Code of Practice for the Safe Transport of Radioactive Material (ARPANSA 2014)[8]
Relevant Act and Regulation	AS/NZS 4123:2008 Mobile Waste Containers *Protection of the Environment Operations Act 1997* *Protection of the Environment Operations (Waste) Regulation 2014*	*Poisons and Therapeutic Goods Act 1966* *Poisons and Therapeutic Goods Regulation 2008*	AS/NZS 4123:2008 Mobile Waste Containers *Radiation Control Act 1990* *Radiation Control Regulation 2013*
EPA licence requirements	No	No	Yes - Waste Classification Guidelines Part 3: Waste containing radioactive material (EPA, 2014)

Appendix 1 – SLHD Waste Management Policy

Health
Sydney
Local Health District

Policy Directive

Waste Management P61icy

Document No:	RPAH_PD2013_022
Functional Sub-Group:	Corporate Governance
Summary:	Effective waste management through implementation and evaluation of an annual waste management plan that reduces the risks associated with waste provides financial gain through waste reduction / recycling and supports a sustainable environment. Ensure improved performance in waste avoidance, reduction, reuse and recycling and compliance with the NSW Waste Reduction and Purchasing Policy (WRAPP).
National Standard:	Corporate Systems and Safety Preventing and controlling Healthcare Associated Infections
Policy Author:	Manager Environmental Services
Approved by:	General Manager
Publication (Issue) Date:	June 2013
Next Review Date:	June 2018
Replaces Existing Policy:	RPAH_PD2009_019
Previous Review Dates:	2005, April 2009

Note: Sydney Local Health District (LHD) and South Western Sydney LHD were established on 1 July 2011, with the dissolution of the former Sydney South West Area Health Service (SSWAHS) in January 2011. The former SSWAHS was established on 1 January 2005 with the amalgamation of the former Central Sydney Area Health Service (CSAHS) and the former South Western Sydney Area Health Service (SWSAHS).

In the interim period between 1 January 2011 and the release of specific LHN policies (dated after 1 January 2011) and SLHD (dated after July 2011), the former SSWAHS, CSAHS and SWSAHS policies are applicable to the LHDs as follows:

Where there is a relevant SSWAHS policy, that policy will apply.

Where there is no relevant SSWAHS policy, relevant CSAHS policies will apply to Sydney LHD; and relevant SWSAHS policies will apply to South Western Sydney LHD.

Waste Management Policy

CONTENTS

1. Introduction
2. Policy Statement
3. Specific Responsibility
4. Principles/Guidelines
5. Performance Measures
6. Definitions
7. References and Links
8. Procedure - Waste Disposal Guidelines
9. Attachment - Waste Management Policy Display Version

1. Introduction

RPAH is committed to maintaining an efficient and cost effective waste management system that protects the health and safety of all employees, patients and other persons working in or visiting the hospital premises. In accordance with NSW Government policy and International best practice, the hospital takes a "cradle to the grave" approach to waste management which implies responsibility for waste from point of generation to final disposal. As such, all staff as waste generators has an obligation to dispose of waste responsibly.

RPAH waste management strategies focus on waste minimisation principles of avoidance, reduction and correct segregation of waste and the promotion of reuse and recycling practices where feasible. Waste management is legislated under the Waste Avoidance and Resource Recovery Act 2001 repealed and replaced the **Waste Minimisation and Management Act 1995 and Waste Regulation (1996)** which is administered by the NSW Environmental Protection Authority. The implementation of the RPAH Sustainability Committee and Management Plan in conjunction with this Policy aims to ensure compliance with all relevant legislative and regulatory requirements as set out in Section 7 of this policy

The risks addressed by this policy:

Corporate Risk

The aims / expected outcome of this policy

To provide a framework that ensures all waste at RPAH is managed safely and efficiently with consideration to environmental issues. This policy outlines the overall objectives of the RPAH waste management program and the responsibilities of staff in relation to waste management. To improve our waste segregation by labelling clearly and colour coding our waste streams. Operational details of the RPAH waste management system can be found in the RPAH Waste Minimisation and Management Plan.

2. Policy Statement.

All staff and volunteers are to ensure that all activities pertaining to the management of waste reflect Royal Prince Alfred Hospitals' commitment to the safe, efficient and environmentally sound and ecologically appropriate practices, in the segregation, handling, disposal, recycling, reuse and minimisation of waste products.

Environmental Services are responsible for waste management across the hospital and facilities and are to be contacted for additional or revised services or other waste problems or issues.

All staff are to receive education at Royal Prince Alfred Hospital Facility Orientation.

Some waste streams have tracking mechanisms in place for costing the waste to the user.

3. Specific Responsibility.

Executive Director.

- Ensure implementation of this policy.

General Manager.

- Ensure implementation of this policy.
- Support the Executive Director in the implementation of this policy.

Director of Finance and Corporate Services.

- Support the General Manager in the implementation of this policy.
- Ensure that compliance with the NSW and relevant national standards are monitored and evaluated.
- Ensure their healthcare facility is well maintained free of waste products and clean.
- Monitor compliance with the Waste Management policy standards.

Environmental Services Manager

- Provide advice to staff of RPAH on waste management services through the Waste Management Coordinator.

- Ensure all department staff have access to task specific training and education.
- Ensure all department staff are competent in performing waste orientation tasks.
- Ensure waste management procedures are documented, available and relevant to staff.
- Monitor and audit waste collection performance and ensure required levels of compliance.

Managers, Coordinators and Department Heads.

- Ensure department staff complies with infection prevention and control national standards.
- Ensure there are appropriate resources to meet the national standards.
- Ensure the Waste Management standards are met in their jurisdiction.
- Ensure all department staff complies with the standards.
- Ensure the patient environment is well maintained, clean and free of waste through relevant waste streams.
- Monitor compliance with the Waste Management Policy.

Infection Control Consultant.

- Provide advice on infection prevention and control aspects of environmental cleaning and waste standards.
- Provide advice on cleaning and disinfection requirements for all risk categories, during outbreaks of communicable disease and during refurbishment, renovations and construction.
- Provide advice for minimising risks.

Infection Prevention & Control Committee.

- Review the results of the waste audits and recommend action to Sustainability Committee.

Cleaning Staff.

- Undertake environmental cleaning and waste management training in accordance with this policy, the Environmental Cleaning Policy and Environmental Cleaning Standard Operating Procedures, with the advice of their Coordination Supervisors, Leading Hands and the advice of relevant ward/unit staff or Infection Control Consultant.
- Are responsible for ensuring a safe environment including all environmental hygiene concerns.
- Comply with this policy in undertaking the requirements of waste management, recycling and waste minimisation requirements.
- Are expected to escalate risks (i.e. identified environmental waste management, hygiene or maintenance deficiencies) through line management and call upon the relevant experts to develop risk management strategies to manage risks.

4. Principles / Guidelines.

4.1 Waste Segregation.

- Waste is managed throughout the hospital via waste streams that are classified in accordance with the NSW MoH Policy Guidelines.
- The hospital provides facilities for the following waste streams: general, clinical, genetically modified organism (GMO's), cytotoxic, recyclable, chemical, pharmaceutical, radioactive and hazardous liquid waste.
- It is the responsibility of all employees to dispose of waste into the appropriate waste stream at the point of generation.
- Refer to Section 8. Waste Disposal Procedures for further information.

4.2 RPAH Sustainability Committee.

- It is purpose of the RPAH Sustainability Committee to assist in the implementation and monitoring of waste management activities across the hospital.
- The committee has a membership which is representative of all key areas and departments of the hospital.

4.3 Education and Training.

- Waste Management training is provided to all new employees through the Royal Prince Alfred Hospital Orientation Program, Intern and RMO Orientation programs.
- Waste management information is also provided to agency nursing and sessional medical staff in their orientation handbooks.
- Annual waste management training is available to all hospital departments via the Intranet.
- Training is also available on request for specific waste management issues and can be arrange through the Environmental Services Department.

4.4 Waste Management Strategies.

- KPI's for waste management are monitored by the Environmental Services Department and the RPAH Sustainability Committee and used to target waste management and minimisation activities.
- Regular waste segregation audits are carried out on Clinical & Sharps waste streams and the results of these audits fed back to the appropriate departments for review and action.
- All new equipment should be purchased in accordance with the District Waste Reduction and Purchasing Plan.
- Disposal of furniture and equipment is managed by the Director of Finance and Corporate Services. Disposal of property should first consider the potential for revenue raising within the guidelines provided in the NSW Health Purchasing and Supply Manual.

4.5 Waste Handling Containment and Transport.

- Waste is separated into the appropriate waste stream at the point of generation by the provision of waste bags and bins appropriate to the types of waste generated.
- Waste is stored in mobile garbage bins which are kept in designated waste rooms located on each floor.
- Waste is collected by Environmental Services Staff and transported on foot by motor tug or by truck to the waste storage area.
- General waste is then emptied into the compactor bin by hydraulic lifter.

- Clinical, GMO's, Cytotoxic, Sharps and Confidential Paper waste are kept in a secure area in locked bins until collection by the appropriate contractor.

4.6 Waste Disposal.

- Contracts with the various waste transporters and waste treatment disposal contractor are documented and are consistent with the relevant regulations.
- Disposal of general waste generated by RPA is tracked via weighbridge docket records. Copies of these records are kept and monitored by the Environmental Services Department.
- Disposal of clinical waste generated by RPAH is tracked via a bar coding system and barcode records supplied by the clinical waste contractor are kept and monitored by the Environmental Services Department.

4.7 Work Health & Safety.

- The RPAH waste management system is designed to minimise the potential hazards to employees in managing waste. Employees have an obligation to follow instructions regarding safe work practices.
- All staff involved in the handling of waste, are trained in safe work practices that minimise manual handling and infection control risks and are provided with Personal Protective Equipment appropriate to the waste handling task.
- All staff is instructed in correct sharps injury protocols.
- Staff are advise to follow the Hand Hygiene policy after handling waste of any sort.

Infection Control Policy: Hand Hygiene. RPAH_PD2013_011

4.8 Spill Management.

- All staff should manage waste spills in accordance with the RPAH spill management policy and relevant spill management procedure.

RPAH Spill Management Policy_RPAH_PD2010_058

In most cases, concerns about pollution should be referred to the source or person causing the problem. The contact telephone numbers on this page should be used when an approach to the person causing the problem has not been or is unlikely to be successful.

Duty to report incidents that cause or threaten material harm to the environment as per the New South Wales Environment Protection Authority (EPA).

Pollution incidents that cause or threaten material harm to the environment first call

- 2222 and ask for the RPA Fire Department.

They will advise the appropriate authorities as per below:

- The Appropriate Regulatory Authority (ARA).
- The NSW Environment Protection Authority (EPA) or if they are not the ARA the Ministry of Health.
- The WorkCover Authority.
- The local authority, e.g. the local council, if this is not the ARA.

4.9 Cleaning & Maintenance.

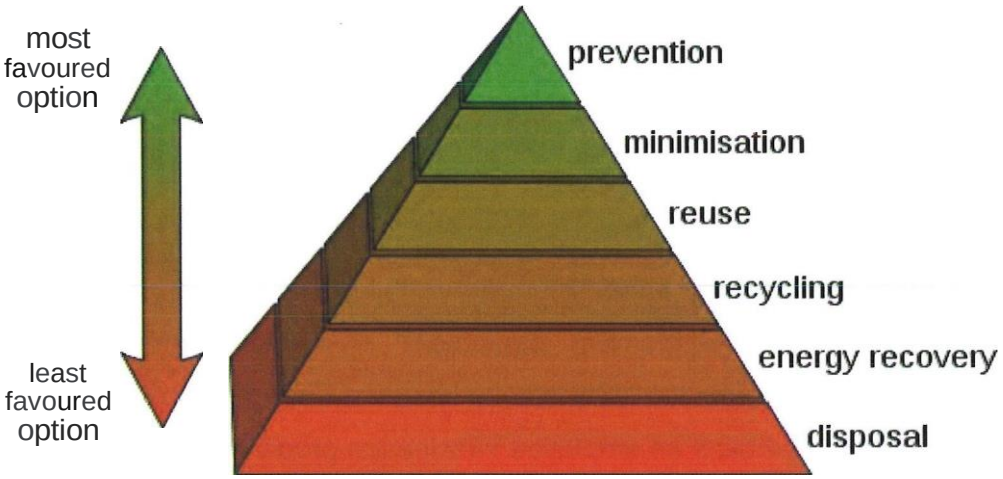
- All waste management equipment is washed and maintained in accordance with the NSW Health Infection Control Policy.
- RPAH maintains an employee vaccination program for all staff involved in the handling of potentially infectious waste.
- Statistics on manual handling and sharps inJuries related to waste handling activities are reported and monitored by the RPAH Peak WH&S Committee and the RPAH Sustainability Committee. Targeted strategies are implemented as necessary to reduce the incidence and severity of these injuries.

5. Performance Measures.

- Key Performance Indicators are used by the RPAH Sustainability Committee, RPAH WH&S Peak Committee and the RPAH Environmental Services Department to monitor compliance to Waste Management policy and Guidelines, ensure cost efficiency, identify and develop targeted waste management strategies performance with other health care facilities. These include:
- Cost and tonnage trends over time.
- Cost and tonnage trends over time by unit or department.

- Clinical waste trends vs. hospital activity (tonnes/1000 occupied bed days).
- General waste trends vs. hospital activity (tonnes/1000 occupied bed days).
- Sharps waste trends vs. hospital activity (litres/ 1000 occupied bed days).
- Recycling rates (kilograms per 100 DOHRS FTE).

WASTE HIERACHY



- The waste hierarchy refers to the "3 Rs" reduce, reuse and recycle, which classify waste management strategies according to their desirability. The 3 Rs are meant to be a hierarchy, in order of importance.

Reports.

- Reports are produced on a monthly basis from contractor with information regarding the diversion.

6. Definitions.

- NIL

7. References and links.

- Work Health and Safety Regulation 2011.
- Waste Avoidance and Resource Recovery Act 2001.
- Protection of the Environment Operations (Waste) Regulation 2005.
- NSW Health Waste Management Guidelines for Health Care Facilities

August 1998 PD 2005_132.

- NSW Health Infection Control Policy PD2007_036.
- Australian / New Zealand Standard AS/NZS 4478/1997.
- Australian / New Zealand Standard AS/NZS 3816/1998.
- Gene Technology Act 2000.
- Gene Technology Regulation 2001.
- NSW MoH Hand Hygiene Policy PD2010_058.
- NSW Health Infection Control Policy PD2007_036.

8. Procedure - Waste Disposal Guidelines.

8.1 The Clinical Waste Stream (colour code yellow).

Definition: Clinical waste means any waste resulting from medical, nursing, dental, pharmaceutical, skin penetration or other related clinical activity, being waste that has the potential to cause injury, infection or offence, and includes waste containing any of the following:

(a) Human tissue (other than hair, teeth and nails),
(b) Bulk body fluids or blood,
(c) Visibly blood-stained body fluids, materials or equipment,
(d) Laboratory specimens or cultures,
(e) Animal tissue, carcasses or other waste from animals used for medical research.

- The disposal of clinical waste is separated and disposed of in two categories, non sharps and sharps.

8.1.1 Non Sharp Clinical Waste.

- Non sharp clinical waste should be placed into yellow bags with the black clinical waste (biohazard) signage printed on them. Environmental services staff will then place these bags into yellow mobile garbage bins. When these bins are full they will be locked prior to transport to the holding area on level 2 building 89.
- Non sharps clinical waste includes:
- any waste **visibly** stained with blood or visibly stained body fluids (incontinence pads or disposable sheets not completely soaked in urine and without faeces may go into general waste).
- bulk body fluids and blood.
- human tissue (excludes hair, teeth and nails).

- Laboratory specimens and cultures.
- Animal tissues and carcasses.

Examples of waste commonly found in non sharps clinical waste that should not be there:

- waste from VRE or MRSA patients that are not visibly stained with blood or body fluids. This waste is disposed of into general waste.
- sharps of any description.
- gowns and gloves not visibly soiled with blood (including those from VRE and MRSA patients).
- polystyrene and paper cups.
- reusable linen and towels contaminated with blood and body fluids.
- paper.

NB: If you are uncertain please contact the Infection Control Unit for clarification.

8.1.2 Sharps Clinical Waste

- Sharps clinical waste should be placed into the sharps containers provided. Most of these containers are reusable and not disposable (therefore do not write or stick anything onto these containers). Dispose of sharps into the sharp container until it is full to the line or until the tray tips and displays the full sign at the back of the tray. When the tray has tipped into the full position do not attempt to pull the tray back to place another sharp in, as this may propel a contaminated sharp out and cause injury. Once full the sharp container must be locked and placed in the dirty utility room for collection by Environmental Services staff. Do not close these containers off if they are not full as the disposal charge on these bins is per container and so half filled bins incur the same price as full containers.
- sharps clinical waste includes:
- needles.
- small glass ampoules.
- scalpel blades.
- stitch cutters.

- auto lancets.
- trocars.
- Wires.
- metal cannula inserts.

Examples of waste commonly found in sharps containers that should not be there:

- polystyrene cups.
- gloves.
- glass bottles.
- paper towels.
- plastic ampoules.
- IV administration sets.
- syringes (without needles attached).

8.2 Cytotoxic Waste Stream (colour code purple).

- Definition: Material contaminated with residues or preparations containing materials toxic to cells.
- The disposal of cytotoxic waste is separated into two categories non sharps and sharps.

8.2.1 Non Sharp Cytotoxic Waste.

- Non sharp cytotoxic waste should be double bagged and placed into clearly labelled purple mobile garbage bins.
- Only staff who have received prior cytotoxic drug/waste handling training should be depositing waste into these bins or transporting these bins.
- These bins should remain locked at all times when not in use. Only when these bins are secured/locked and authority given, are Environmental services staff to remove them from the area.
- Environmental services staff will replace the mobile garbage bins on request or by prior arrangement. The used bin will be locked then transported and stored in a holding bay on level 2 building 89 for collection by the licensed contractor.
- Non sharps cytotoxic waste includes;

- leftover or unused cytotoxic drugs
- IV infusion sets and containers associated with the preparation or administration of cytotoxic drugs.
- glass/plastic vials associated with the preparation or administration of cytotoxic
- drugs.
- gowns, caps, gloves and swabs associated with the preparation or administration of cytotoxic drugs.
- material used to clean or contain cytotoxic spills.

8.2.2 Sharps Cytotoxic Waste.

- Sharps cytotoxic waste should be placed into the purple cytotoxic sharps containers provided. These are disposable containers. Once full or no longer needed the lid should be screwed on and taped down. The container should be placed in the dirty utility for collection by Environmental Services Staff.
- Sharps cytotoxic waste includes;
- needles that have contained cytotoxic drugs.
- small glass ampoules that have contained or still contain cytotoxic drugs.
- any glass containers that have contained cytotoxic drugs.

8.3 Hazardous Chemicals, Hazardous Substances & Dangerous Goods Waste.

8.3.1 The hazardous and dangerous goods colour coding is defined by Chemalert. Red - High risk - Amber - Medium risk - Green - Low risk.

Definition: **Hazardous chemical waste** is a substance that to be disposed of and is listed in a document entitled "List of Designated Hazardous Substance" [NOHSC: 10005 (1999)] published by the National Occupational Health and Safety Commission.

Definition: **Hazardous Substances** & **Dangerous Goods Waste** are substances which have the potential to cause a severe single exposure risk such as explosion, fire, poisoning or corrosion. They are classified by the Australian Code for the Transport of Dangerous Goods.

- This waste should be stored in the correct containers. A file containing the MSDS sheets should be stored next to this waste.
- This waste is collected from the area it is generated in on a weekly basis.
- A request form needs to be filled in and emailed to the Supply & Waste Management Coordinator before 12 pm on a Wednesday for collection by licensed contractor on Thursday afternoon.

See policy **RPAH_PD2012_037** for full details.

8.3.2 All Relevant Waste Streams are secured from public access.

- Genetically Modified Organisms, confidential paper, clinical waste, sharp waste & cytotoxic waste must be secured from public access at all times. If removing the bin from an area then it should be locked and removed in a safe and orderly manner.
- NB. GMO waste should be only transported in a secondary container that has been appropriately labelled and approved by the Institutional Biosafety Committee (IBC).

Refer to the Environmental Services Guidelines for the transporting, storage and disposal of GMO's.

8.4 Confidential Paper Recycling- colour code blue (with lockable lid).

Definition: **Confidential paper recycling** is paper that has any identifying personal information.

- Confidential paper must be disposed of directly into secure locked bins in order to comply with the Privacy & Personal Information Act 1998. It should not be placed into general paper recycling.
- The confidential paper recycling bins are blue 240 litres mobile garbage bins with lockable lids (a few different colour lids are around mainly blue, red and yellow) that have slits in the top for disposal.

These bins are available on request from Environmental services Department.

- The request form is available on the intranet and needs to be faxed to the number given on the form. These bins should only be filled to ¾ full. Once ¾ full a new request form will need to be faxed through to the Environmental Services Department.
  http:/intranet.sswahs.nsw.gov.au/RPA/forms/ConfBinRequest.pdf
- On receipt of the form the full bin will be exchanged for an empty bin. If you do not need another bin then the rapid response team may be paged on #80031 for its removal. In the event that large amounts of confidential waste are being disposed of the bins can be supplied unlocked but will need to be locked immediately after disposal ceases and prior to transport.
- Confidential Waste Paper includes;
  - Patient Health Information.
  - Patient Labels.
  - Medication Labels.
  - Personal Staff Information.

NB: Confidential documents that have been shredded may be placed directly into general paper recycling, provided they are emptied out of the plastic bag.

8.5 General Paper Recycling- colour code blue.

Definition: **General paper recycling** is any waste paper that does not contain confidential information, wax or food scraps.

- General paper waste should be placed into the blue cardboard boxes that are labelled "paper only". These cardboard boxes are emptied by the Environmental Services staff into the blue unlocked mobile garbage bins.
- General Paper Recycling includes;
- Office paper (non-confidential).
- Cardboard (small amounts e.g. empty glove boxes).
- Magazines.

- Glossy brochures.
- Envelopes.
- Notepaper.
- Newspapers.

NB: Staples and paperclips do not need to be removed.

8.6 Mixed/Co-mingled Recycling- colour code Red.

Definition: **Materials mixed together,** such as plastic bottles with glass and metal containers. Commingled recyclable materials require sorting after collection before they can be recycled.

- Mixed/Co-mingled waste should be placed into the red cardboard boxes that are labelled "mixed recycling". These cardboard boxes are emptied by Environmental Services staff into the red mobile garbage bins.
- Mixed Recycling includes;
- Unbroken Glass Bottles (No Pyrex or Winchester bottles).
- Aluminium Cans.
- Steel Cans.
- Plastic Bottles with recycling sign 1-7.
- Milk Cartons (empty).
- Plastic with recycling sign 1-7.

Waste that should not be in mixed recycling bins.

- pyrex glass.
- broken glass.
- paper.
- paper cups.
- gloves.
- pizza boxes.
- steel cans containing food scraps.
- milk container partially filled with milk.

8.7 Single use Surgical Equipment Recycling- no colour code.

- Theatres and TSSU will recycle single use surgical equipment and bins will be placed in the each of the Theatre areas which will be clearly marked for "Single Use Surgical Equipment Recycling".

8.8 Cardboard Recycling- no colour code.

- All cardboard boxes should be flattened by the person who emptied them. The flattened cardboard boxes should then be placed in trolleys provided or in the waste rooms near the general waste bins. These flattened cardboard boxes will be removed by Environmental services staff.

8.9 Battery Recycling- no colour code.

- Rechargeable batteries can be recycled. These batteries should be placed in the collection bins inside Biomedical Engineering on Level 2 Building 89 or Engineering Services on Level 5 Building 28 (Environmental services do not collect these batteries it is up to individual wards/areas to place these batteries in the receptacles provided inside Biomedical Engineering or Engineering Services).
- Battery Recycling includes;
  - lead acid
  - nickel cadmium
- Non recyclable batteries (i.e. alkaline) should be placed in general waste bins (there is currently no recycling facility available for these in Australia.)

8.10 Print Cartridge and Toner Recycling- no colour code

- Print cartridge recycling boxes are available on request from Environmental Services. These boxes are lined with plastic bags with special prepaid post address labels. Used print cartridges or photocopy toner cartridges should be placed in these bags. When approximately ½ full the bags should be tied off with cable ties provided. The bags should then be placed outside the mail room level 5 KGV for collection by Australia Post. For departments that do not need their own print

cartridge recycling box the cartridges can still be recycled by depositing them in the box outside the mail room level 5, KGV.

Print Cartridge Recycling includes;

Inkjet cartridges.

Toner bottles.

Laser cartridges.

Fuser Kits.

Drum kits.

Fax, photocopier and printer cartridges.

It is the department/ward responsibility to take the ½ filled bags to the mail room in KGV.

8.11 Pink Plastic Patient Bag Recycling- no colour code.

- Pink plastic patient bag recycling can be arranged on request from the Environmental Services Department.
- Pink plastic patient bags should be placed in plastic bags in receptacle provided. When full, the plastic bag should be tied off and replaced and the full bag placed in waste room. The Environmental services staff will remove the tied off bag ready for recycling.

8.12 Pallet Wrap Recycling- no colour code.

- Pallet wrap recycling can be arranged on request from the Environmental Services Department. Pallet wrap should be placed in plastic bags in receptacle provided. When full the plastic bag should be tied off and replaced and the full bag placed in waste room. Environmental services staff will remove the tied off bag ready for recycling.

8.13 Broken Glass.

- Broken glass should not be placed in the glass recycling bins this will result in Environmental services staff receiving sharps injuries. Broken glass should be swept up and placed into a small cardboard box and then taped shut, "broken glass" should then be written on the outside

of the box and the box placed directly into a general waste mobile garbage bin. Pyrex glass should be disposed of in the same manner.

8.14 E-Waste / Obsolete Equipment.

- E-Waste / Obsolete Equipment should be removed from the asset register using the intranet form:

http://intranet.sswahs.nsw.gov.au/Csahs/Finance/TransferAsset.pdf

- Once removed from the asset register removal will then need to be arranged through the relocation team by faxing them on 57418.
- E-Waste / Obsolete Equipment which includes: -
- Computers.
- Fax machines.
- Ward equipment.

8.15 Furniture.

- Furniture can be discarded through the relocation team by faxing a request through to them on 57418.

8.16 Mattresses.

- Old mattresses can be discarded by faxing the request through to the relocation team on 57418.

8.17 General Waste Stream- colour code green.

General waste includes:

- food scraps.
- paper towel.
- outer plastic packaging (that does not have a recycling sign 1-7).
- non soiled alcohol wipes.
- disposable gowns not visibly stained with blood (paper & plastic).
- paper masks, disposable (theatre) caps.
- gloves not visibly stained with blood.
- polystyrene cups.

- dead flowers.
- plastic sheeting off beds not visibly stained with blood.
- Incontinence pads or disposable sheets that are not visibly stained with blood or completely soaked in body fluids and/or faeces.

Waste that should not be put into general waste bins.

- office paper.
- confidential paper.
- clinical waste.
- GMO's.
- cytotoxic waste.
- computers and furniture.
- cardboard boxes.

Waste Licensing.

- All contractors are to have the appropriate licenses for the removal and disposal of waste under the Environment Protection and Regulation Division of New South Wales. A copy of the contractor/s current licence will be kept by the Environmental Service Department.
- It is a requirement that all contractors coming onto the facility/site must be inducted.

This induction course is to be completed online using the Engineering link.

https://www.inductee.com.au/sswahs/

8.18 Certificate of Destruction

- A certificate of destruction for single use surgical equipment, confidential, cytotoxic, chemical liquid, clinical and printer cartridges should be obtained from the waste contractor/s to ensure the waste has been disposed of correctly.

9. Waste Management Policy - Display Version

See on next page

RPAH WASTE MANAGEMENT POLICY - DISPLAY VERSION

1. Aim / Expected outcome of this policy: To provide a framework that ensures all waste at RPAH is managed safely and efficiently with consideration to environmental issues. This policy outlines the overall objectives of the RPAH waste management program and the responsibilities of staff in relation to waste management. To improve our waste segregation by labelling clearly and colour coding our waste streams. Operational details of the RPAH waste management system can be found in the RPAH Waste Minimisation and Management Plan.

2. Policy Statement/ Principles /Guidelines: RPAH is committed to maintaining an efficient and cost effective waste management system that protects the health and safety of all employees, patients and other persons working in or visiting the hospital premises. In accordance with NSW government policy and international best practice, the hospital takes a "cradle to the grave" approach to waste management which implies responsibility for waste from point of generation to final disposal. As such, all staff as waste generators has an obligation to dispose of waste responsibly. RPAH Waste management strategies focus on waste minimisation principles of avoidance, reduction and correct segregation of waste and the promotion of re-use and recycling practices where feasible. Waste management is legislated under the Waste Act (1995) and Waste Regulation (1996) which is administered by the NSW Environmental Protection Authority. The implementation of the RPAH Waste Minimisation and Management Plan in conjunction with this Policy aims to ensure compliance with all relevant legislative and regulatory requirements as set out in Section 8 of this policy.

3. Scope: All employees and contractors working in the hospital or at other premises controlled by the hospital.

4. Exceptions: No exceptions.

5. Policy principles: The RPAH Waste Management Policy in conjunction with the RPAH Waste Minimisation and Management Plan has been implemented with the following objectives:

Waste segregation

To ensure waste is managed throughout the hospital via the appropriate waste streams that are classified in accordance with the NSW Health Policy Guidelines

RPAH Sustainability Committee

To monitor and report on the efficiency and effectiveness of the waste management system via the RPAH Waste Management Plan.

Education and Training

To promote good waste management practice via ongoing waste management education and training programmes.

Waste management Strategies

RPAH Waste management strategies focus on waste minimisation principles of avoidance, reduction and correct segregation of waste and the promotion of re-use and recycling practices where feasible.

Waste Handling Containment and Transport

To ensure segregated waste is stored and transported appropriately

Waste Disposal

To ensure waste management contracts are consistent with relevant regulations as well as track and record various waste streams

Work Health and Safety

To minimise the incidence of injuries related to waste generation and handling, through safe work practices, staff training and the provision of Personal Protective Equipment.

6. Cognizant Office / Getting Help: Environmental Services Department, RPAH Supply and Waste Management Coordinator.

7. References

Work Health and Safety Regulation 2011

Waste Avoidance and Resource Recovery Act 2001

Protection of the Environment Operations (Waste) Regulation 2005

NSW Health Waste Management Guidelines for Health Care Facilities August 1998 PD 2005_132

NSW Health Infection Control Policy PD2007_036

Australian/ **New** Zealand Standard **AS/NZS** 4478/1997 and **AS/NZS** 3816/1998

Gene Technology Act 2000 and Gene Technology Regulation 2001

NSW MoH Hand Hygiene Policy PD2010_058

NSW Health Infection Control Policy PD2007_036

8. Note: This is a display version of the Waste Management Policy. Further details should be obtained from the comprehensive version of the Waste Management Policy (RPAH_PD2013_).

POLICY APPROVAL AUTHORITY:	**Ms. Deborah Willcox**	**Policy Reference No.**
Review Date:		
	General Manager	**RPAH_PD2013_**
APRIL 2017		

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Health Infrastructure

Royal Prince Alfred Hospital

REF #2 Acoustic Assessment Report

AC02

D | 7 June 2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 280318

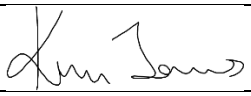
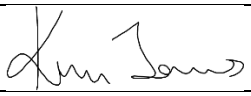
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Contents

			Page
1	**Introduction**		**2**
	1.1	Relevant documentation	2
2	**Scope**		**3**
	2.1	Site description	5
3	**Surrounding land uses**		**6**
4	**Existing noise environment**		**8**
	4.1	Noise measurement locations	8
	4.2	Long-term noise measurement results	8
5	**Operational noise criteria**		**9**
	5.1	NSW Noise Policy for Industry	9
	5.2	Operational noise review	13
6	**Construction**		**14**
	6.1	Construction noise criteria – external receivers	14
	6.2	Construction noise criteria – internal receivers	17
	6.3	Construction vibration criteria	17
	6.4	Construction stages and activities	23
	6.5	Construction hours	24
	6.6	Construction noise predictions	25
	6.7	Construction vibration	29
	6.8	Construction noise and vibration mitigation	31
7	**Conclusion**		**34**

Appendices

Appendix A

Acoustic Glossary

Appendix B

Distances from locations of works to receivers

1 Introduction

Arup has been engaged by Health Infrastructure NSW to undertake an acoustic assessment to support Review of Environmental Factors (REF) #2 for the Package 2 Enabling / Early Works related to the proposed redevelopment of the Royal Prince Alfred Hospital (RPA).

The works are being carried out under State Environmental Planning Policy (Infrastructure) 2007 [1] as 'Development without Consent' by Health Infrastructure NSW as a public authority. This acoustic and vibration assessment considers the polices, guidelines and standards outlined in Section 1.1.

This document provides noise and vibration advice on the following:

- Impact on adjacent to sensitive receivers and mitigation measures (during construction and operation) – i.e. including existing hospital uses, child care centres etc
- Consideration of noise and vibration impacts with the proposed construction hours for REF works.
- Further assessment/justification required if demolition is proposed outside of standard construction hours (i.e. Monday – Friday: 7am to 6pm; Saturday: 8am to 1pm; Sunday and public holidays: no work)
- Identification of work equipment and machinery for construction and assessment of impact on surrounding receivers.

1.1 Relevant documentation

The assessment of construction noise impacts has been carried out in accordance with the NSW Interim Construction Noise Guidelines [2]. As sensitive receivers will be impacted for greater than 3 weeks, a quantitative assessment is required.

The assessment of operational noise impacts must be in accordance with the NSW EPA Noise Policy for Industry (NPfI) [3].

Potential impacts from vibration during construction and/or operation has been quantified as per Assessing Vibration: a technical guideline [4].

Other standards, policies and guidelines referenced in this report include:

- BS 7385-2: 1993 Evaluation and measurement for vibration in buildings – Pt2: Guide to damage levels from groundborne vibration, (1993) [5]
- DIN 4150-3: 1999 Structural vibration – Effects of vibration on structures, (1999) [6]
- ASHRAE Handbook, Chapter 49 – Noise and vibration control (2019) [7]
- DIN 4150-2: 1999 Structural vibration – Human exposure to vibration in buildings [8]

2 Scope

The scope of the Package 2 early / enabling works includes the following:

Gloucester house bridge and road civil and services

Scope of the proposed works:

- Reconfiguration of Gloucester House footbridge and associated roadworks
- Gloucester House Road hump adjustment
- Reconfigure Lambie Dew Drive turning bay
- Tree removal / pruning

The location of the proposed works is shown in Figure 1.

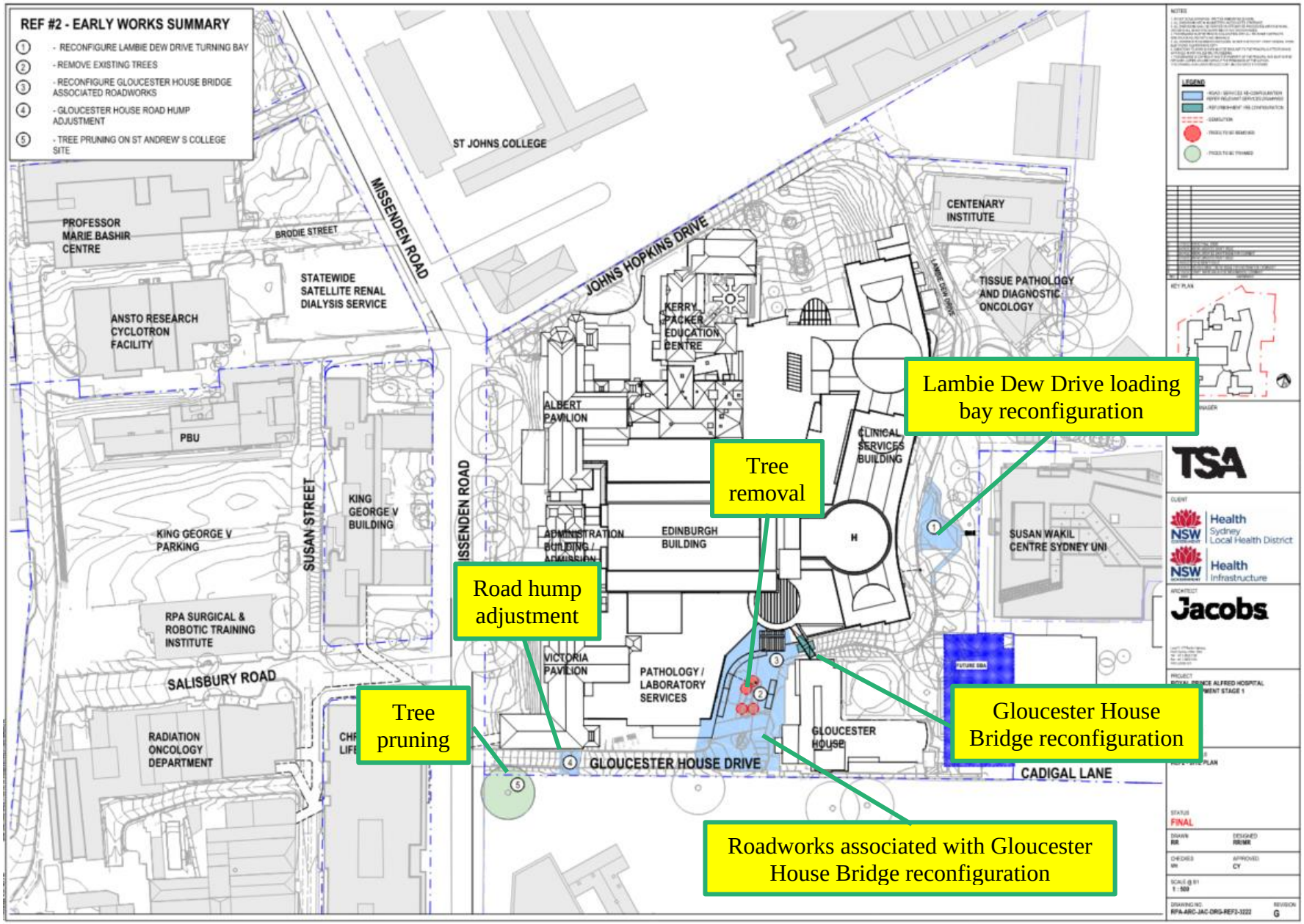


Figure 1: Site Map showing location of REF #2 works

2.1 Site description

This section of the report references the Camperdown Health Education & Research Precinct (CHERP) RPAH Campus Plan [9].

The RPA campus is located within Camperdown, Sydney, between the Leichhardt, Inner West and City of Sydney Local Government Areas. It sits between Sydney University to the East and the residential area of Camperdown to the West. The campus is bisected by Missenden Road, which runs North - South, dividing the East Campus from the West Campus. The northern boundary of the campus is defined by the Queen Elizabeth II Rehabilitation Centre located on the corner of Missenden Road and Lucas Street. The southern extent of the campus is defined by Carillon Avenue. Church Street forms the western boundary.

The subject site is the main hospital building. The main hospital building is surrounded by:

- other buildings on the RPA campus
- Commercial building to the north
- University of Sydney buildings and amenity areas:
    - St. John's College and St. John's Oval to the north
    - St. Andrew's College and St. Andrew's Oval to the south
    - CreateSpace and Susan Wakil Health Building to the east
    - Charles Perkins Centre to the northeast

Both St. John's and St. Andrew's Colleges contain student dormitories.

Several buildings on the RPA campus are noted as having heritage significance, including those noted in Table 1.

Table 1: Heritage buildings on the RPA campus

Building	**Heritage Status**
Admission Block	Exceptional significance
Albert and Victoria Pavilion	High significance
King George V Memorial Hospital	High significance
Morgue and Chapel	Chapel of Low significance
Immunology building	Exceptional significance
Gloucester House	High significance
Resident Medical Officer's Quarters (Nurses Home)	Significance not rated
Boiler House	Moderate significance

3 Surrounding land uses

The nearest most potentially affected off-site land uses surrounding the development have been identified in Figure 2, which shows the location of the main RPA building (the subject site) and identifies the surrounding buildings which are also part of the RPA campus.

Table 2 summarises the location of the nearest most potentially affected receivers.

Hospital wards on the subject site (i.e. on the same lot) do not need to be assessed under the NPfI. Nevertheless, this report does provide criteria for hospital wards on the subject site, which can be used to assess the impact of operational noise from the proposed works on these wards.

Table 2: Receiver locations

ID	Receiver	Description
SS	Hospital wards within the subject site, i.e. RPA Main Building, Centenary Institute, Tissue Pathology and Diagnostic Oncology Building and Gloucester House	Hospital Ward (Subject site)
R1	St. John's College	Residential
R2	St Andrew's College	Residential
E1	CreateSpace and Susan Wakil Health Building, University of Sydney	Classroom
E2	Charles Perkins Centre, University of Sydney	Classroom
E3	Surgical and Robotic Training Institute	Classroom
E4	CG5I Workshop - St Andrew's College	Classroom
A1	St. John's Oval	Active Recreation
A2	St Andrew's Oval / Tennis Courts	Active Recreation
A3	University Oval No. 1	Active Recreation
C1	7-Eleven Camperdown	Commercial
C2	King George V Building (hospital administration)	Commercial
C3	ANSTO Cyclotron	Commercial
C4	Capital Works	Commercial
H1	Chris O'Brien Lifehouse	Hospital Ward
H2	Building 12 (formerly the State Satellite Renal Dialysis Service)	Hospital Ward
H3	Professor Marie Bashir Centre	Hospital Ward
H4	RPAH Medical Centre	Hospital Ward
H5	Radiation Oncology Department	Hospital Ward



Figure 2: Site, receiver and noise monitoring locations

4 Existing noise environment

Unattended noise monitoring was undertaken at St. Andrew's College by Resonate in 2018 for the SEARS Noise and Vibration Assessment for the Susan Wakil AO Health Building ("the Resonate report") [10].

The background noise levels presented in the Resonate report were assessed against attended noise measurements that were obtained during the daytime period at Building 12 and St John's College by Acoustic Studio in 2012 and presented in the report *Royal Prince Alfred Hospital North West Precinct Redevelopment Main Works Contract - Excavation & Construction Noise And Vibration Management* [11].

The attended daytime noise levels at Building 12 and St. John's College from the between 1 and 6 dB higher than the unattended daytime noise levels presented in The Resonate Report. Therefore, the background noise levels measured at St. Andrew's College are more conservative and expected to be representative of the current environment and have been adopted in this report.

4.1 Noise measurement locations

Noise measurements are ideally carried out at the nearest or most potentially affected locations surrounding a development. Representative locations may be established in the case of multiple receivers as it is usually impractical to carry out measurements at all locations surrounding a site.

The long-term measurement locations are outlined in Table 3 and shown in Figure 2.

Table 3: Noise monitoring locations

ID	Address
L1[1]	St. Andrew's College

Notes:
1. Long-term noise monitoring results obtained from the Resonate report

4.2 Long-term noise measurement results

Long-term noise monitoring was carried out from Wednesday, 10 January 2018 to Wednesday, 17 January 2018.

Table 4 presents the overall single Rating Background Levels (RBL) and representative ambient L_{Aeq} noise levels for each assessment period, determined in accordance with the NPfI [3].

Table 4: Long-term noise monitoring results, dB(A)

Location	Time period	Rating background noise levels, dBL_{A90}	Ambient dBL_{Aeq} noise levels
L1	Day	50	58

Location	Time period	Rating background noise levels, dBL_{A90}	Ambient dBL_{Aeq} noise levels
	Evening	50	54
	Night	47	52

Notes:
Day: 07:00-18:00 Monday to Saturday and 08:00-18:00 Sundays & Public Holidays
Evening: 18:00-22:00 Monday to Sunday & Public Holidays
Night: 22:00-07:00 Monday to Saturday and 22:00-08:00 Sundays & Public Holidays
As required by the NPfI, the external ambient noise levels presented are free-field noise levels (i.e. no façade reflection)

5 Operational noise criteria

The primary operational noise sources with the potential to impact upon surrounding noise sensitive uses has been identified as building services (i.e. mechanical, electrical and hydraulic plant and equipment) and vehicular movements on site.

The operational noise impact on the subject site (SS) is not required to be assessed, but a discussion of potential impacts on the SS is provided for information only in Section 5.2.

5.1 NSW Noise Policy for Industry

Operational noise emissions from the project are to be assessed in accordance with the Noise Policy for Industry (NPfI), which is primarily concerned with controlling intrusive noise impacts in the short-term for residences, and maintaining long-term noise level amenity for residences and other land uses.

The NPfI sets out the procedure to determine the project noise trigger levels relevant to an industrial development. The project noise trigger level is a level that, if exceeded would indicate a potential noise impact on the community and so 'trigger' a management response.

5.1.1 Intrusive noise trigger level

The intrusiveness noise trigger level is applicable to residential premises only and is summarised as follows:

- $L_{Aeq,15minute} \leq$ Rating Background Level (RBL) plus 5 dB

  (where $L_{Aeq,15minute}$ represent the equivalent continuous noise level of the source)

5.1.2 Recommended and project amenity noise level

To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level within an area from **all** industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 of the NPfI where feasible and reasonable. An extract from the policy is given below in Table 5.

Table 5: NPfI Recommended Amenity Noise Levels (RANLs)

Receiver	**Noise amenity area**	**Time of Day**	**Recommended amenity noise levels (RANLs) L_{Aeq}, dB(A)**
Residential	Rural	Day	50
		Evening	45
		Night	40
	Suburban	Day	55
		Evening	45
		Night	40
	Urban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	See column 4	See column 4	5 dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School classroom - internal	All	Noisiest 1-hour period when in use	35 (see notes for table)
Hospital ward Internal External	 All All	 Noisiest 1-hour Noisiest 1-hour	 35 50
Place of worship – internal	All	When in use	40
Area specifically reserved for passive recreation (e.g. national park)	All	When in use	50
Active recreation area (e.g. school playground, gold course)	All	When in use	55
Commercial premises	All	When in use	65
Industrial premises	All	When in use	70
Industrial interface (applicable only to residential noise amenity areas)	All	All	Add 5 dB(A) to recommended noise amenity area

Receiver	Noise amenity area	Time of Day	Recommended amenity noise levels (RANLs) L_{Aeq}, dB(A)

Notes: The recommended amenity noise levels (RANLs) refer only to noise from industrial sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

1. The NPfI defines day, evening and night time periods as:
   - Day: the period from 7 am to 6 pm Monday to Saturday; or 8 am to 6 pm on Sundays and Public Holidays.
   - Evening: the period from 6 pm to 10 pm.
   - Night: the remaining period.

(These periods may be varied where appropriate. In the case where existing schools are affected by noise from existing industrial noise sources, the acceptable L_{Aeq} noise level may be increased to 40 dB $L_{Aeq(1hr)}$

The recommended amenity noise levels (RANLs) represent the objective for **total** industrial noise at a receiver location, whereas the **project amenity noise level (PANL)** represents the objective for noise from a **single** industrial development at a receiver location.

To ensure that any new industrial source of noise is within the RANLs for an area, the PANL applies for each new source of industrial noise as follows:

- *Project Amenity Noise Level (PANL) = Recommended Amenity Noise Level (RANL) minus 5 dB(A)*

The NPfI also provides the following exceptions to the above method for deriving the project amenity noise level:

1. *In areas with high traffic noise levels.*
2. *In proposed developments in major industrial clusters.*
3. *Where the resultant project amenity noise level is 10 dB or more lower than the existing industrial noise level. In this case the project amenity noise levels can be set at 10 dB below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time.*
4. *Where cumulative industrial noise is not a necessary consideration because no other industries are present in the area, or likely to be introduced into the area in the future. In such cases the relevant amenity noise level is assigned as the project amenity noise level for the development.*

The area surrounding the site can be categorised as Urban under the NPfI.

The NPfI sets the PANLs to $L_{Aeq(period(traffic))}$ minus 15 dB(A) in the case that the level of transport $L_{Aeq(period(traffic))}$ exceeds the RANL by 10 dB or more. As the $L_{Aeq(period)}$ does not exceed the RANL by 10 dB or more, the PANLs will be set to the RANL – 5 dB.

Table 6 summarises the RANLs and the PANLs applicable for the project.

Table 6: NPfI RANLs and PANLs

Receiver	Indicative Noise Amenity Area	Time of day[1]	Recommended Amenity Noise Level (RANL) $L_{Aeq(period)}$	Project Amenity Noise Level (PANL) $L_{Aeq(period)}$
R1, R2	Urban	Day	60	55
		Evening	50	45
		Night	45	40
E1, E2, E3, E4	N/A[2]	Classroom – noisiest 1 hour, when in use	40 (internal) 50 (external)[3]	35 (internal) 45 (external)
A1, A2, A3	N/A[2]	When in use	55	50
C1, C2, C3, C4	N/A[2]	When in use	65	60
SS, H1, H2, H3, H4, H5	N/A[2]	Hospital ward – noisiest 1 hour	35 (internal) 50 (external)	30 (internal) 45 (external)

Notes:

1. The NPfI defines day, evening and night-time periods as:
   - Day: the period from 7 am to 6 pm Monday to Saturday; or 8 am to 6 pm on Sundays and Public Holidays.
   - Evening: the period from 6 pm to 10 pm.
   - Night: the remaining period.
2. N/A = not applicable
3. External criteria set to 10 dB above the internal criteria to represent noise reduction through an open window. Since the classrooms are impacted by noise from the existing RPA building, internal criteria have been set according to note in Table 5.

5.1.3 Sleep disturbance

The NSW NPfI recommends the following screening criteria for the assessment of potential sleep disturbance, for the period between 10 pm and 7 am:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or;
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater

5.1.4 NPfI Project specific noise levels

In addition to the above criteria, the NPfI has simplified assessment for the amenity criteria, making an assumption regarding the relationship between the $L_{Aeq(15min)}$ and $L_{Aeq(period)}$ and applying a +3 dB correction to adjust $L_{Aeq(period)}$ Project Amenity Level to an $L_{Aeq(15min)}$. This correlates to assuming a noise source operates for half the period. This simplified adjustment has been adopted and applied to residential receivers in this report.

Project Noise Trigger Levels (PNTLs) for residential receivers represent the lower of the intrusive criteria and the adjusted $L_{Aeq,15min}$ amenity criteria.

The derived criteria for each receiver are given in Table 7.

Table 7: NPfI Project specific noise levels

Receiver	Time of day[1]	Project Specific Noise Levels			
		Intrusive noise trigger level $L_{Aeq(15min)}$	**Project Amenity Noise Level (PANL)** $L_{Aeq(period)}$	**Project Noise Trigger Level (PNTL)** $L_{Aeq(15min)}$	**Sleep Disturbance** $L_{Amax(night)}$
R1, R2	Day	55	55	55	N/A[2]
	Evening	55	45	48	N/A[2]
	Night	52	40	43	62
E1, E2, E3, E4	Classroom – noisiest 1 hour, when in use	N/A[2]	35 (internal) 45 (external)	35 (internal) 45 (external)	N/A[2]
A1, A2, A3	When in use	N/A[2]	50	50	N/A[2]
C1, C2, C3, C4	When in use	N/A[2]	60	60	N/A[2]
SS, H1, H2, H3, H4, H5	Hospital ward – noisiest 1 hour	N/A[2]	30 (internal) 45 (external)	30 (internal) 45 (external)	N/A[2]

Notes:

1. The NPfI defines day, evening and night-time periods as:
   - Day: the period from 7 am to 6 pm Monday to Saturday; or 8 am to 6 pm on Sundays and Public Holidays.
   - Evening: the period from 6 pm to 10 pm.
   - Night: the remaining period.
2. N/A = not applicable

5.2 Operational noise review

Building services

No sources of operational noise have been identified for the proposed works; no changes to operational noise levels are expected due to these works.

Vehicular movements on site

It is expected that vehicular movements and traffic noise levels not will not significantly increase as a result of the proposed works.

6 Construction

This assessment should be used to inform the proposed work practices and management measures contained in the preliminary Construction Management Plan (CMP). The preliminary CMP will be further developed as the construction methodologies and processes are confirmed during the design development process.

6.1 Construction noise criteria – external receivers

The ICNG provides recommended noise levels for airborne construction noise at sensitive land uses. The guideline provides construction noise management levels above which all feasible and reasonable work practices should be applied to minimise the construction noise impact. The ICNG works on the principle of a 'screening' criterion – if predicted or measured construction noise exceeds the ICNG levels then the construction activity must implement all 'feasible and reasonable' work practices to reduce noise levels.

The ICNG provides two methods for assessing construction noise, varying typically based on the project duration, being either a quantitative or a qualitative assessment. A quantitative assessment is recommended for major construction projects of significant duration, and involves the measurement of background noise levels for determination of noise management levels and prediction of construction noise levels. A qualitative assessment is recommended for small projects with a duration of less than three weeks and focuses on minimising noise disturbance through the implementation of reasonable and feasible work practices, and community notification.

The size of the early / enabling works covered in this report and the indicative construction schedule warrant a quantitative assessment including prediction of construction noise levels. A preliminary screening quantitative assessment has been carried out, however it is expected that a more detailed quantitative assessment be undertaken prior to commencement of works, to confirm mitigation and management processes.

While not required under the ICNG, criteria have been established for hospital wards on the subject site. The final noise and vibration criteria for the subject site should be developed in consultation with the contractor and the operators of the hospital.

6.1.1 Management levels

The ICNG sets out management levels for noise at noise sensitive receivers, and how they are to be applied. These noise management levels (NMLs) for residential receivers and other sensitive receivers are reproduced in Table 8 and in Table 9 respectively.

Table 8: Construction noise management levels (NMLs) at residential receivers

Time of day	NML[1] $L_{Aeq\ (15\ min)}$	How to apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays	Noise affected RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dB(A) above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2 of the ICNG.

Notes:

1. Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Table 9: Construction noise management levels (NMLs) at other noise sensitive land uses

Land use	Where objective applies	Management level $L_{Aeq(15\ min)}$[1]
Classrooms at schools and other educational institutions	Internal noise level	45 dB(A)
Hospital wards and operating theatres	Internal noise level	45 dB(A)

Land use	Where objective applies	Management level $L_{Aeq(15\ min)}$[1]
Places of worship	Internal noise level	45 dB(A)
Active recreation areas	External noise level	65 dB(A)
Passive recreation areas	External noise level	60 dB(A)
Community centres	Depends on the intended use of the centre.	Refer to the 'maximum' internal levels in AS2107 for specific uses.
Commercial premises	External noise level	70 dB(A)
Industrial premises	External noise level	75 dB(A)

Notes:

1. Noise management levels apply when receiver areas are in use only.

For work within standard construction hours, if after implementing all 'feasible and reasonable' noise levels the site still exceeds the noise affected level, the ICNG does not require any further action – since there is no further scope for noise mitigation.

For out-of-hours work, the ICNG uses a noise level 5 dB above the noise-affected level as a threshold where the proponent should negotiate with the community. While there is no 'highly-noise affected level' outlined in the ICNG for out-of-hours work, this report adopts the terminology where the construction noise level is 5 dB above the noise affected level for residential receivers.

6.1.2 Project construction noise targets

Based on the measured background noise levels presented in Table 4 and the criteria methodology presented above, Table 10 outlines the construction noise management levels applicable to demolition, excavation and construction.

Table 10: Construction noise management levels (NMLs)

Receiver	Where objective applies	Noise management level, $dBL_{Aeq(15\ min)}$			
		Standard hours[1]		Outside standard hours[2]	
		Noise affected	Highly noise affected	Noise affected	Highly noise affected
R1, R2	External	60	75	52	57
E1, E2, E3, E4	Internal External[3]	45 55	-	45 55	-
A1, A2, A3	External	65	-	65	-
C1, C2, C3, C4	External	70	-	70	-
SS, H1, H2, H3, H4, H5	Internal External[3]	45 55	-	45 55	-

Receiver	Where objective applies	Noise management level, $dBL_{Aeq(15\ min)}$			
		Standard hours[1]		Outside standard hours[2]	
		Noise affected	Highly noise affected	Noise affected	Highly noise affected

Notes:

1. Monday to Friday 7 am to 6pm; Saturday 8am to 1pm; Sunday and Public Holidays no work
2. Noise management level based on night period (i.e. 10 pm to 7 am) background noise level
3. External noise level based on an assumed 10dB reduction through open window

6.2 Construction noise criteria – internal receivers

The Gloucester House Bridge reconfiguration works will involve some internal construction works which will impact upon the subject site, namely the RPAH main building and Gloucester House.

Managing construction noise and vibration within an occupied building is challenging. There is no standard guidance or code for managing construction noise and vibration impact to internal spaces, and there is no ideal approach that reliably avoids construction noise disturbance to building occupants without significantly impeding progression of works.

Effective management of construction noise and vibration to internal spaces is not as simple as setting criteria, monitoring levels, and implementing mitigation measures when criteria is exceeded. People response is subjective, and exceeding standard criteria does not necessarily constitute disturbance and achieve set criteria is not always practicable. Setting criteria that appropriately accounts for the disturbing characteristics is also complex, such as being able to respond to both short term impulsive events or more constant lower-level sources. In addition, the use of monitors to measure exposure in occupied spaces is often problematic, as exceedances are easily triggered by non-construction sources (particularly people and noise-generating equipment at the monitoring location). Furthermore, it may be impractical to comply with the preferred criteria, which if imposed, may unduly prohibit works from occurring.

It is recommended that the approach to managing internal noise (as outlined in the Construction Noise and Vibration Management Plan (CNVMP)) should aim to identify actual noise disturbance via effective complaint communication processes, instead of relying on noise level criteria.

Further details regarding the management of internal noise levels are discussed in Section 6.8.4.

6.3 Construction vibration criteria

6.3.1 Disturbance to building occupants

Potential vibration disturbance to human occupants of buildings is made in accordance with the NSW DEC Guideline [4]. The criteria outlined in the

guideline is based on BS 6472-1992 [12]. Sources of vibration are defined as either 'Continuous', 'Impulsive' or 'Intermittent', as described in Table 11.

Table 11: Types of vibration – Definition

Type of vibration	Definition	Examples
Continuous vibration	Continues uninterrupted for a defined period (usually throughout the day-time and/or night-time)	Machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery).
Impulsive vibration	A rapid build-up to a peak followed by a damped decay that may or may not involve several cycles of vibration (depending on frequency and damping). It can also consist of a sudden application of several cycles at approximately the same amplitude, providing that the duration is short, typically less than 2 seconds	Infrequent: Activities that create up to 3 distinct vibration events in an assessment period, e.g. occasional dropping of heavy equipment, occasional loading and unloading.
Intermittent vibration	Can be defined as interrupted periods of continuous or repeated periods of impulsive vibration that varies significantly in magnitude	Trains, nearby intermittent construction activity, passing heavy vehicles, forging machines, impact pile driving, jack hammers. Where the number of vibration events in an assessment period is three or fewer, this would be assessed against impulsive vibration criteria.

Table 12 reproduces the ‘Preferred’ and ‘Maximum’ values for continuous and impulsive vibration from Table 2.2 of the Guideline.

Table 12: Preferred and maximum vibration acceleration levels for human comfort, m/s^2

Location	Assessment period[1]	Preferred values		Maximum values	
		z-axis	x- and y-axes	z-axis	x- and y-axes
Continuous vibration (weighted RMS acceleration, m/s^2, 1-80Hz)					
Critical areas[2]	Day- or night-time	0.005	0.0036	0.010	0.0072
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day- or night-time	0.020	0.014	0.040	0.028
Workshops	Day- or night-time	0.04	0.029	0.080	0.058
Impulsive vibration (weighted RMS acceleration, m/s^2, 1-80Hz)					
Critical areas[2]	Day- or night-time	0.005	0.0036	0.010	0.0072
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14

Location	Assessment period[1]	Preferred values		Maximum values	
		z-axis	x- and y-axes	z-axis	x- and y-axes
Offices, schools, educational institutions and places of worship	Day- or night-time	0.64	0.46	1.28	0.92
Workshops	Day- or night-time	0.64	0.46	1.28	0.92

Notes:

1. Daytime is 7:00am to 10:00pm and night-time is 10:00pm to 7:00am
2. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. There may be cases where sensitive equipment or delicate tasks require more stringent criteria than the human comfort criteria specified above. Alternative criteria are outside the scope of the policy and other guidance documents should be referred to.

Table 13 reproduces the 'Preferred' and 'Maximum' values for intermittent vibration from Table 2.4 of the Guideline.

Table 13: Acceptable vibration dose values (VDV) for intermittent vibration ($m/s^{1.75}$)

Location	Daytime[1]		Night-time[1]	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas[2]	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Notes:

1. Daytime is 7:00am to 10:00pm and night-time is 10:00pm to 7:00am
2. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous of impulsive criteria for critical areas. Source: BS 6472-1992

6.3.2 Structural damage

6.3.2.1 Definition

Potential structural or cosmetic damage to buildings as a result of vibration is typically assessed in accordance with British Standard 7385 Part 2 [5] and/or German Standard DIN4150-3 [6]. British Standard 7385 Part 1: 1990, defines different levels of structural damage as:

- *Cosmetic - The formation of hairline cracks on drywall surfaces, or the growth of existing cracks in plaster or drywall surfaces; in addition, the formation of hairline cracks in mortar joints of brick/concrete block construction.*

- *Minor - The formation of large cracks or loosening of plaster or drywall surfaces, or cracks through bricks/concrete blocks.*
- *Major - Damage to structural elements of the building, cracks in supporting columns, loosening of joints, splaying of masonry cracks, etc.*

Table 1 of British Standard 7385 Part 2 (1993) sets limits for the protection against cosmetic damage, however the following guidance on minor and major damage is provided in Section 7.4.2 of the Standard:

> *7.4.2 Guide values for transient vibration relating to cosmetic damage*
>
> *Limits for transient vibration, above which cosmetic damage could occur are given numerically in Table 1 and graphically in Figure 1. In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the guide values for the building types corresponding to line 2 are reduced. Below a frequency of 4 Hz, where a high displacement is associated with a relatively low peak component particle velocity value a maximum displacement of 0.6 mm (zero to peak) should be used.*
>
> *Minor damage is possible at vibration magnitudes which are greater than twice those given in Table 1, and major damage to a building structure may occur at values greater than four times the tabulated values.*

Within DIN4150-3, damage is defined as "*any permanent effect of vibration that reduces the serviceability of a structure or one of its components"* (p.2). The Standard also outlines:

> *"that for structures as in lines 2 and 3 of Table 1, the serviceability is considered to have been reduced if*
>
> - *cracks form in plastered surfaces of walls;*
> - *existing cracks in the building are enlarged;*
> - *partitions become detached from loadbearing walls or floors.*
>
> *These effects are deemed 'minor damage." (DIN4150.3, 1990, p.3)*

While the DIN Standard defines the above damage as 'minor', the description aligns with BS7385 cosmetic damage, rather than referring to structural failures.

6.3.2.2 British standard BS7835-2

BS7385-2 is based on peak particle velocity and specifies damage criteria for frequencies within the range 4–250 Hz, and a maximum displacement value below 4 Hz is recommended. Table 14 sets out the BS7385 criteria for cosmetic, minor and major damage.

Table 14: BS7385-2 structural damage criteria – low rise buildings

Line	Type of structure	Damage level	Peak component particle velocity[1] (PCPV), mm/s					
			Where vibration that does not give rise to resonant responses in structures[3]			Where vibration might give rise to resonant responses in structures[4]		
			4 Hz to 15 Hz	15 Hz to 40 Hz	40 Hz and above	4 Hz to 15 Hz	15 Hz to 40 Hz	40 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	Cosmetic	50			25		
		Minor[2]	100			50		
		Major[2]	200			100		
2	Un-reinforced or light framed structures Residential or light commercial type buildings	Cosmetic	15 to 20	20 to 50	50	7.5 to 10	10 to 25	25
		Minor[2]	30 to 40	40 to 100	100	15 to 20	20 to 50	50
		Major[2]	60 to 80	80 to 200	200	30 to 40	40 to 100	100

Notes:

1. Peak Component Particle Velocity is the maximum Peak particle velocity in any one direction (x, y, z) as measured by a tri-axial vibration transducer.
2. Minor and major damage criteria established based on British Standard 7385 Part 2 (1993) Section 7.4.2
3. Levels relates to transient vibrations in low-rise buildings.
4. A 50% reduction might apply to the guide levels for “vibration that does not give rise to resonant responses in structures” if there is potential for continuous vibration to give rise to dynamic magnifications. Activities considered to have the potential to cause dynamic loading in some structures (e.g. residences) include rock breaking/hammering and sheet piling activities.

6.3.2.3 German standard DIN 4150

German Standard DIN 4150 - Part 3 '*Structural vibration in buildings - Effects on Structure'* [6] are generally recognised to be conservative and is often referred to for the purpose of assessing structurally sensitive buildings. Heritage buildings are not automatically assumed to be structurally unsound and do not need to be assessed under this standard unless they have been identified as structurally unsound. As there are heritage listed buildings in the vicinity of the proposed works, a heritage consultant should be consulted during the preparation of the CNVMP to determine whether any of the heritage listed buildings are considered structurally unsound.

For structurally sound buildings, the British Standard is considered appropriate for vibration management.

6.3.3 Vibration sensitive equipment or receivers

Some high technology manufacturing facilities, hospitals and laboratories use equipment and processes that are highly sensitive to vibration, such as high magnification microscopy (including optical and electron microscopes) and high resolution imaging equipment (e.g. MRI). Buildings housing sensitive computer or telecommunications equipment may also require assessment against stricter criteria than those nominated for building damage or human comfort.

While the acceptable vibration levels for such equipment are recommended to be obtained from the instrument manufacturers, generic criteria such as the ASHRAE Vibration Criteria for Vibration Sensitive Equipment (VC-curves) can be adopted for planning purposes. Baseline vibration levels could also be measured to inform the establishment of appropriate criteria.

Regarding existing hospital buildings/facilities on site at RPA, an investigation of all vibration sensitive equipment should take place during development of the detailed Construction Noise and Vibration Management Plan.

6.3.4 Buried services

Proposed roadworks may impact upon buried services.

DIN 4150-2:1999 sets out guideline values for vibration effects on buried pipework (see Table 15).

Table 15: Guideline values for short-term vibration impacts on buried pipework

	Pipe material	**Guideline values for vibration velocity measured on the pipe, mm/s**
1	Steel (including welded pipes)	100
2	Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80
3	Masonry, plastic	50

Notes:

For gas and water supply pipes within 2m of buildings, the levels given in DIN4150-3 [6] should be applied. Consideration must also be given to pipe junctions with the building structure as potential significant changes in mechanical loads on the pipe must be considered.

In addition, specific limits for vibration affecting high-pressure gas pipelines is provided in the UK National Grid's *Specification for Safe Working in the Vicinity of National Grid High Pressure Gas Pipelines and Associated Installations – Requirements for Third Parties* (report T/SP/SSW/22, UK National Grid, Rev 10/06, October 2006). This specification states that no piling is allowed within 15 m of a pipeline without an assessment of the vibration levels at the pipeline. The PPV at the pipeline is limited to a maximum level of 75 mm/s, and where PPV is predicted to exceed 50 mm/s the ground vibration is required to be monitored.

Other services that maybe encountered include electrical cables and telecommunication services such as fibre optic cables. While these may sustain vibration velocity levels from between 50 mm/s and 100 mm/s, the connected

services such as transformers and switchgear, may not. Where encountered, site specific vibration assessment in consultation with the utility provider should be carried out.

6.4 Construction stages and activities

As detail of the construction noise equipment / plant to be used is not known at the time, assumptions have been made based on sources normally found on construction sites similar to the RPA Hospital redevelopment.

Table 16 gives a high-level outline of the general stages of work, expected construction activities and anticipated airborne noise levels for indicative plant items. It is assumed that the listed plant may be used during out-of-hours works (OOHW) as well as during standard hours.

The equipment listed in Table 16 is not expected to operate continuously for 15-minutes and concurrently. A conservative adjustment for duration has been applied in the predicted construction noise levels. The adjustment assumes each item of equipment operates for 75% of the 15-minute assessment period.

Equipment sound power levels (L_w) have been sourced from AS2436 – 2010 Guide to noise and vibration control on construction, demolition and maintenance sites. It should be noted that during the different construction stages, it is unlikely that all machinery would be operating at the same time (like the modelling assumes), but taking a 'worse-case' scenario approach helps to identify where noise impacts could be a concern and assists in the design of mitigation measures.

Table 16: Summary of works, noise generating activities and indicative plant items

Project scope item	**Significant noise generating activity**	**Indicative plant items**	**Sound power level (per unit), dBL_{Aeq}**	**Time-adjusted sound power level (per unit), dBL_{Aeq}**
Reconfiguration of Lambie Dew Drive turning bay	Excavation of road Road works	Pavement profiler	117	116
		Pavement laying machine	114	113
		Front end loader	112	111
		Generator (diesel)	113	112
		Dump truck	117	116
		Smooth drum roller	107	106
		Asphalt truck and sprayer	107	106
		Backhoe	108	107
		Bulldozer	114	113
		Concrete saw	122	121
		Excavator tracked (hydraulic) – 30t	122	121
		Pneumatic hammer	121	120

Project scope item	Significant noise generating activity	Indicative plant items	Sound power level (per unit), dBL_{Aeq}	Time-adjusted sound power level (per unit), dBL_{Aeq}
Reconfiguration of Gloucester House footbridge[1]	Demolition and construction of bridge; glazing removal and replacement	Handheld tools (electric)	110	109
		Mobile crane	113	112
		Cherry picker	105	106
		Pneumatic hammer	121	120
		Dump truck	117	116
		Concrete pump truck	113	112
Roadworks associated with Gloucester House Bridge reconfiguration, including road hump adjustment	Excavation of road Road works	Pavement profiler	117	116
		Pavement laying machine	114	113
		Front end loader	112	111
		Generator (diesel)	113	112
		Dump truck	117	116
		Smooth drum roller	107	106
		Asphalt truck and sprayer	107	106
		Backhoe	108	107
		Bulldozer	114	113
		Concrete saw	122	121
		Excavator tracked (hydraulic) – 30t	122	121
		Pneumatic hammer	121	120
Removal of existing trees	Tree removal	Bulldozer	114	113
		Excavator tracked (hydraulic) – 30t	122	121
		Dump truck	117	116
		Chainsaw 4-5hp	114	113
		Tub grinder/mulcher 40-50hp	116	115
Tree pruning	Tree pruning	Chainsaw 4-5hp	114	113
		Dump Truck	117	116

Notes:

1. Some works may be carried out within Gloucester House and the RPAH main building and as such will have a greater impact on staff and patients within these buildings.

6.5 Construction hours

In addition to the ICNG [3] recommended standard construction hours, approval is being sought to:

- extend construction hours on Saturdays to commence at 7 am.
- Conduct out-of-hours works at night and during weekends.

For projects undergoing a typical approvals process, permission for extended operating hours is granted for:

1. the delivery of oversized plant or structures that police or other authorities determine require special arrangements to transport along public roads
2. emergency work to avoid the loss of life or damage to property, or to prevent environmental harm
3. maintenance and repair of public infrastructure where disruption to essential services and/or considerations of worker safety do not allow work within standard hours
4. public infrastructure works that shorten the length of the project and are supported by the affected community
5. works where a proponent demonstrates and justifies a need to operate outside the recommended standard hours

Justification for 7am Saturday morning extension of hours

On the basis of point 5 above and given that slightly longer hours shorten the construction duration for an essential service site, Arup recommends that approval be granted for the extension to operating hours on Saturday mornings, on condition that the works being undertaken are low noise activities only (such as site preparation works). In particular, the following activities are excluded:

- Demolition works
- Excavation works

Justification for out-of-hours night and weekend works

Gloucester House Road and the Patient Plaza will need to close during some of the proposed works. To reduce the impact on staff and patients at the hospital during these works, OOHW at night and during weekends will be required. For this reason, it is proposed that demolition and excavation can take place during OOHW.

On the basis of point 5 above, Arup recommends that approval be granted for OOHW which require the closure of Gloucester House Road and the Patient Plaza, so that impact on staff and patients at the hospital can be minimised.

During periods where OOHW are taking place, and where the 7 am Saturday morning start forms a part of the OOHW, it is proposed that full demolition and construction activities can take place from 7 am on Saturday.

6.6 Construction noise predictions

6.6.1 Noise assessment – external receivers

Predicted construction noise levels, considering standard construction hours and outside standard construction hours, are tabulated in Table 18. Noise levels have been compared to the receiver's relevant Noise Management Level and exceedances have been highlighted.

The noise levels at each receiver have been assessed based on the representative locations of works shown in Figure 1 and Table 17. Where the works occur over a large area, the point closest to each receiver is conservatively used to establish the distance of that receiver from the works.

Table 17: Locations of noise-generating works

Location (shown in Figure 1)	Works at this location
1 (blue shading)	Reconfiguration of Lambie Dew Drive turning bay
2 (red shading)	Tree removal
3 (blue shading) (a)	Gloucester House Bridge associated roadworks
3 (bridge shown in teal) (b)	Reconfiguration of Gloucester House Bridge
4 (blue shading)	Gloucester House Bridge Road hump adjustment
5 (mint shading)	Tree pruning

The magnitude of construction noise impacts is dependent upon several aspects including the intensity, location of activities and the type of equipment used during the construction period. Based on these factors, the predicted construction noise levels are generally conservative and do not represent a constant noise emission that would be experienced by the community on a daily basis throughout the project construction period. The predicted noise levels would only be experienced for limited periods of time when works are occurring and should not be experienced for full daytime or night-time periods.

It is again emphasised that all the equipment listed in Table 16 is not expected to operate continuously for 15-minutes and concurrently. A conservative adjustment for duration has been applied in the predicted construction noise levels. The adjustment assumes each item of equipment operates for 75% of the 15-minute assessment period.

Receivers within the main RPAH building ("internal receivers"), as well as receivers within surrounding off-site locations ("external receivers") will be impacted by the proposed REF #2 works.

Table 18: Predicted noise levels at nearest affected off-site receiver locations

Location	NML $dBL_{Aeq(15\ min)}$		Predicted sound level from each location of works $dBL_{Aeq(15\ min)}$					
	Noise affected	Highly noise affected	Loc. 1	Loc. 2	Loc. 3(a)	Loc. 3 (b)	Loc. 4	Loc. 5
Standard hours								
R1	60	75	60[4]	56[4]	60[4]	56[4]	58[4]	58[4]
R2	60	75	60[4]	78	84	74	109	109
E1	45[2]	N/A[1]	95[3]	67[3]	72[3]	68[3]	65[3]	49[3,4]
E2	45[2]	N/A[1]	66[3]	44[3]	48[3,4]	44[3,4]	46[3,4]	45[3,4]
E3	45[2]	N/A[1]	46[3,4]	46[3]	64[3]	59[3]	68[3]	69[3]
E4	45[2]	N/A[1]	53[3,4]	78[3]	89[3]	75[3]	74[3]	71[3]

Location	NML $dBL_{Aeq(15\ min)}$		Predicted sound level from each location of works $dBL_{Aeq(15\ min)}$					
	Noise affected	Highly noise affected	Loc. 1	Loc. 2	Loc. 3(a)	Loc. 3 (b)	Loc. 4	Loc. 5
A1	65	N/A[1]	59[4]	54[4]	58[4]	53[4]	56[4]	56[4]
A2	65	N/A[1]	80	84	101	80	95	88
A3	65	N/A[1]	81	71	75	71	56[4]	55[4]
C1	70	N/A[1]	60[4]	56[4]	60[4]	55[4]	59[4]	74
C2	70	N/A[1]	59[4]	59[4]	63[4]	57[4]	83	84
C3	70	N/A[1]	55[4]	53[4]	57[4]	52[4]	58[4]	73
C4	70	N/A[1]	56[4]	56[4]	60[4]	54[4]	64[4]	66[4]
SS	45[2]	N/A[1]	99[3]	92[3]	109[3]	104[3]	109[3]	109[3]
H1	45[2]	N/A[1]	49[3,4]	65[3]	70[3]	62[3]	77[3]	83[3]
H2	45[2]	N/A[1]	48[3,4]	46[3,4]	49[3,4]	44[3,4]	49[3,4]	65[3]
H3	45[2]	N/A[1]	45[3,4]	43[3,4]	46[3,4]	41[3,4]	47[3,4]	47[3,4]
H4	45[2]	N/A[1]	46[3,4]	61[3]	65[3]	59[3]	51[3,4]	51[3,4]
H5	45[2]	N/A[1]	46[3,4]	61[3]	50[3,4]	44[3,4]	54[3,4]	56[3,4]
Outside standard hours								
R1	52	57	60[4]	56[4]	60[4]	56[4]	58[4]	58[4]
R2	52	57	60[4]	78	84	74	109	109
E1	45[2]	N/A[1]	95[3]	67[3]	72[3]	68[3]	65[3]	49[3,4]
E2	45[2]	N/A[1]	66[3]	44[3]	48[3,4]	44[3,4]	46[3,4]	45[3,4]
E3	45[2]	N/A[1]	46[3,4]	46[3]	64[3]	59[3]	68[3]	69[3]
E4	45[2]	N/A[1]	53[3,4]	78[3]	89[3]	75[3]	74[3]	71[3]
A1	65	N/A[1]	59[4]	54[4]	58[4]	53[4]	56[4]	56[4]
A2	65	N/A[1]	80	84	101	80	95	88
A3	65	N/A[1]	81	71	75	71	56[4]	55[4]
C1	70	N/A[1]	60[4]	56[4]	60[4]	55[4]	59[4]	74
C2	70	N/A[1]	59[4]	59[4]	63[4]	57[4]	83	84
C3	70	N/A[1]	55[4]	53[4]	57[4]	52[4]	58[4]	73
C4	70	N/A[1]	56[4]	56[4]	60[4]	54[4]	64[4]	66[4]
SS	45[2]	N/A[1]	99[3]	92[3]	109[3]	104[3]	109[3]	109[3]
H1	45[2]	N/A[1]	49[3,4]	65[3]	70[3]	62[3]	77[3]	83[3]
H2	45[2]	N/A[1]	48[3,4]	46[3,4]	49[3,4]	44[3,4]	49[3,4]	65[3]
H3	45[2]	N/A[1]	45[3,4]	43[3,4]	46[3,4]	41[3,4]	47[3,4]	47[3,4]
H4	45[2]	N/A[1]	46[3,4]	61[3]	65[3]	59[3]	51[3,4]	51[3,4]
H5	45[2]	N/A[1]	46[3,4]	61[3]	50[3,4]	44[3,4]	54[3,4]	56[3,4]

Location	NML dBL$_{Aeq(15\ min)}$		Predicted sound level from each location of works dBL$_{Aeq(15\ min)}$					
	Noise affected	Highly noise affected	Loc. 1	Loc. 2	Loc. 3(a)	Loc. 3 (b)	Loc. 4	Loc. 5

Notes:

1. N/A = not applicable
2. internal noise level
3. Predicted sound pressure level includes -10 dB adjustment accounting for external-to-internal noise reduction (assuming window partially open)
4. Predicted sound pressure level includes -15 dB adjustment accounting for shielding from buildings / changing terrain height

Predicted sound pressure level ≤ noise affected level

Noise affected level < predicted sound pressure level ≤ highly noise affected

Highly noise affected < predicted sound pressure level

Results show that construction noise is predicted to exceed ‘noise affected’ levels during standard hours for several receivers, with residential receiver R2 predicted to be “highly noise affected”.

High noise levels are also predicted to hospital wards in the subject site (note that hospital wards do not have a “highly noise affected” management level under the ICNG).

The “outside standard hours” noise predictions in Table 18 are based on full construction activities taking place, which are expected to be necessary where works require the closure of Gloucester House Road and the Patient Plaza (as stated in Section 6.5).

It is recommended that only low-noise (e.g. painting, plastering, and other activities that do not require the use of powered tools) and site preparation works be undertaken during the 7 am – 8 am time period on Saturdays. Therefore, no assessment has been undertaken for this time period.

In general, construction works are temporary in nature therefore potential noise impact on the community and the surrounding environment will not be permanent or continuous. However, where the predicted $L_{Aeq(15min)}$ noise level is greater than the noise management levels all feasible and reasonable work practices should be applied, however it is unlikely mitigation measures would reduce the received noise levels below the noise management levels in all cases.

6.6.2 Noise assessment – internal receivers

Noise impacts to receivers within the subject site are typically not assessed during project approval noise assessments. Nevertheless, a qualitative assessment of construction noise impacts on internal receivers is presented below.

The Gloucester House Bridge works will impact upon internal receivers within the subject site (i.e. the RPAH main building and Gloucester House).

Based on the equipment sound power levels in Table 16, it is expected that staff and patients located in the vicinity of Gloucester House Bridge may be “noise

affected" during the course of the works to the Bridge (note that hospital wards do not have a "highly noise affected" management level under the ICNG). It is expected that loud construction equipment will also be audible on floors above and below the bridge.

As noted in Section 6.2, managing construction noise within an occupied building is challenging.

Hospital staff and management should be consulted during the development of the CNVMP to ensure that suitable noise management strategies (as outlined in Section 6.8.4), are implemented. The CNVMP should outline steps to:

- minimise the impact on staff as far as practicable
- mitigate the risk of impacts on patients

6.7 Construction vibration

The nearest off-site vibration sensitive receiver locations are presented in Table 19.

Table 19: Nearest off-site vibration receivers

ID	Description	Type of receiver	Approx. distance from structure to nearest works location, m
SS	Subject site, i.e. RPA Main Building, Centenary Institute, Tissue Pathology and Diagnostic Oncology Building and Gloucester House	Healthcare	1
H1	Chris O'Brien Lifehouse	Healthcare	20
H5	Radiation Oncology Dept	Healthcare	76
E1	CreateSpace and Susan Wakil Health Building, University of Sydney	Education	5
E3	Surgical and Robotic Training Institute	Education	93
E4	CG5I Workshop - St Andrew's College	Education	10
C2	King George V Building (hospital administration)	Commercial	53
C4	Capital Works	Commercial	78
R2	St. Andrew's College	Residential	3

6.7.1 Vibration – minimum working distances

Recommended minimum working distances for vibration intensive plant, which are based on international standards and guidance, are provided in Table 20. Minimum working distances are quoted for:

- Cosmetic damage (based on the British Standard 7385 [5])

- Human comfort (based on the DECCs 'Assessing Vibration; a technical guideline' [4])

Table 20: Recommended minimum working distances for vibration intensive equipment

Plant item	**Rating / description**	**Minimum working distance (m)**			
		Cosmetic damage – screening criteria			**Human response** DECC Guideline
		Industrial and heavy commercial buildings BS 7385 Line 1 - 25 mm/s (see note 2)	**Residential and light commercial buildings** BS 7385 Line 2 - 7.5 mm/s (See note 2)	**Unsound structures** DIN 4150 Line 3 - 3 mm/s	
Vibratory roller	< 50 kN (~ 1 to 2t)	2	5	11	15 to 20
	< 100 kN (~ 2 to 4t)	2	6	13	20
	< 200 kN (~ 4 to 6t)	5	12	26	40
	< 300 kN (~ 7 to 13t)	6	15	31	100
	> 300 kN (~ 13 to 18t)	8	20	40	100
	> 300 kN (> 18t)	10	25	50	100
Hydraulic hammer – Small	300 kg / 5 to 12t excavator	1	2	5	7
Hydraulic hammer – Medium	900 kg / 12 to 18t excavator	3	7	15	23
Hydraulic hammer – Large	1600 kg / 18 to 34t excavator	9	22	44	73
Jackhammer	Hand-held	1 (nominal)	1 (nominal)	3	5
Truck movements	-	-	-	-	10

Notes:

1. Based on TRL document [13] using Godio et al formula, equation 24
2. Where vibration might give rise to resonant responses in structures

6.7.2 Vibration assessment

Noting the minimum working distances in Table 20 and the distance to the nearest sensitive receiver locations (as detailed in Table 19), there exists the potential for certain demolition, excavation and construction activities to result in vibration impacts upon the existing buildings on the subject site and off-site receivers H1, E1, E4 and R2.

In addition to these, receivers H5, E3 and C2 and C4 may be impacted from a human comfort perspective depending on the plant item (i.e. if vibratory rollers >= 7 t or large hydraulic hammers are used during the works). Where vibration

generating equipment is proposed to be used within the minimum distance in Table 18, review of equipment selection and/or method of construction should be conducted. Vibration monitoring might also be required.

It is expected that the subject site, and possibly some off-site receivers, will contain vibration-sensitive equipment. While beyond the scope of this assessment, an investigation of vibration sensitive equipment located in proximity to the proposed works should occur. If vibration sensitive equipment is identified, a review of the equipment and manufacturer data should be conducted to establish acceptable vibration levels. Subsequently, a review of construction equipment selection and/or method of construction should be completed.

6.8 Construction noise and vibration mitigation

Noise mitigation measures for each major construction activity are discussed in the following sections. These mitigation measures are considered to represent 'feasible and reasonable' mitigation measures suitable for implementation during construction of the project.

6.8.1 Construction noise and vibration management plan

For all construction works, the contractor would be expected to prepare a detailed Construction Noise and Vibration Management Plan (CNVMP). This plan should include but not be limited to the following:

- Roles and responsibilities
- Noise and vibration sensitive receiver locations
- Areas of potential impact
- Mitigation strategy
- Monitoring methodology
- Community engagement strategy.

General guidance on the control of construction noise and vibration impacts relevant to this study are discussed in the following sections.

6.8.2 General

In general, practices to reduce construction noise impacts will be required, and may include;

- Adherence to the standard approved working hours as outlined in the Project Approval.
- Manage noise from construction work that might be undertaken outside the recommended standard hours
- The location of stationary plant (concrete pumps, air-compressors, generators, etc.) as far away as possible from sensitive receivers
- Using site sheds and other temporary structures or screens/hoarding to limit noise exposure where possible.

- Sealing of openings in the building (temporary or permanent) prior to commencement of internal works to limit noise emission.
- The appropriate choice of low-noise construction equipment and/or methods
- Modifications to construction equipment or the construction methodology or programme. This may entail programming activities to occur concurrently where a noisy activity will mask a less noisy activity, or, at different times where more than one noisy activity will significantly increase the noise. The programming should also consider the location of the activities due to occur concurrently.
- Carry out consultation with the community during construction including, but not limited to; advance notification of planned activities and expected disruption/effects, construction noise complaints handling procedures.

6.8.3 Universal work practices

The following noise mitigation work practices are recommended to be adopted at all times on site:

- Regularly train workers and contractors (such as at toolbox talks) to use equipment in ways to minimise noise.
- Site managers to periodically check the site and nearby residences for noise problems so that solutions can be quickly applied.
- Avoid the use of radios or stereos outdoors.
- Avoid the overuse of public address systems.
- Avoid shouting and minimise talking loudly and slamming vehicle doors.
- Turn off all plant and equipment when not in use.

6.8.4 Managing internal noise and vibration levels

There are pros and cons to relying upon internal criteria for management in the Project context.

Setting numeric criteria as a limit for construction works also necessitates confidence in the ability to comply with the set levels. Prediction of noise transfer through a building is far more difficult than an external environment. The contractor will ultimately need greater certainty that works can reasonably be undertaken.

A *qualitative* process informed by pre-work testing is proposed:

- A combination of high-level quantitative assessment, qualitative evaluation and on-site pretesting, is to be used to categorise works in terms of their range of potential impact and align with allowable scheduling of works.
- Outline potential mitigation measures or alternative works procedures
- Develop a detailed staff and contractor engagement and consultation procedure to prewarn of impacting works

- Implement a detailed complaint handling procedure for during works, both between staff and management at the RPAH Main Building, and with the head contractor and their subcontractors.

6.8.5 Vibration – minimum working distances

Recommended minimum working distances for vibration intensive plant, which are based on international standards and guidance, are provided in Table 20.

During development of the detailed CNVMP, an investigation of vibration impact upon existing buildings on the subject site and on nearby sensitive receivers should take place. It is expected that vibration monitoring will be required under the CNVMP.

7 Conclusion

Arup has completed an acoustic and vibration assessment for REF #2 for the enabling works proposed for RPA Hospital.

Regarding operations, the assessment concludes that the proposed development can satisfy the standard NSW EPA noise policy requirements. Notwithstanding, further detailed acoustic assessment is warranted during the design development, particularly concerning building services noise control.

Regarding construction, the proposed works are predicted to result in exceedance of the relevant noise management levels at most off-site assessment locations and accordingly mitigation and management procedures will need to be considered for the works. However, the predicted exceedances are only expected during periods of intense activity subject to the type of equipment used.

Predictions indicate that the proposed works may result in in exceedance of the minimum working distances of vibration for the subject site and for receivers H1, E1, E4 and R2. During development of the detailed Construction Noise and Vibration Management Plan an investigation of vibration impact upon existing buildings on the subject site and on nearby sensitive receivers should take place.

A detailed Construction Noise and Vibration Management Plan (CNVMP) for the project should be prepared, in which specific attention should be given to mitigating and managing potential impacts upon the surrounding receiver locations. It is expected that the detailed CNVMP would be prepared by the contractor prior to the commencement of works.

The construction assessment showed that while specific plant is not yet known, there is potential for some receivers to be impacted from a human comfort perspective depending on the type of construction equipment used and distance to nearest buildings. There is also potential damage to vibration sensitive equipment if any vibration sensitive equipment is located within the site boundary. The CNVMP should identify any vibration sensitive equipment within the site boundary and associated vibration criteria then identify appropriate construction equipment, method of construction and/or mitigation measures to be implemented including vibration monitoring if required.

References

[1] NSW Government, “State Environmental Planning Policy (Infrastructure) 2007,” 2007.

[2] Department of Environment and Climate Change NSW, “Interim Construction Noise Guideline,” Department of Environment and Climate Change NSW, Sydney, 2009.

[3] NSW Environment Protection Authority, “NSW Noise Policy for Industry,” NSW Environment Protection Authority, Sydney, 2017.

[4] Department of Environment and Conservation (NSW), “Assessing Vibration: A technical guideline,” Department of Environment and Conservation (NSW), Sydney, 2006.

[5] Bristish Standard Institution, “BS 7385-2: 1993 Evaluation and measurement for vibration in buildings - Pt 2: Guide to damage levels from groundborne vibration,” Bristish Standard Institution, London, 1993.

[6] Deutsches Institut fur Normung, “DIN 4150-3 (1999) Structural vibration - Effects of vibration on structures,” Deutsches Institut fur Normung, Berlin, 1999.

[7] American Society of Heating, Refrigerating and Air-Conditioning Engineers, “Applications Handbook (SI), Chapter 49 Noise and Vibration Control,” ASHRAE, Atlanta, 2019.

[8] D. I. f. Normung, “DIN 4150-2:1999 Structural vibration - Human exposure to vibration in buildings,” Deutsches Institut fur Normung, Berlin, 1999.

[9] Jacobs, MSJ, “IA228500 CHERP - RPAH CAMPUS PLAN R09 - Final,” 06 June 2020.

[10] Resonate Consultants, “Susan Wakil AO Health Building SEARS Noise and Vibration Assessment M17183RP2 Revision C,” 31 Jan 2018.

[11] Acoustic Studio, “Royal Prince Alfred Hospital North West Precinct Redevelopment Main Works Contract - Excavation & Construction Noise And Vibration Management,” SAV2052.0003.Rep.revC.120705.doc, July 2012.

[12] British Standards Institute, “BS 6472:1992 Guide to evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz),” BSI, London, 1992.

[13] C. H. D and G. I. Miller, “Transport Reseach Laboratory (TRL), GroundBorne vibration caused by mechanised construction works,” 2000.

[14] NSW Department of Planning, “Development Near Rail Corridors and Busy Roads - Interim Guideline,” NSW Department of Planning, Sydney, 2008.

[15] “Campbelltown Hospital Carpark REF Acoustic Assessment_AC03_V2,” Arup, Sydney, April 2019.

[16] “Campbelltown Hospital Carpark DA Acoustic Assessment_AC02_V2,” Arup, Sydney, December 2017.

[17] Arup Australia Pty Ltd, “AC03_v6_SSDA Acoustic Assessment Report,” Arup Australia Pty Ltd, Sydney, 2018.

[18] A. A. P. Ltd, “AC03_v2_CH Carpark REF Acoustics,” Arup Australia Pty Ltd, Sydney, 2018.

[19] C. Gordon, “Generic Vibration Criteria for Vibration Sensitive Equipment,” in *Proceedings of International Society of Photo-Optical Instrumentation Engineers (SPIE)* , 28 September 1999.

Appendix A

Acoustic Glossary

Ambient Noise Level

The ambient noise level is the overall noise level measured at a location from multiple noise sources. When assessing noise from a particular development, the ambient noise level is defined as the remaining noise level in the absence of the specific noise source being investigated. For example, if a fan located on a city building is being investigated, the ambient noise level is the noise level from all other sources without the fan running. This would include sources such as traffic, birds, people talking and other nearby fans on other buildings.

Background Noise Level

The background noise level is the noise level that is generally present at a location at all or most times. Although the background noise may change over the course of a day, over shorter time periods (e.g. 15 minutes) the background noise is almost-constant. Examples of background noise sources include steady traffic (e.g. motorways or arterial roads), constant mechanical or electrical plant and some natural noise sources such as wind, foliage, water and insects.

Assessment Background Level (ABL)

A single-number figure used to characterise the background noise levels from a single day of a noise survey. ABL is derived from the measured noise levels for the day, evening or night time period of a single day of background measurements. The ABL is calculated to be the tenth percentile of the background L_{A90} noise levels – i.e. the measured background noise is above the ABL 90% of the time.

Rating Background Level (RBL / min$L_{A90,1hour}$)

A single-number figure used to characterise the background noise levels from a complete noise survey. The RBL for a day, evening or night time period for the overall survey is calculated from the individual Assessment Background Levels (ABL) for each day of the measurement period, and is numerically equal to the median (middle value) of the ABL values for the days in the noise survey. This parameter is denoted RBL in NSW, and min$L_{A90,1hour}$ in QLD.

Decibel

The decibel scale is a logarithmic scale which is used to measure sound and vibration levels. Human hearing is not linear and involves hearing over a large range of sound pressure levels, which would be unwieldy if presented on a linear scale. Therefore, a logarithmic scale, the decibel (dB) scale, is used to describe sound levels.

An increase of approximately 10 dB corresponds to a subjective doubling of the loudness of a noise. The minimum increase or decrease in noise level that can be noticed is typically 2 to 3 dB.

dB(A)

dB(A) denotes a single-number sound pressure level that includes a frequency weighting ("A-weighting") to reflect the subjective loudness of the sound level.

The frequency of a sound affects its perceived loudness. Human hearing is less sensitive at low and very high frequencies, and so the A-weighting is used to account for this effect. An A-weighted decibel level is written as dB(A).

Some typical dB(A) levels are shown below.

Sound Pressure Level dB(A)	Example
130	Human threshold of pain
120	Jet aircraft take-off at 100 m
110	Chain saw at 1 m
100	Inside nightclub
90	Heavy trucks at 5 m
80	Kerbside of busy street
70	Loud stereo in living room
60	Office or restaurant with people present
50	Domestic fan heater at 1m
40	Living room (without TV, stereo, etc)
30	Background noise in a theatre
20	Remote rural area on still night
10	Acoustic laboratory test chamber
0	Threshold of hearing

L_1

The L_1 statistical level is often used to represent the maximum level of a sound level that varies with time.

Mathematically, the L_1 level is the sound level exceeded for 1% of the measurement duration. As an example, 87 dB $L_{A1,15min}$ is a sound level of 87 dB(A) or higher for 1% of the 15 minute measurement period.

L_{10}

The L_{10} statistical level is often used as the "average maximum" level of a sound level that varies with time.

Mathematically, the L_{10} level is the sound level exceeded for 10% of the measurement duration. L_{10} is often used for road traffic noise assessment. As an

example, 63 dB $L_{A10,18hr}$ is a sound level of 63 dB(A) or higher for 10% of the 18 hour measurement period.

L_{90}

The L_{90} statistical level is often used as the "average minimum" or "background" level of a sound level that varies with time.

Mathematically, L_{90} is the sound level exceeded for 90% of the measurement duration. As an example, 45 dB $L_{A90,15min}$ is a sound level of 45 dB(A) or higher for 90% of the 15 minute measurement period.

L_{eq}

The 'equivalent continuous sound level', L_{eq}, is used to describe the level of a time-varying sound or vibration measurement.

L_{eq} is often used as the "average" level for a measurement where the level is fluctuating over time. Mathematically, it is the energy-average level over a period of time (i.e. the constant sound level that contains the same sound energy as the measured level). When the dB(A) weighting is applied, the level is denoted dB $L_{Aeq.}$ Often the measurement duration is quoted, thus $L_{Aeq,15\ min}$ represents the dB(A) weighted energy-average level of a 15 minute measurement.

L_{max}

The L_{max} statistical level can be used to describe the "absolute maximum" level of a sound or vibration level that varies with time.

Mathematically, L_{max} is the highest value recorded during the measurement period. As an example, 94 dB L_{Amax} is a highest value of 94 dB(A) during the measurement period.

Since L_{max} is often caused by an instantaneous event, L_{max} levels often vary significantly between measurements.

Frequency

Frequency is the number of cycles per second of a sound or vibration wave. In musical terms, frequency is described as "pitch". Sounds towards the lower end of the human hearing frequency range are perceived as "bass" or "low-pitched" and sounds with a higher frequency are perceived as "treble" or "high pitched".

Peak Particle Velocity (PPV)

Peak Particle Velocity (PPV) is the highest velocity of a particle (such as part of a building structure) as it vibrates. Most sound level meters measure *root mean squared* (RMS) values; it is common to approximate the PPV based on an RMS measurement.

PPV is commonly used as a vibration criteria, and is often interpreted as a PPV based on the L_{max} or $L_{max,spec}$ index.

Sound Power and Sound Pressure

The sound power level (L_w) of a source is a measure of the total acoustic power radiated by a source. The sound pressure level (L_p) varies as a function of distance from a source. However, the sound power level is an intrinsic characteristic of a source (analogous to its mass), which is not affected by the environment within which the source is located.

Vibration

Waves in a solid material are called “vibration”, as opposed to similar waves in air, which are called “sound” or “noise”. If vibration levels are high enough, they can be felt; usually vibration levels must be much higher to cause structural damage.

A vibrating structure (e.g. a wall) can cause airborne noise to be radiated, even if the vibration itself is too low to be felt. Structureborne vibration limits are sometimes set to control the noise level in a space.

Vibration levels can be described using measurements of displacement, velocity and acceleration. Velocity and acceleration are commonly used for structureborne noise and human comfort. Vibration is described using either metric units (such as mm, mm/s and mm/s^2) or else using a decibel scale.

Appendix B

Distances from locations of works to receivers

B1 Distances from locations of works to receivers

The assumed distances from locations of works (as listed in Table 17) and the nearest sensitive receivers are presented below. Distances are from the location of the works to the boundary of the site for receivers with an external noise criteria and from the location of works to the building for receivers with an internal noise criteria.

	Loc. 1	Loc. 2	Loc. 3(a)	Loc. 3(b)	Loc. 4	Loc. 5
R1[1]	148	172	161	156	194	191
R2[1]	160	78	52	102	3	3
E1[2]	5	86	70	68	158	178
E2[2]	137	208	185	191	259	264
E3[2]	244	177	174	192	116	93
E4[2]	116	33	10	50	54	77
A1[1]	173	222	205	221	260	257
A2[1]	86	36	8	54	15	34
A3[1]	80	176	154	154	252	269
C1[1]	163	164	155	157	173	170
C2[1]	179	117	111	129	64	53
C3[1]	268	231	220	231	194	189
C4[1]	249	170	154	194	100	78
SS[2]	3	5	1	1	1	1
H1[2]	184	106	90	130	39	20
H2[2]	199	176	168	182	169	164
H3[2]	273	245	244	260	227	219
H4[2]	235	169	149	192	142	143
H5[2]	242	168	152	187	101	76

Notes:

1. Distance to site boundary (external noise criteria)
2. Distance to building (internal noise criteria)

Sydney Environmental Group

Hazardous Building Materials Survey Report

Gloucester House Pedestrian Walkway, Portion of Building 89, RPA Hospital, Camperdown NSW

Sydney Local Health District (c/- Cardno)

Report No: 1284-HBMS-05-250522.v1f
Client Ref: RPA-B89-HAZ-RPT-EW-03-0
Report Date: 25 May 2022



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Subject Areas:	Gloucester House Pedestrian Walkway and tie ins between Building 89 and Gloucester House (Level 4, Level 5 and underside of Level 4 (exterior)) ≈ 245 m^2 (Each level)
Client Name:	Sydney Local Health District (c/- Cardno (NSW) Pty Ltd)
Site Size:	Gloucester House Pedestrian Walkway ≈ 245 m^2 (Each level)
Client Reference Number:	RPA-B89-HAZ-RPT-EW-03-0
SEG Reference Number:	1284-HBMS-05-250522.v1f
Project Type:	Hazardous Building Materials Survey
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Document Revision No.	v1

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EXECUTIVE SUMMARY

Sydney Environmental Group Pty Ltd (SE) was engaged by Sydney Local Health District (c/- Cardno (NSW) Pty Ltd) (the client), to undertake a Hazardous Building Materials Survey of the Gloucester House Pedestrian Walkway and tie ins between Building 89 and Gloucester House (Level 4, Level 5 and underside of Level 4 (exterior)), located within Royal Prince Alfred (RPA) Hospital, Camperdown NSW (hereafter referred to as 'the site') (refer to **Figure 1** and **Figure 2**) prior to the commencement of refurbishment/demolition works.

SE has the following project appreciation:

- The structures within the site are proposed for refurbishment works; and
- A hazardous building materials survey is required prior to refurbishment / demolition works as part of the Royal Prince Alfred Hospital Redevelopment Project to identify and document hazardous building materials within the structures situated within the site.

The objectives of this investigation were to:

- Confirm the presence/ absence of hazardous building materials (HBM) within accessible areas of the structures on site;
- Provide a qualitative risk assessment of the hazardous building materials identified (if any);
- Provide recommendations on control measures and strategies for removal; and
- Prepare a Hazardous Materials Register for the site to ensure legislative compliance.

The scope of works undertaken to address the investigation objectives, included:

- Fieldwork, including investigation of subject areas;
- Collection of suspect building materials (as required);
- Analysis of samples by a NATA accredited laboratory;
- Provide recommendations for the removal of hazardous building materials where identified; and
- Prepare a Hazardous Building Materials Register for the site, detailing location and type of HBMS present within the site.

For this report, HBM are limited to the following:

- Asbestos Containing Materials (ACM);
- Lead Containing Paint (LCP);
- Lead Containing Dust (LCD);
- Polychlorinated Biphenyls (PCBs);
- Synthetic Mineral Fibres (SMF); and
- Ozone Depleting Substances (ODS).

A summary of hazardous building materials identified within the site is provided in **Table 1.1** below. For an exhaustive list of hazardous building materials identified, refer to **Attachment 3 – Hazardous Building Materials Register**).

Table 1.1 Summary of Hazardous Building Materials Identified

Item	Areas Identified
Asbestos Containing Materials (ACM)	No ACM was identified within the Gloucester House Pedestrian Walkway.
Lead Containing Paint (LCP)	No LCP was identified, presumed, or suspected to be present within the site
Lead Containing Dust (LCD)	No LCD was identified, presumed, or suspected to be present within the site
Polychlorinated Biphenyls (PCB)	No fluorescent light fittings were observed.
Synthetic Mineral Fibres (SMF)	SMF was presumed to be present within the site. All air conditioning ducting and insulation material is presumed to contain SMF.
Ozone Depleting Substances (ODS)	All air conditioning units are presumed to contain ODS.

TABLE OF CONTENTS

DOCUMENT RECORD i
EXECUTIVE SUMMARY ii

1 INTRODUCTION 5
1.1 Background 5
1.2 Objectives 5
1.3 Scope of Work 5
1.4 Previous Relevant Reports 5
1.5 Access Restrictions / Areas Not Accessed 5
2 SITE IDENTIFICATION 6
3 FIELDWORKS 7
3.1 Survey Methodology 7
3.2 Hazardous Building Materials Identification 7
3.2.1 Asbestos Containing Materials 7
3.2.2 Lead Containing Paint (LCP) 7
3.2.3 Lead Containing Dust (LCD) 8
3.2.4 Polychlorinated Biphenyls (PCBs) 8
3.2.5 Synthetic Mineral Fibres 8
3.2.6 Ozone Depleting Substances 9
4 HAZARDOUS BUILDING MATERIALS MANAGEMENT PLAN 10
4.1 Regulatory Framework 10
4.2 Hazardous Building Materials Management Plan Objectives 10
4.3 Legislative Requirements 11
4.4 Remedial Options 11
5 HAZARDOUS BUILDING MATERIALS ABATEMENT STRATEGIES 12
5.1 Asbestos Containing Materials 12
5.2 Lead Paint and Dust 12
5.2.1 Report and Document 13
5.2.2 Lead Paint Stabilisation 13
5.2.3 Lead Paint and Lead Dust Removal 13
5.3 Synthetic Mineral Fibres 14
5.4 Polychlorinated Biphenyls 15
5.5 Ozone Depleting Substances 15
6 CONCLUSIONS AND RECOMMENDATIONS 16
7 STATEMENT OF LIMITATIONS 17
8 REFERENCES 18

ATTACHMENTS

1 Figures
2 Photographs
3 Hazardous Building Materials Register
4 Laboratory Documentation

LIST OF ABBREVIATIONS

ACM	Asbestos Containing Materials
EPA	Environmental Protection Authority
LCD	Lead Containing Dust
LCP	Lead Containing Paint
m	Metres
m^2	Square Metres
PCBs	Poly-Chlorinated Biphenyls
SE	Sydney Environmental Group Pty Ltd
SMF	Synthetic Mineral Fibres
ODS	Ozone Depleting Substances

1 INTRODUCTION

1.1 Background

Sydney Environmental Group Pty Ltd (SE) was engaged by Sydney Local Health District (c/- Cardno (NSW) Pty Ltd) (the client), to undertake a Hazardous Building Materials Survey of the Gloucester House Pedestrian Walkway and tie ins between Building 89 and Gloucester House (Level 4, Level 5 and underside of Level 4 (exterior)), located within Royal Prince Alfred (RPA) Hospital, Camperdown NSW (hereafter referred to as 'the site') (refer to **Figure 1** and **Figure 2**) prior to the commencement of refurbishment/demolition works.

1.2 Objectives

The objectives of this investigation were to:

- Confirm the presence/ absence of hazardous building materials (HBM) within accessible areas of the residences;
- Provide a qualitative risk assessment of the hazardous building materials identified (if any);
- Provide recommendations on control measures and strategies for removal; and
- Prepare a Hazardous Materials Register for the site to ensure legislative compliance.

1.3 Scope of Work

The scope of works undertaken to address the investigation objectives, included:

- Fieldwork, including investigation of subject areas within the residences (or portions thereof);
- Collection of suspect building materials (as required);
- Analysis of samples by a NATA accredited laboratory;
- Provide recommendations for the removal of hazardous building materials where identified; and
- Prepare a Hazardous Building Materials Register for the site, detailing to location and type of HBMS present within the site.

1.4 Previous Relevant Reports

SE were not provided with any relevant reports or assessments pertaining to the subject area.

SE noted that the Gloucester House Walkway and tie ins appeared to have been constructed or refurbished within the last 20 - 25 years, which limits the likely presence of hazardous building materials likely to be present.

1.5 Access Restrictions / Areas Not Accessed

It is possible that hazardous building materials may have been concealed within restricted and/or inaccessible areas/voids at the time of the survey. These areas include:

Restricted Areas:

- Locations behind locked doors;
- In-set ceilings or wall cavities;
- Areas only accessible by dismantling equipment or performing minor localised demolition works;
- Service shafts, ducts etc concealed within the building structure;
- Height restricted areas and surfaces greater than three (3) metres in height;
- Voids or internal areas of plant, equipment, air-conditioning ducts, etc;
- Inaccessible areas, such as voids and cavities created and intimately concealed within the building structure. These voids are only accessible following major demolition works; and
- Sub-floor space.

2 SITE IDENTIFICATION

The site identification details and associated information are presented in **Table 2.1**.

Table 2.1 Site Identification Information

Attribute	Description
Street Address	Gloucester House Pedestrian Walkway, Portion of Building 89, RPA Hospital, Camperdown NSW
Lot and Deposited Plan (DP)	Portion of Lot 1000 DP1159799
Geographical Coordinates	33°52'7.3"S 151°16'22.4"E (Centre of site)
Site Area	Gloucester House Pedestrian Walkway between Building 89 and Gloucester House ≈ 245 m^2 (Each level)
Local Government Area (LGA)	City of Sydney
Subject Areas:	Building 89: Gloucester House Pedestrian Walkway and Tie ins, Level 4 and Level 5 (situated between Building 89 and Gloucester House) (Refer to **Figure 2**)

The general layout and boundary of the site is set out in **Figure 1**.

The subject areas examined are provided in **Figure 2**.

3 FIELDWORKS

3.1 Survey Methodology

Hazardous Material (hazmat) surveys are performed using a risk assessment approach in agreement with the legal regulations and current Codes of Practice. The hazmat surveys involve the site identification and inspection of Asbestos Containing Materials (ACM), Synthetic Mineral Fibres (SMF), lead based paint systems, Lead Containing Dust (LCD), Polychlorinated Biphenyls (PCBs) when applicable.

The Occupational Hygienist performs a visual inspection within all accessible areas to identify the hazardous building materials. When a potentially hazardous building material is suspected, a sample of the material is collected and sent to a NATA accredited laboratory for the required analysis. Where identical suspected hazardous materials are detected at different locations, only visual confirmation is made rather than the collection of additional samples. The following observations were recorded at the time of the inspection:

- Location;
- Description;
- Quantity;
- Condition; and
- Friability (where applicable).

Additionally, the survey will include minor destructive sampling within the properties. This is to allow the occupational hygienist to accurately determine which building materials may contain hazardous materials by collecting an adequate sample for laboratory analysis. Following the completion of sampling, any minor holes/scratches made by the occupational hygienist at the property will be sealed with a clear adhesive spray to contain and potential hazardous material that was disturbed during sampling.

3.2 Hazardous Building Materials Identification

3.2.1 Asbestos Containing Materials

Asbestos is defined as the fibrous form of mineral silicates. There are two major groups of asbestos:

- Serpentine group minerals: chrysotile (white asbestos); and
- Amphibole group minerals: amosite (brown asbestos), crocidolite (blue asbestos) and minor forms including actinolite, tremolite and anthophyllite.

Asbestos minerals have separable long fibres that are strong and flexible enough to be spun and woven and are heat resistant. Because of these characteristics, asbestos has been historically used for a wide range of manufactured goods, mostly in building materials, friction products, heat-resistant fabrics, gaskets, and coatings.

Asbestos mainly affects the lungs; breathing in high levels of asbestos fibres over time can lead to a number of diseases and cancers (asbestos is a known carcinogen). The aim is to minimise the risk of exposure to ACM. This management plan aids in ensuring that ACM in the workplace are managed in such a way that they do not become damaged and increase the risk of exposure.

During the survey, the occupational hygienist will collect samples of suspected asbestos containing materials (ACM). If sampling is not possible for whatever reason, the occupational hygienist may presume an item to contain asbestos. For example, most power distribution boxes found in older structures (built prior to 1983) will have an asbestos backing board, however due to the electrical hazard present, a sample will not be taken but the material will be presumed to contain asbestos.

3.2.2 Lead Containing Paint (LCP)

Lead is a naturally occurring metal. Pure lead can combine with other substances to form various lead compounds. Lead based paint is defined as “Any paint containing greater than 0.1% by dry weight of lead” in the Australian/New Zealand Standard (AS/NZS) 4361.2:2017 Guide to hazardous paint management: Part 2: Lead paint in residential and commercial buildings.

Distinct paint systems are initially tested with a 3M 'leadcheck' swab. Should the swab return a positive result for lead, then the paint will be sampled by the occupational hygienist for laboratory analysis. Paint samples returning a result of above 0.1% w/w lead are classified as lead paint.

3.2.3 Lead Containing Dust (LCD)

Lead dust is found everywhere in the urban environment, resulting from air, water, and soil pollution from industrial processes, house renovations, and as a by-product of the combustion of leaded fuels. Over an extended period of time, the lead from these sources may have contaminated the dust found in the ceiling voids of most houses examined. Significant lead levels are likely to occur in the ceilings of older homes, near major roads, or near current or previously heavily industrialised areas.

As a consequence of lead contamination, samples will be collected where significant amounts of dust are observed during the inspection. This will generally be limited to the ceiling void space.

In the absence of a legislative standard for classifying lead containing dust as hazardous within a ceiling space, SE have adopted a threshold criterion of 10 µg/cm^2 or 300 mg/kg for lead in dust which is considered appropriate for demolition of structures. An adjustment of the threshold criteria may be undertaken based on further risk assessment.

3.2.4 Polychlorinated Biphenyls (PCBs)

PCBs are a group of chlorinated organic compounds. PCBs are very stable chemicals that resist change over time and temperature variation. They are fire resistant and very good insulators. Reference is made to the document 'Identification of PCB-Containing Capacitors' – Australian & New Zealand Environment and Conservation Council (ANZECC), 1997 for identification of PCB-containing capacitors'.

The major use of PCBs has been as an insulating fluid inside transformers and capacitors. These transformers and capacitors range in size but generally are encased within a cylindrical or rectangular metal casing. PCBs have been commonly used in closed or semi-closed systems such as electrical transformers, heat transfer systems, hydraulic fluids, feeder cabling and in the metal case capacitors to fluorescent lights, sodium vapour and mercury vapour lights, and starter capacitors to electrical motors. PCBs will generally only be found in capacitors made before the late 1970's (though some electrical equipment imported after this period may contain PCBs). High voltage and medium voltage feeder cables prior to the use of PVC insulation, particularly the armoured type of cabling may contain PCBs in concentrations sufficient to be a scheduled PCB waste.

For de-energised premises, all accessible fluorescent light fittings are visually inspected for PCB containing capacitors or PCB containing ballast, listed in '*Scheduled Waste Management: Identification of PCB-containing Capacitors* – (ANZECC. 1997).

Where premises are energised, direct inspection of these components is not possible due to the significant electrical hazard present. Under these circumstances, all fluorescent light fittings are treated as potentially containing PCB capacitors until proven otherwise.

3.2.5 Synthetic Mineral Fibres

SMF is a generic term used to collectively describe a number of amorphous (non-crystalline) fibrous materials, commonly referred to as "Man Made Mineral Fibres" (MMMF).

SMF materials include fibreglass, rockwool and ceramic fibre based products. These products are used in a number of areas throughout buildings. These materials are generally used as insulation within ceilings and walls, as well as heating hot water pipework and associated mechanical equipment.

SMF materials are classified as bonded and unbonded materials. Unbonded SMF material includes loose fill fibreglass or rockwool dry wall or ceiling insulation, and sprayed rockwool to structural steel and acoustic finishes. Bonded SMF insulation materials include sectional fibreglass and rockwool pipe insulation; ceiling batts, duct blankets (lined and unlined with mesh/foil), dry wall batt insulation and acoustic mineral fibre ceiling tiles etc.

3.2.6 Ozone Depleting Substances

No Ozone depleting substances (ODSs) were found on site, following information is provided for future reference.

ODSs refer to those substances that deplete the ozone layer and are widely used in refrigerators, air conditioners, fire extinguishers, dry cleaning and cleaning solvents, electronic equipment and as agricultural fumigants.

In 1987, an international protection agreement was made, named the Montreal Protocol, which sets out a schedule that countries must follow to phase out ODSs based on their effect on the earths' ozone layer. In Australia, the Commonwealth Ozone Protection and Synthetic Greenhouse Gas Management Act 1989 controls the manufacture, import and export of ODSs in accordance with the Montreal Protocol.

The release of large amounts of ODSs in an enclosed area is harmful to humans as it can act as an asphyxiator by reducing the amount of oxygen in the air. Liquid refrigerant is extremely cold and can burn your skin. SE will identify any HVAC system and presume it to contain ODS. All removal or refurbishment works that relating to HVAC systems must be undertaken by a licensed air-conditioning technician with experience working with and properly disposing of refrigerant fluids including ODS.

4 HAZARDOUS BUILDING MATERIALS MANAGEMENT PLAN

4.1 Regulatory Framework

The success of any option involving hazardous materials remaining in-situ is dependent on the need to ensure the hazardous material remains undisturbed and in good condition.

Accordingly, the purpose of this Hazardous Building Materials Management Plan (HBMMP) is to ensure that all practicable steps are taken to prevent, or minimise the risk of exposure to hazardous materials, for all occupants of the site. This is driven by state legislation and is achieved through the identification and listing of the known and typical locations of hazardous materials and the implementation of appropriate control measures including engineering and administrative systems.

Hazardous materials to be managed by this plan are as follows:

- Asbestos-Containing Materials (ACM);
- Synthetic Mineral Fibre (SMF)-containing materials;
- Lead-containing paint (LCP);
- Lead-containing dust (LCD);
- Polychlorinated Biphenyls (PCBs); and
- Ozone Depleting Substances (ODSs).

To accomplish this, the HBMMP specifies work practices and procedures to:

- Maintain the hazardous materials in good condition;
- Ensure implementation of hazard control strategies;
- Nominate the management plan controller;
- Monitor the condition of the hazardous materials; and
- Minimise the possibility of accidental damage or exposure to hazardous materials.

The HBMMP must be made available to, and understood by, all participants involved in the management and operation of the site. The appropriate personnel at the site should be aware of the presence of the hazardous materials and the need to ensure they remain undisturbed and in good condition. They should also understand their role in achieving this.

4.2 Hazardous Building Materials Management Plan Objectives

The HBMMP represents an integrated risk management approach to ensure that all practicable steps are taken to prevent or minimise the risk of exposure to hazardous materials in the buildings located at the Site.

The HBMMP therefore:

- Outlines the necessary actions to control the risk as required by state legislation;
- Identifies and describes the administrative line of authority for the site, outlining responsibilities, procedures and systems for the effective management and control of hazardous materials at the site;
- Establishes a timetable for the review and assessment of the hazardous materials;
- Where appropriate, instigates a work permit system, which ensures that any proposed maintenance, installation, alteration, or renovation at the site are notified to the Management Plan Controller;
- Requires that all participants involved in the management and operations at the site are clearly informed and where necessary trained to manage the hazardous material risks; and
- Forms an integral part of an effective HBMMP. The HBMMP and Hazardous Materials Register must be made available as required for inspection by tenants, other employers, employees, union representatives, government representatives, contractors and maintenance personnel.

4.3 Legislative Requirements

This HBMMP is designed to assist the client in fulfilling its general obligation to ensure the health and safety of employees, contractors, visitors and others accessing the site. The HBMMP also addresses specific hazardous materials related legislative requirements and guidelines in approved industry standards.

Chapter 8, Part 8.3 Management of Asbestos and Associated Risks of the Work Health and Safety Regulation 2017 (NSW) states that a person with management or control of a workplace must ensure that a register (an asbestos register) is prepared and kept at the workplace. All asbestos or ACM at the workplace are to be identified by a competent person as far as is reasonably practicable. Asbestos sample analysis must be carried out by a National Association of Testing Authorities (NATA) Australia accredited laboratory for the relevant test method (Australian Standard AS4964-2004).

The person responsible for the management of the workplace must ensure the review of the asbestos register and management plan is conducted as necessary. This should take place if further ACM are identified, if ACM are removed, disturbed or encapsulated and/or at least once every 5 years. A health and safety representative has the authority to request a review of the asbestos register and management plan if they believe that the health and safety of an employee is at risk.

The personnel responsible for the management plan must ensure that the document is available for review to contractors, health and safety representatives and workers who are and/or intend to be conducting work within the workplace.

The following legislation and industry standard documentation are relevant to this HBMMP and are to be construed as forming an integral part of this HBMMP:

- Work Health and Safety Act 2011 (NSW);
- Work Health and Safety Regulation 2017 (NSW);
- Code of Practice: How to Safely Remove Asbestos (SafeWork NSW, 2019);
- Code of Practice: How to Manage and Control Asbestos in the Workplace (SafeWork NSW, 2019);
- Code of Practice for the Safe Use of Synthetic Mineral Fibres [NOHSC:2006 (1990)];
- AS 4361.2 Guide to lead paint management – Part 2 Residential and commercial buildings, Standards Australia, 2017 (previously AS 4361.2-2017 Australian Standard Guide to lead paint management Part 2: Residential and commercial buildings);
- ANZECC Polychlorinated Biphenyls Management Plan, Revised Edition 2003; and
- NSW Protection of the Environment Operations Act 1997.

4.4 Remedial Options

A range of measures are available for the control of hazardous materials risks. The selection of the appropriate control measures are based on the assessed risk for each specific location. These measures may include:

- Leave and maintain in existing condition;
- Repair and maintain in good condition;
- Encapsulate/seal using sealant paints, adhesive or mastic or providing a barrier such as a box enclosure or steel cladding;
- Remove/decontaminate by approved methods under controlled conditions;
- Safe Working Practices and Safe Systems of Work; and
- Labelling of ACM that are to remain in-situ should be undertaken where practical to ensure that the asbestos materials are not damaged inadvertently by maintenance contractors etc.

All known or suspected ACM should be identified with warning labels. ACM and other hazardous materials should be re-inspected on a 5-yearly basis (or earlier if the materials are damaged or removed) to ensure the materials are kept in good condition and that there is no damage to the materials (refer to Section 3.2 of the Code of Practice: How to Manage and Control Asbestos in the Workplace (SafeWork NSW, 2016)).

5 HAZARDOUS BUILDING MATERIALS ABATEMENT STRATEGIES

The following section outlines general remedial methodologies for hazardous building materials.

5.1 Asbestos Containing Materials

Materials identified as containing asbestos should be removed from any proposed work area or satisfactorily contained prior to commencement of refurbishment or demolition works. It is recommended that a specific scope of works document be produced to manage the asbestos abatement project.

The removal of asbestos must be controlled within a strict asbestos removal technical specification. This specification should include:

- Work area isolation (barrier protection, buffer zone);
- Removal methods (friable/non-friable);
- Contamination control methods (negative air pressure/decontamination procedures); and
- Health and safety procedures (respiratory protection, working at heights, scaffolding).

Asbestos abatement works must be performed in accordance with all legislative requirements. The statutory requirements for asbestos removal are prescribed in the NSW Work Health and Safety Regulation 2017 (Part 8.7). The Code of Practice: How to Safely Remove Asbestos (SafeWork NSW, 2016) provides guidelines for the safe removal of friable and non-friable asbestos-containing materials.

Depending on the nature of the abatement operations, it may be necessary to engage a licensed asbestos contractor.

A suitably qualified consultant must provide independent verification of the work practices, engineering controls and standard of workmanship employed during removal operations.

5.2 Lead Paint and Dust

The health risk associated with lead occurs via an accumulative effect within the human body. Depending on the amount of exposure, side effects of lead poisoning would not be apparent for many years. It is therefore recommended that workers associated with lead processes have regular medical examinations to monitor the amount of lead in their system.

The most common exposure risks faced by workers are the inhalation of lead dust or fumes. The creation of the hazards generally relates to abrading or burning lead or lead coated surfaces. Other common sources of lead dust or fumes are as follows:

- Lead based paints – when removing paint by sanding or heat (e.g. creating dust), or when welding; or cutting steel coated with lead or lead based paints;
- Welding, oxy cutting of steel coated with lead based paint or primer; and
- Dismantling of equipment containing lead based paint.

The abatement of lead painted surfaces and reduction of potential lead exposure risks to workers and the environment requires a review of the potential exposure pathways to lead dust during the abatement project. Local authority requirements, public safety and health requirements, site preparation, waste disposal and contamination control all need to be fully considered therefore, prior to the commencement of the abatement project.

Lead exposure is likely where painted surfaces are to be removed or treated by mechanically sanding, scraping or other cleaning techniques creating airborne dust and fall-out contaminating ground and building surfaces. Accordingly, lead abatement work must fully contain and control airborne emissions and remove resultant lead contaminated dusts and sludge from work surfaces. The painting contractors must prepare a waste management plan prior to any lead paint management work.

Workers must also be fully protected against exposure with personnel protective clothing and respiratory protection and employers of these workers must fully comply with the Work Health and Safety Regulation 2017 (NSW), including organising medical testing of their employees.

The Australian Standard AS 4361.2 Guide to lead paint management – Part 2 Residential and commercial buildings, Standards Australia, 2017 provides guidance for the management of lead-paint and lead-dust on non-industrial structures such as residential, commercial and public buildings.

The options available for the management of lead painted surfaces include:

- Report and Document;
- Stabilise the paint;
- Carrying out lead paint and lead dust abatement (removal); and
- A combination of these options.

5.2.1 Report and Document

This is only appropriate for painted surfaces that are generally inaccessible and are in sound condition and will not be disturbed during the refurbishment of the site.

The presence of lead paint, even under existing non-lead painted surfaces should be documented and recorded and regular inspection conducted for evidence of deterioration.

5.2.2 Lead Paint Stabilisation

The easiest option in dealing with lead painted surfaces is to over-paint using a lead free paint. This can only be done effectively where the existing lead paint is in good condition and does not require extensive preparation for re-painting. Below is a summarised procedure of lead paint encapsulation:

- Remove all loose surface material in accordance with lead paint removal procedures;
- Remove surface gloss with a de-glossing solution;
- Ensure new paint is compatible with existing paint, i.e.: no leaching of lead compounds from old to new surfaces;
- Oil based paint is preferable;
- Carry out over-painting in accordance to Australian Standard AS 2311-1992 The Painting of Structures;
- Undercoat sealer be applied;
- Two (2) coats of topcoat; and
- Monitor surface for any signs of deterioration.

Usually, the existing paint will need to be washed to remove grime and dirt using sugar soap (tri-sodium phosphate) or removing a glossy surface by wet sanding with a de-glossing solution etc. Small areas of flaking paint will require rectification prior to stabilisation.

5.2.3 Lead Paint and Lead Dust Removal

In the event that some surfaces are in poor condition and over-painting is not appropriate, the lead paint will need to be removed. Any lead paint & lead dust removal must be carried out with the appropriate guidelines for any lead work activity involving machine sanding, grinding, discing, buffing of surfaces coated with paint containing greater than 0.1% of lead by dry weight.

Lead processes involving such activities with lead paint will require:

- Enclosure to prevent escape of lead bearing dusts;
- Adequate signage around work area;
- Appropriate personal protective equipment;
- Personal hygiene – no smoking, washing of hands prior to eating etc.;
- Removal of lead paint via wet sanding or chemical stripping;

- Vacuuming of all surfaces (with a HEPA filter fitted) within and including the enclosure to remove all remaining traces of lead paint;
- Decontamination;
- Clearance testing via surface soil or dust sampling; and
- Medical surveillance of lead workers (blood tests).

Any work processes involving lead paint must be undertaken in a manner to ensure that no worker is exposed to lead at concentrations above the Workplace Exposure Standard (WES) of 0.15 mg/m^3 over an eight-hour day. Furthermore the levels should not exceed 0.03 mg/m3 at the boundary of the regulated area, i.e. boundary of area surrounding a lead paint worksite where it can be reasonably expected not to exceed the ES.

In a lead abatement operation, it is recommended that a certified lead abatement contractor be engaged (as recommended by the Federation of Master Painters Australia or the Painting Contractors Certification Program). This contractor should then perform any lead abatement work. Contractors involved in lead paint removal must have medical surveillance, including blood tests, conducted in accordance with the regulations.

A detailed work procedure should be reviewed based on assessment of options available to the builder for the various painted surfaces and nature of refurbishment activities to be conducted.

5.3 Synthetic Mineral Fibres

In all cases, it is essential that SMF materials be handled appropriately to control dust and debris, as they are irritating to the skin and mucous membranes. SMF fibres are generally thick and will scratch and puncture the skin causing rashes and irritation to the skin, nose and eye if exposed to high levels of dust and debris. Protective eyewear therefore should be worn if handling SMF materials above the head, i.e. entering ceiling cavities.

Action should be taken on a continuing basis to achieve the lowest workable exposure levels of SMF. The provision of engineering controls, close attention to plant cleanliness, in particular within plant rooms and air handling units, and the containment of waste material may achieve this. Additionally, the use of binders or work practices which reduce the liberation of fibres and the provision of appropriate personal protective equipment can help reduce SMF levels to personnel and the environment.

Caution is required when handling SMF products in order to minimise airborne SMF fibre levels. It is recommended that the code of practice “Code of Practice for the Safe Use of Synthetic Mineral Fibres NOHSC:2006 (1990)]” be closely adhered to when handling such materials.

Essentially, SMF materials should be handled in such a way as to minimise dust and disturbance of the materials. Where SMF materials are installed or removed, then suitable controls and appropriate personal protection are to be provided. Consultation should be sought with regard to appropriate procedures prior to the handling of such materials

- If SMF insulation is to be disturbed or removed, control monitoring for airborne SMF in accordance with the Guidance Note on the Membrane Filter Method for Estimating Airborne SMF [NOHSC:3006(1989)] should be carried out by qualified occupational hygienist during the removal operations and sample analysis should be undertaken by a NATA accredited laboratory to ensure the method of control is effective;
- Use hand tools, not power tools, and wet or dampen the material before cutting. If power tools are used, local exhaust ventilation should be installed;
- Protective equipment must be used whenever other means cannot keep the exposure level below the exposure standard. It should include the appropriate type of mask and clothing. The code of practice has a detailed guide to selecting respiratory protection; and
- At the end of removal operations, a clearance inspection and sampling program should be carried out and a Clearance Certificate issued.

Note that SMF’s are currently not on the schedule of substances requiring health surveillance.

5.4 Polychlorinated Biphenyls

The management of PCBs is outlined in the policy document issued by ANZECC Polychlorinated Biphenyls Management Plan, November 1996. This plan sets out timelines for the eventual phase out and replacement of PCBs within workplaces in Australia.

The Environmental Protection Authority has deemed PCBs to be a prescribed waste. Proper procedures must be undertaken when disposing of items containing PCBs. Registered waste disposal companies are licensed to dispose of PCBs.

Not all materials containing PCBs are required to be removed. The management strategy depends on the priority of the area in which the material is located and the classification of the PCB containing material. The PCB concentration classifies a material as one of the following:

- PCB Free – materials and wastes are defined for the purposes of the PCB Management Plan as those materials or wastes containing PCBs at concentrations of 2 mg/kg or less;
- Scheduled PCB materials and wastes containing PCBs at levels greater than or equal to either 50 mg/kg or 50 g; and
- Non-Scheduled PCB materials or waste containing PCBs at concentration levels between those defined above.

Prior to any removal of PCBs, workers involved should be suitably trained in the health and safety procedures and the use of Personal Protective Equipment (PPE)

- The following PPE should be worn when handling items containing PCBs:
  - Nitrile Gloves;
  - Eye Protection; and
  - Disposable Overalls.
- The PPE should be worn when removing capacitors from light fittings in case of PCB material leaking from the capacitor housing;
- A registered electrical contractor should conduct all electrical works;
- Generally, metal-cased capacitors contain PCBs while plastic-cased capacitors usually do not, however all leaking capacitors should be treated as if they contain PCBs unless proven otherwise.
- Remove diffuser and light tubes;
- Remove cover panels carefully and inspect the internals of the light fitting for signs of leakage from the capacitor;
- Disposable overalls and gloves should be disposed of as contaminated material on completion of work;
- Wash hands in warm soapy water before eating, drinking, smoking, handling food or drink or using toilet facilities (even if gloves were worn);
- If skin contact with PCB material occurs, the liquid shall be removed immediately with soap and water and waste contained and disposed of as PCB containing waste (depending on quantity of spillage); and
- If PCB material has leaked from the capacitor onto the cover plate or diffuser, the spillage must be wiped with an absorbent cloth soaked with some white spirit or kerosene, and the cloth then disposed of as PCB waste. Leaking capacitors should first be placed in a plastic bag with loose vermiculite placed at the bottom to absorb any spillage/leakage.

5.5 Ozone Depleting Substances

Containers holding ODSs should be labelled to provide ready identification by emergency teams. Appropriate signage may also be required under the relevant dangerous goods storage legislation.

Service personnel should refer to the relevant Material Safety Data Sheets when handling ODSs.

Containers and valves should be handled with care to avoid any damage that could lead to a discharge.

Disposal of an ODSs should be completed in a way that prevents their emissions into atmosphere.

6 CONCLUSIONS AND RECOMMENDATIONS

Based on SE's assessment of the desktop review information, fieldwork data and laboratory analytical data, SE make the following conclusions:

- A copy of the hazardous building materials register should be made readily available to all contractors conducting works on the site;
- All hazardous building materials identified and recorded in the register were assessed to be safe and low-risk. These items are suitable to remain in-situ without further remedial works;
- Any hazardous building materials identified and recorded in the register that are likely to be impacted by refurbishment works are to be removed prior to refurbishment works;
- Remove all hazardous building materials identified and recorded in the register prior to any major demolition works of the structures identified within the site; and
- Should any previously unidentified suspected hazardous building materials be identified during demolition, works should cease, and the materials should be inspected by an experienced occupational hygienist prior to the recommencement of works. Sydney Environmental Group can be contacted on 1300 884 164.

Based on these conclusions and the information gathered during the assessment, SE make the following recommendations:

- No ACM, LCD, LCP, or PCBs was identified, presumed, or suspected to be present within the site. However, given the age of the building, ACM may be encountered in areas not fully accessible during the survey (i.e. void spaces behind walls, lift shafts, internal componentry of equipment). Care is to be taken during all refurbishment works, and an occupational hygienist engaged should any unexpected hazardous building materials finds be uncovered;
- All air conditioning, ducting, and insulation material is presumed to contain SMF. Caution is required when handling SMF products in order to minimise airborne SMF fibre levels. It is recommended that the code of practice "Code of Practice for the Safe Use of Synthetic Mineral Fibres NOHSC:2006 (1990)]" be closely adhered to when handling such materials; and
- As a conservative measure to eliminate the risk of unintended ODS release to the environment, removal of refrigerant gases for all HVAC equipment is to be undertaken by a qualified HVAC technician prior to removal of HVAC equipment.

7 STATEMENT OF LIMITATIONS

No survey can be guaranteed to locate all hazardous building materials. The demolition or refurbishment of site structures may uncover hazardous building materials which were concealed or otherwise impractical to access during this assessment.

The findings presented in this report are based on specific searches of relevant, government historical databases and anecdotal information that were made available during the course of this investigation. To the best of our knowledge, these observations represent a reasonable interpretation of the general condition of the site at the time of report completion.

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

No warranties are made as to the information provided in this report. All conclusions and recommendations made in this report are of the professional opinions of personnel involved with the project and while normal checking of the accuracy of data has been conducted, any circumstances outside the scope of this report or which are not made known to personnel and which may impact on those opinions is not the responsibility of Sydney Environmental Group Pty Ltd. Should information become available regarding conditions at the site including previously unknown sources of contamination, SE reserves the right to review the report in the context of the additional information.

This report must be reviewed in its entirety and in conjunction with the objectives, scope and terms applicable to SE's engagement. The report must not be used for any purpose other than the purpose specified at the time SE was engaged to prepare the report.

Logs, figures, and drawings are generated for this report based on individual SE consultant interpretations of nominated data, as well as observations made at the time site walkover/s were completed.

Data and/or information presented in this report must not be redrawn for its inclusion in other reports, plans or documents, nor should that data and/or information be separated from this report in any way.

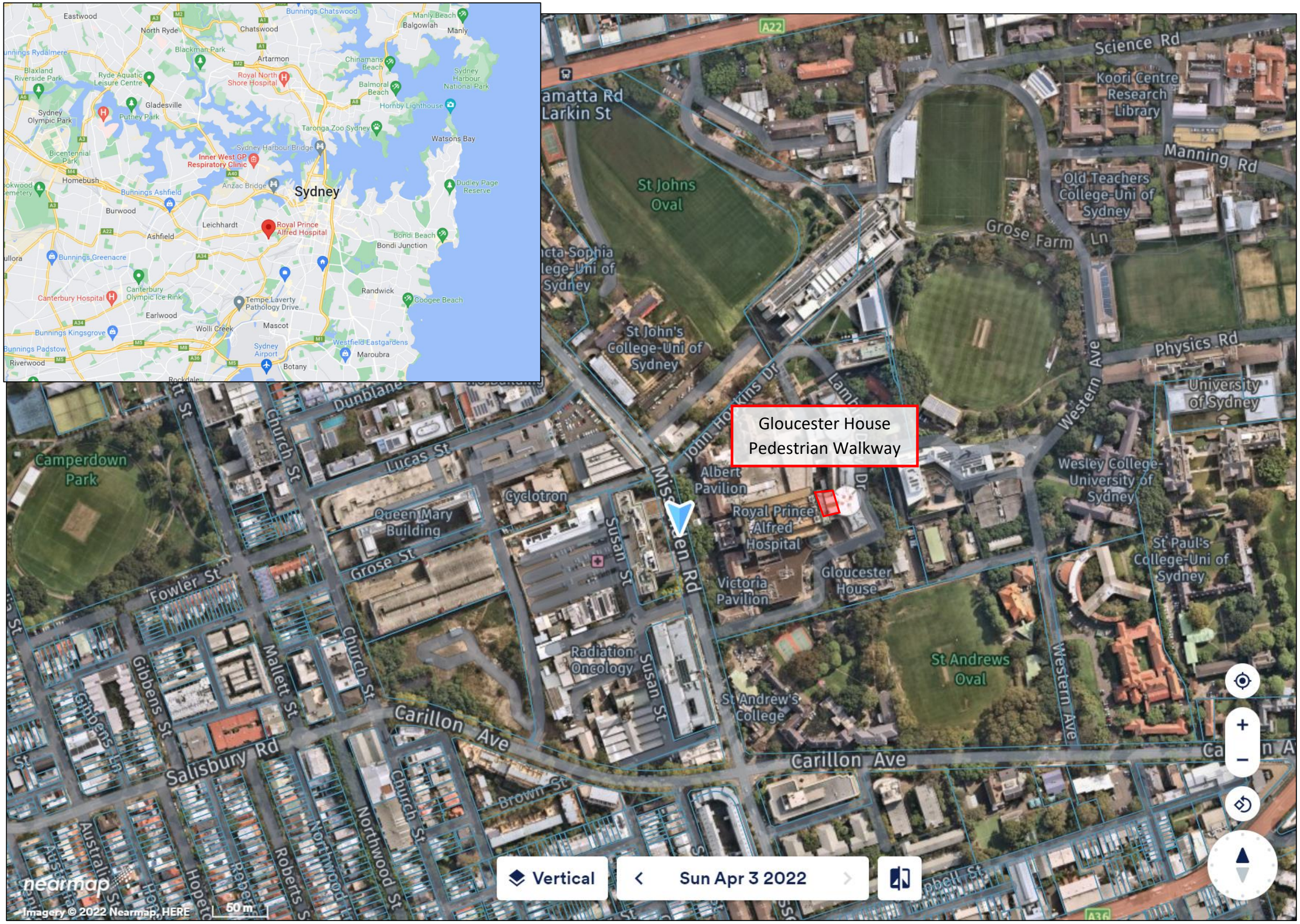
Should additional information that may impact on the findings of this report be encountered or site conditions change, SE reserves the right to review and amend this report.

8 REFERENCES

- Health Infrastructure. (2021). Design Guidance Note 15. *Asbestos and Other Hazardous Materials Management*;
- Health Infrastructure. (2021). Design Guidance Note 30. *Asbestos and Other Hazardous Materials Management*;
- NSW Government. (2011). Workplace Health and Safety Act 2011;
- NSW Government. (2017). Workplace Health and Safety Regulation;
- SafeWork NSW. (2016). Code of Practice: Demolition Work;
- Standards Australia. (2001). Australian Standard 2601: The Demolition of Structures;
- SafeWork NSW (2019). Code of Practice: How to Safely Remove Asbestos;
- SafeWork NSW (2019). Code of Practice: How to Manage and Control Asbestos the Workplace;
- Standards Australia. (2017). Australia Standard 4361.1 Guide to Lead Paint Management. Part 1: Industrial Applications;
- Standards Australia. (2017). Australian Standard 4361.2: Guide to Hazardous Paint Management, Part 2: Lead Paint in Residential, Public and Commercial Buildings;
- Standards Australia. (2000). Australian Standard 4874: Guide to the Investigation of Potentially Contaminated Soil and Deposited Dust as a Source of Lead Available to Humans;
- ANZECC. (1997). Identification of PCB-containing Capacitors: An Information Booklet for Electricians and Electrical Contractors;
- National Environment Protection Council. (2013). National Environment Protection (Assessment of Site Contamination) Measure, 1999, 2013 Amendment;
- Queensland Department of Environmental and Heritage Protection. (2016). Guideline Waste Management - Managing Polychlorinated biphenyl;
- National Occupational Health and Safety Commission. (1990). National Standard for Synthetic Mineral Fibres [NOHSC:1004(1990)];
- SafeWork NSW. (2013). Guide to Handling Refractory Ceramic Fibres;
- Electrical Contractors' Association of Australia. (1993). Code of Practice for the Safe Handling of Equipment Containing Polychlorinated Biphenyls;
- NSW EPA. (1997). Polychlorinated Biphenyl (PCB) Chemical Control Order 1997; and
- NSW EPA. (2014). Waste Classification Guidelines – Part 1: Classifying Waste.

ATTACHMENT 1

FIGURES

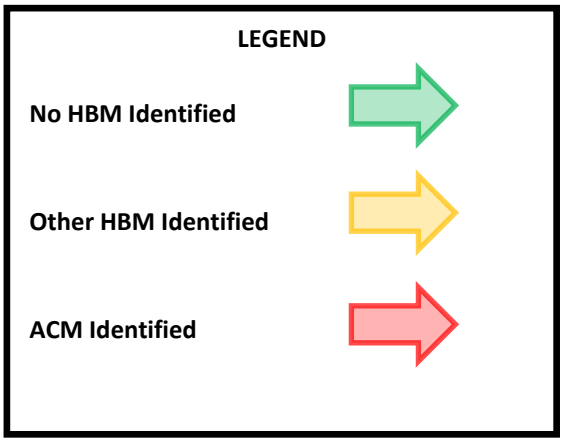


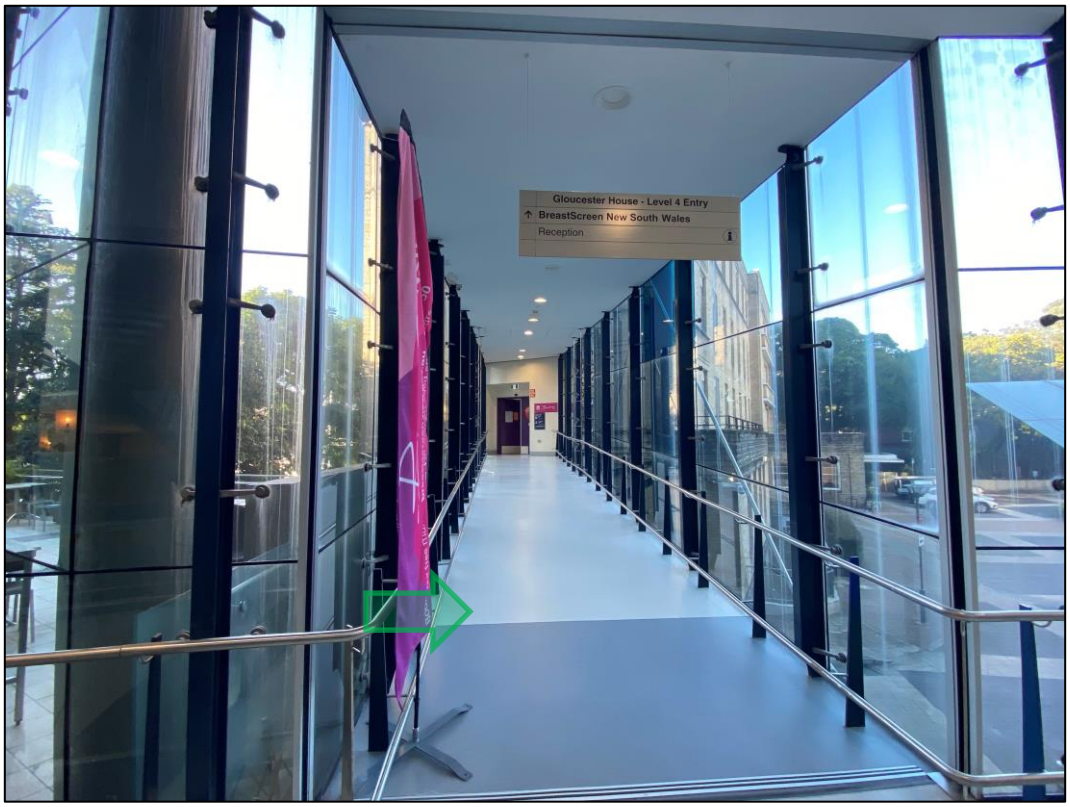
Site Locality and Subject Area				
Client Name:	Sydney Local Health District (c/- Cardno (NSW) Pty Ltd)	N	Figure Number:	1
Project Name:	Hazardous Building Materials Survey		Figure Date:	24 May 2022
Project Location:	Gloucester House Pedestrian Walkway (Portion B89), RPA Hospital, Camperdown NSW		Report Number:	1284-HBMS-05-250522.v1f

Sydney Environmental Group

ATTACHMENT 2

SITE PHOTOGRAPHS





Photograph 1 Building 89: Level 4, interior walls and vinyl flooring, as observed on 07/05/22. Location of sample B89-VT-01 (vinyl flooring). No asbestos detected).



Photograph 2 Building 89: Exterior underside of Level 4 walkway, fibre cement ceiling lining, as observed on 07/05/22. Location of sample 'B89-FC01' (external ceiling lining) and 'B89-FC02' (internal ceiling lining). No asbestos detected.

ATTACHMENT 3

HAZARDOUS BUILDING MATERIALS REGISTER

Hazardous Building Materials Register

Inspected By: Isabelle Figatowski
LAA ID: LAA001585
Inspection Dates: 17/05/2022

Address: Royal Prince Alfred Hospital - Gloucester House Bridge (Portion of B89)
Subject Areas: Gloucester House Bridge (Portion of B89) and tie ins

Inaccessible Areas: All live electrical equipment
Areas above three metres
Areas behind locked doors

Date	LOCATION			MATERIAL DESCRIPTION								RISK MANAGEMENT			CORRECTIVE ACTIONS			
	Building	Room	Surface	Material Application	Quantity	Units	Sample Type	Sample ID No.	Photo No.	Analytical Result	Material Condition as Surveyed	Risk Status	Control Recommendations/ Comments	Review date	Consultant/ Hygienist Name	Control Action Taken	Date Actioned	Contractor Details
Gloucester House Bridge (B89) - Interior																		
7/05/2022	B89	Hallway (interior)	Flooring	Vinyl tile	490	sq. m	VT	B89-VT-01	1	SMF detected	Good	Low	Maintain in current condition. Remove as per the code of practice "Code of Practice for the Safe Use of Synthetic Mineral Fibres NOHSC:2006 (1990)"	-				
Gloucester House Bridge (B89) - Exterior																		
7/05/2022	B89	Underside of L4 (exterior)	Ceiling Lining	Fibre cement	245	sq. m	FC	B89-FC01	2	No asbestos detected	Good	-	Nil	-				
7/05/2022	B89	Underside of L4 (exterior)	Ceiling Lining	Fibre cement	245	sq. m	FC	B89-FC02	2	No asbestos detected	Good	-	Nil	-				

ATTACHMENT 4

LABORATORY DOCUMENTATION

Sydney Environmental Group Pty Ltd
Unit 63/45 Huntley St
Alexandria
NSW 2015

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025–Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention:	Patrick Brown
Report	890175-AID
Project Name	RPA HOSPITAL B89+B95
Project ID	1284
Received Date	May 17, 2022
Date Reported	May 25, 2022

Methodology:

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

Project Name RPA HOSPITAL B89+B95
Project ID 1284
Date Sampled May 17, 2022
Report 890175-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
B89-VT-01	22-My0048107	May 17, 2022	Approximate Sample 1g / 40x15x2mm Sample consisted of: Grey/ Brown flexible linoleum with clear glue	No asbestos detected. Synthetic mineral fibre detected. No trace asbestos detected.
B89-FC-01	22-My0048108	May 17, 2022	Approximate Sample 1g / 12x10x2mm Sample consisted of: Grey/ Yellow plaster cement material with white coating	No asbestos detected. No trace asbestos detected.
B89-FC-02	22-My0048109	May 17, 2022	Approximate Sample 41g / 100x70x7mm Sample consisted of: Grey fibre plaster cement material	No asbestos detected. Organic fibre detected. No trace asbestos detected.
B95-CARPET-01	22-My0048110	May 17, 2022	Approximate Sample 7g / 50x45x7mm Sample consisted of: Piece of carpet material with woven backing	No asbestos detected. Organic fibre detected. No trace asbestos detected.
B95-MST-01	22-My0048111	May 17, 2022	Approximate Sample 2g / 45x22x2mm Sample consisted of: Black rubber sheet with amber glue	No asbestos detected. No trace asbestos detected.
B95-EAVE-01	22-My0048112	May 17, 2022	Approximate Sample 738g / 300x140x5mm Sample consisted of: Grey compressed fibre cement	Chrysotile asbestos detected.

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Sydney	May 20, 2022	Indefinite

eurofins | Environment Testing

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ABN: 50 005 085 521

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NATA # 1261 Site # 1254

Sydney
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Girraween NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
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NATA # 1261 Site # 20794

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Company Name: Sydney Environmental Group Pty Ltd
Address: Unit 63/45 Huntley St
Alexandria
NSW 2015

Project Name: RPA HOSPITAL B89+B95
Project ID: 1284

Order No.:
Report #: 890175
Phone: 1300 884 164
Fax:

Received: May 17, 2022 5:35 PM
Due: May 25, 2022
Priority: 5 Day
Contact Name: Patrick Brown

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						Asbestos Absence /Presence
Melbourne Laboratory - NATA # 1261 Site # 1254						
Sydney Laboratory - NATA # 1261 Site # 18217						X
Brisbane Laboratory - NATA # 1261 Site # 20794						
Mayfield Laboratory - NATA # 1261 Site # 25079						
Perth Laboratory - NATA # 2377 Site # 2370						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	B89-VT-01	May 17, 2022		Building Materials	S22-My0048107	X
2	B89-FC-01	May 17, 2022		Building Materials	S22-My0048108	X
3	B89-FC-02	May 17, 2022		Building Materials	S22-My0048109	X
4	B95-CARPET-01	May 17, 2022		Building Materials	S22-My0048110	X
5	B95-MST-01	May 17, 2022		Building Materials	S22-My0048111	X
6	B95-EAVE-01	May 17, 2022		Building	S22-	X

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web: www.eurofins.com.au
email: EnviroSales@eurofins.com

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IANZ # 1290

Company Name:	Sydney Environmental Group Pty Ltd	**Order No.:**	
Address:	Unit 63/45 Huntley St Alexandria NSW 2015	**Report #:**	890175
		Phone:	1300 884 164
		Fax:	
Project Name:	RPA HOSPITAL B89+B95		
Project ID:	1284		

Received:	May 17, 2022 5:35 PM
Due:	May 25, 2022
Priority:	5 Day
Contact Name:	Patrick Brown

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						Asbestos Absence /Presence
Melbourne Laboratory - NATA # 1261 Site # 1254						
Sydney Laboratory - NATA # 1261 Site # 18217						X
Brisbane Laboratory - NATA # 1261 Site # 20794						
Mayfield Laboratory - NATA # 1261 Site # 25079						
Perth Laboratory - NATA # 2377 Site # 2370						
External Laboratory						
				Materials	My0048112	
Test Counts						6

Internal Quality Control Review and Glossary General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. Information identified on this report with the colour **blue** indicates data provided by customer that may have an impact on the results.
5. Information identified on this report with the colour **orange** indicates sections of the report not covered by the laboratory's scope of NATA accreditation.
6. This report replaces any interim results previously issued.

Holding Times

Please refer to the most recent version of the 'Sample Preservation and Container Guide' for holding times (QS3001).
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

% w/w:	Percentage weight-for-weight basis, e.g. of asbestos in asbestos-containing finds in soil samples (**% w/w**)
F/fld	Airborne fibre filter loading as Fibres (**N**) per Fields counted (**n**)
F/mL	Airborne fibre reported concentration as Fibres per millilitre of air drawn over the sampler membrane (**C**)
g, kg	Mass, e.g. of whole sample (**M**) or asbestos-containing find within the sample (**m**)
g/kg	Concentration in grams per kilogram
L, mL	Volume, e.g. of air as measured in AFM (**V** = **r** x **t**)
L/min	Airborne fibre sampling Flowrate as litres per minute of air drawn over the sampler membrane (**r**)
min	Time (**t**), e.g. of air sample collection period

Calculations

Airborne Fibre Concentration: $C = \left(\frac{A}{a}\right) \times \left(\frac{N}{n}\right) \times \left(\frac{1}{r}\right) \times \left(\frac{1}{t}\right) = K \times \left(\frac{N}{n}\right) \times \left(\frac{1}{V}\right)$

Asbestos Content (as asbestos): $\%\, w/w = \frac{(m \times P_A)}{M}$

Weighted Average (of asbestos): $\%_{WA} = \sum \frac{(m \times P_A)_x}{x}$

Terms

%asbestos	Estimated percentage of asbestos in a given matrix. May be derived from knowledge or experience of the material, informed by HSG264 *Appendix 2*, else assumed to be 15% in accordance with WA DOH *Appendix 2* (**P_A**).
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded (non-friable) condition. For the purposes of the NEPM and WA DOH, ACM corresponds to material larger than 7 mm x 7 mm.
AF	Asbestos Fines. Asbestos contamination within a soil sample, as defined by WA DOH. Includes loose fibre bundles and small pieces of friable and non-friable material such as asbestos cement fragments mixed with soil. Considered under the NEPM as equivalent to "non-bonded / friable".
AFM	Airborne Fibre Monitoring, e.g. by the MFM.
Amosite	Amosite Asbestos Detected. Amosite may also refer to Fibrous Grunerite or Brown Asbestos. Identified in accordance with AS 4964-2004.
AS	Australian Standard.
Asbestos Content (as asbestos)	Total % w/w asbestos content in asbestos-containing finds in a soil sample (**% w/w**).
Chrysotile	Chrysotile Asbestos Detected. Chrysotile may also refer to Fibrous Serpentine or White Asbestos. Identified in accordance with AS 4964-2004.
COC	Chain of Custody.
Crocidolite	Crocidolite Asbestos Detected. Crocidolite may also refer to Fibrous Riebeckite or Blue Asbestos. Identified in accordance with AS 4964-2004.
Dry	Sample is dried by heating prior to analysis.
DS	Dispersion Staining. Technique required for Unequivocal Identification of asbestos fibres by PLM.
FA	Fibrous Asbestos. Asbestos containing material that is wholly or in part friable, including materials with higher asbestos content with a propensity to become friable with handling, and any material that was previously non-friable and in a severely degraded condition. For the purposes of the NEPM and WA DOH, FA generally corresponds to material larger than 7 mm x 7 mm, although FA may be more difficult to visibly distinguish and may be assessed as AF.
Fibre Count	Total of all fibres (whether asbestos or not) meeting the counting criteria set out in the NOHSC:3003
Fibre ID	Fibre Identification. Unequivocal identification of asbestos fibres according to AS 4964-2004. Includes Chrysotile, Amosite (Grunerite) or Crocidolite asbestos.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory's remit to assess degree of friability.
HSG248	UK HSE HSG248, *Asbestos: The Analysts Guide*, 2nd Edition (2021).
HSG264	UK HSE HSG264, *Asbestos: The Survey Guide* (2012).
ISO (also ISO/IEC)	International Organization for Standardization / International Electrotechnical Commission.
K Factor	Microscope constant (**K**) as derived from the effective filter area of the given AFM membrane used for collecting the sample (**A**) and the projected eyepiece graticule area of the specific microscope used for the analysis (**a**).
LOR	Limit of Reporting.
MFM (also NOHSC:3003)	Membrane Filter Method. As described by the Australian Government National Occupational Health and Safety Commission, *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres*, 2nd Edition [NOHSC:3003(2005)].
NEPM (also ASC NEPM)	National Environment Protection (Assessment of Site Contamination) Measure, (2013, as amended).
Organic	Organic Fibres Detected. Organic may refer to Natural or Man-Made Polymeric Fibres. Identified in accordance with AS 4964-2004.
PCM	Phase Contrast Microscopy. As used for Fibre Counting according to the MFM.
PLM	Polarised Light Microscopy. As used for Fibre Identification and Trace Analysis according to AS 4964-2004.
SMF	Synthetic Mineral Fibre Detected. SMF may also refer to Man Made Vitreous Fibres. Identified in accordance with AS 4964-2004.
SRA	Sample Receipt Advice.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres (particularly asbestos) in a given sample matrix.
UK HSE HSG	United Kingdom, Health and Safety Executive, Health and Safety Guidance, publication.
UMF	Unidentified Mineral Fibre Detected. Fibrous minerals that are detected but have not been unequivocally identified by PLM with DS according the AS 4964-2004. May include (but not limited to) Actinolite, Anthophyllite or Tremolite asbestos.
WA DOH	Reference document for the NEPM. Government of Western Australia, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (updated 2021), including Appendix Four: *Laboratory analysis*
Weighted Average	Combined average % w/w asbestos content of all asbestos-containing finds in the given aliquot or total soil sample (**$\%_{WA}$**).

Comments

Sample Integrity

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

Asbestos Counter/Identifier:

Chamath JHM Annakkage	Senior Analyst-Asbestos (NSW)

Authorised by:

Laxman Dias	Senior Analyst-Asbestos (NSW)



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

CHAIN OF CUSTODY RECORD

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Quote ID №					

Analyses (Mandatory: Please ensure you have specified TAT and all Analytes and SUITE codes required for each sample)

№	Client Sample ID	Sampled Date (dd/mm/yy)	Matrix (Solid (S) Water (W))	General Waste Classification Suite (B7, B13 Suite, Asbestos ID)	Excavated Natural Materials Order Suite (B7 Suite, Asbestos ID, pH, EC)	Virgin Excavated Natural Materials Suite (B7 Suite, Asbestos ID)	Salinity Assessment Suite (L2 Aggressivity Suite, ESP %)	Asbestos ID AS4964 (0.01%)	Asbestos ID NEPM & WA (0.001%)	ASBESTOS BULK ID.	Containers: 1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other Asbestos AS4964 WA Guidelines	Sample Comments / Dangerous Goods Hazard Warning
1	B89-VT-01	17.5.22	BM							X								1	
2	B89-FC-01									X								1	
3	B89-FC-02									X								1	
4	B95-CARPET-01									X								1	
5	B95-MST-01									X								1	
6	B95-EAVE-01									X								1	
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Geotechnical Interpretative Report

Royal Prince Alfred Hospital – Eastern Campus

80022026



Prepared for
TSA Management c/o NSW Health Infrastructure (NSW HI)

16 February 2022

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Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.

Table of Contents

1	INTRODUCTION		1
	1.1	Background	1
	1.2	Purpose and Scope of works	1
	1.3	Previous Investigation	2
2	SITE DESCRIPTION		3
	2.1	Site Description	3
	2.2	Topography and Drainage	5
	2.3	Regional Geology	5
3	INVESTIGATORY WORKS		6
	3.1	Borehole Locations	6
	3.2	Investigation Naming Convention	6
	3.3	Laboratory Testing	7
4	PROPOSED DEVELOPMENT		8
5	GROUND CONDITIONS ENCOUNTERED		9
	5.1	Subsurface Strata	9
	5.2	Groundwater	10
	5.3	Laboratory testing results (Geotechnical)	10
	5.4	Laboratory testing results (Chemical)	11
6	GEOTECHNICAL ASSESSMENT		12
	6.1	General	12
	6.2	Subsurface Conditions / Geology	12
	6.3	Earthworks	12
	6.4	Aggressiveness Classification	17
	6.5	Site Classification	17
	6.6	Seismic Classification	17
	6.7	Geotechnical Parameters	17
	6.8	Foundation Options	19
	6.9	Ground Anchors	20
	6.10	Pavement Design Evaluation	21
7	CONSTRUCTION INSPECTION		21
8	CONCLUSION AND RECOMMENDATIONS		21
9	REFERENCES		22
10	CLOSURE		22

Tables

Table 3-1	Borehole Coordinates	6
Table 5-1	Subsurface Conditions Summary	10
Table 5-2	Groundwater Monitoring Results	10
Table 5-3	Soil Classification lab results summary	11
Table 5-4	CBR Laboratory Results	11

Table 5-5 Results of Shrink Swell test 11
Table 5-6 Uniaxial Compression Strength Results 11
Table 5-7 Environmental Soil Aggressivity Test results summary 12
Table 6-1 Cut Batter Recommendations 15
Table 6-2 Permanent Options 15
Table 6-3 Recommendation for Shoring Options 16
Table 6-4 Material Strength Parameters 17
Table 6-5 Rock Mass Classification System – Shale – Pells et al (2019) 18
Table 6-6 Classification of Rock at Borehole Locations 18
Table 6-7 Shallow / Pad Footing Design Parameters 19
Table 6-8 Pile Design Parameters (Based on Pells 2019) 19
Table 6-9 Deep Foundation Options 20
Table 6-10 Allowable Bond Stresses for Anchor Design 20

Figures

Figure 2-1 RPA Hospital Campus 3
Figure 2-2 RPA Hospital Campus with building numbers 4
Figure 2-3 Approximate Borehole Locations 4
Figure 2-4 Geological Map, Herbert C., 1983, 1st Edition 5
Figure 4-1 Proposed Development Zone – East Campus 8
Figure 4-2 Proposed Concept Design Plan – East Campus (Prepared by Jacobs) 9
Figure 6-1 Zoning of excavatability based on Pettifer and Fookes (1994) 14

Appendices

Appendix A GEOTECHNICAL INVESTIGATION PLAN
Appendix B ENGINEERING LOGS
Appendix C LABORATORY TEST RESULTS
Appendix D SITE PHOTOGRAPHS
Appendix E PREVIOUS BOREHOLE LOGS AND LABORATORY TEST RESULTS
Appendix F IMPORTANT INFORMATION

1 INTRODUCTION

1.1 Background

Cardno, now Stantec Pty Ltd was engaged by TSA Management (TSA) ("the client") on behalf of NSW Health Infrastructure, to undertake an Interpretative geotechnical and contamination investigation report to determine the in-situ ground conditions, for the proposed redevelopment of Royal Prince Alfred Hospital (RPA) – Eastern Campus. The contents of this report detail the ground investigation, methodology, presentation of factual data obtained and interpretation of data appropriate for the design and construction.

The investigatory RPA Eastern Campus ("the Site") is approximately 4.5 Ha in area, located in Sydney's inner west suburb of Camperdown. The site resides under the Local Government Area (LGA) of City of Sydney.

The ground assessment comprised boreholes at nominated locations across the subject site in order to obtain relevant geotechnical and environmental information to aid detailed design for site redevelopment.

This report only presents the results of the geotechnical investigation works undertaken at RPA. A separate report has been prepared for environmental conditions encountered on site and is provided in Ref: 80022026, entitled "*Desktop Contamination Assessment with Limited Sampling*", by Cardno (NSW/ACT) Pty Ltd.

1.2 Purpose and Scope of works

The purpose of this report is to provide the client with geotechnical advice on the in-situ subsurface conditions encountered, along the proposed redevelopment works.

The scope of works undertaken are presented below:

i) Undertaking a desktop study of existing geotechnical information for the site and surrounding areas.
ii) Site Investigation will be carried out in accordance with AS 1726:2017 Geotechnical Investigation. The locations and depths to be undertaken following discussions with Project Civil Engineer.
iii) Preliminary work, including preparation of a Field Work Safety and Environmental Plan (FWSEP), Safe Work Method Statements (SWMS) and site-specific paperwork and inductions as required;
iv) Undertaking a Dial-Before-You-Dig search and check the site using an electronic services locator and GPR (ground penetrating radar).
v) Undertake boreholes drilling as indicated on the attached plans. This includes the following
   - Drilling of four (4) boreholes (BHs) up to a depth of 5m to 8m using track and/or ute mounted geotechnical drill rig with solid flight augers and Tungsten Carbide (TC) bit.
   - Drilling of four (4) BHs to 3m into medium strength rock. Coring of the rock was carried out using NMLC diamond drilling techniques;
vi) Undertake in-situ Standard Penetration Tests (SPT), including recovery of samples, at 1.5 m intervals in the boreholes to assess sub-surface geotechnical strength and geological material characteristics;
vii) Reinstate borehole locations, back-filling with spoil cuttings and topping up with sand, cement grout and rapid set concrete. In instances where this method is not suitable the reinstatement shall match the existing area i.e. pavers, bitumen etc.

viii) Survey of the investigation locations by using survey equipment Topcon GNSS Receiver to determine the ground co-ordinate marks and collar elevation, referencing to GDA 2020, Zone 56 and AHD (m) respectively;

ix) Installation of one (1) Groundwater (GW) monitoring well in one of the drilled borehole;

x) Laboratory testing to be carried out on representative samples by Cardno NATA accredited laboratory, which may include:

- Particle Size Distribution (AS1289.3.6.1);
- Atterberg Limits (AS1289.3.4.1 – 3.3.1 – 3.2.1);
- Moisture Contents (AS1289.2.1.1);
- California Bearing Ratio (CBR) (AS1289.6.1.1);
- Soil Aggressiveness testing (Sulphate, Chloride, Electrical Resistivity and pH testing);
- Point Load (PL) Tests; and
- Unconfined Compressive Strength (UCS).
- Acid sulphate soil (ASS) testing (covered in environmental report)

xi) Provision of a Geotechnical Report

1.3 Previous Investigation

Douglas Partners (DP) have previously carried out a geotechnical investigation, (Ref: 99709.00 R.001.Rev0 dated 26 August 2020) for the same site which included four rock cored boreholes (BH201 – BH204). This report also included previous borehole logs carried out in 1989 (Proj Ref: 12093) and 1998 (Proj Ref: 27456) by DP.

The geotechnical information provided in DP's report also has been taken into consideration in our report. The previous borehole locations are shown on Appendix A – site plan together with cross section of subsurface profiles from previous and current investigations.

DP has carried out a total of 4 BHs (BH201 – BH024) in 2020 in the eastern campus, which were drilled to a depth of approx. 14 to 16m below surface level (BSL). Two (2) Groundwater monitoring wells at BH201 and BH202 were installed. The subsurface profile consisted of Pavement/Fill overlying Residual Clay and Ashfield shale bedrock. The bedrock comprised of very low to low strength laminite over medium to very high strength laminite/siltstone.

The geotechnical investigation carried out by DP in 1989 comprised of six boreholes (BH1 to BH6) for Eastern Campus which were drilled up to 9.70m BSL. The subsurface profile comprised of Pavement/Fill overlying Residual Clay and Laminite. The Laminite varied from low to high strength.

The geotechnical investigation from 1998 comprised of 17 boreholes (BH1 to BH17) for the Eastern precinct. Those boreholes were drilled up to 11.45m BSL. The subsurface conditions comprised of Fill underlain by residual clay and shale and laminite bedrock. The laminate varied from low to high strength.

The interpretation of previous boreholes was carried out in accordance with Pells et al (2019) publication "Classification of Sandstone and Shales in the Sydney Region: A Forty Year Review". The interpreted subsurface profiles have been shown in the cross section provided in Appendix A – Site Plan. The borehole logs and test results are presented in Appendix E.

2 SITE DESCRIPTION

2.1 Site Description

The Royal Prince Alfred Hospital (RPA) campus is located in Sydney's inner west suburb of Camperdown. It is situated between Sydney University to the east and the residential area of Camperdown to the west. The campus is divided by Missenden Road, which runs north to south dividing the campus into two distinct portions, called East Campus and West Campus as show in Figure 2-1 below:

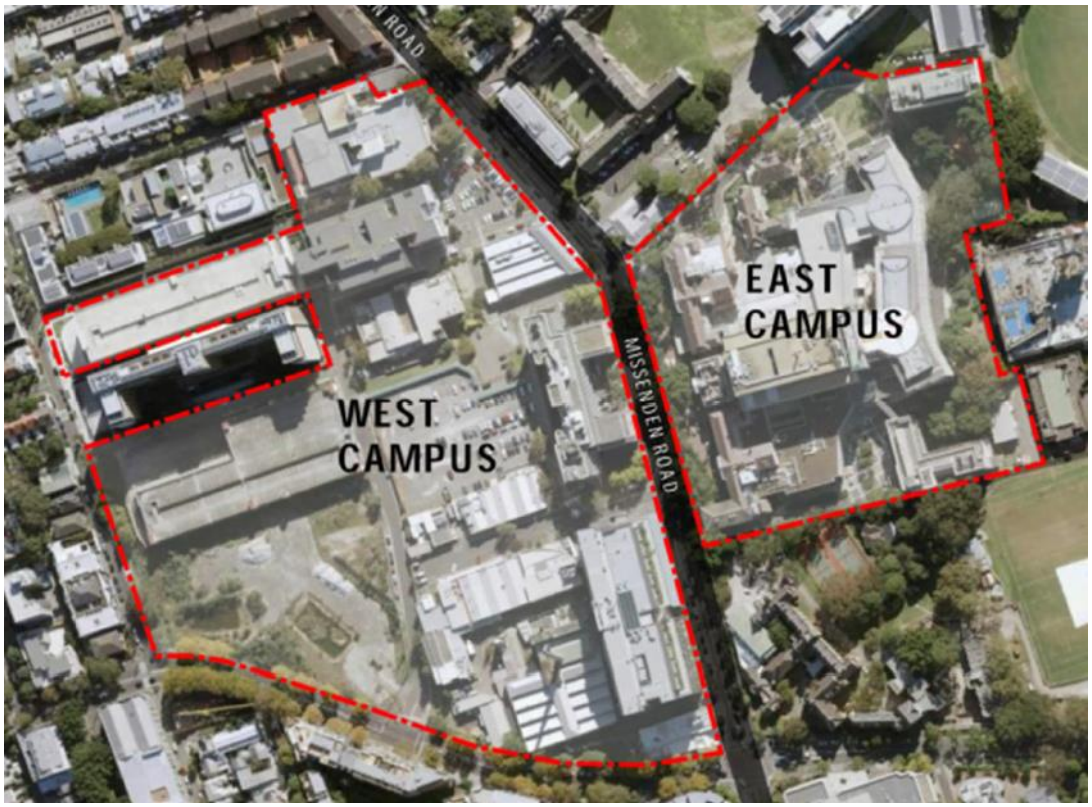


Figure 2-1 RPA Hospital Campus

The RPA Hospital campus (outlined in red in Figure 2-1 above) incorporates a diverse range of operations including research, education, student housing, acute quaternary health services, as well as healthcare in both private and public domains.

There is an internal road called John Hopkins Drive / Lambie Dew Drive, which loops around the Eastern hospital from North west to the South East direction.

The following figure shows the locations of RPA buildings with unique building numbers for the entire eastern and western campus.

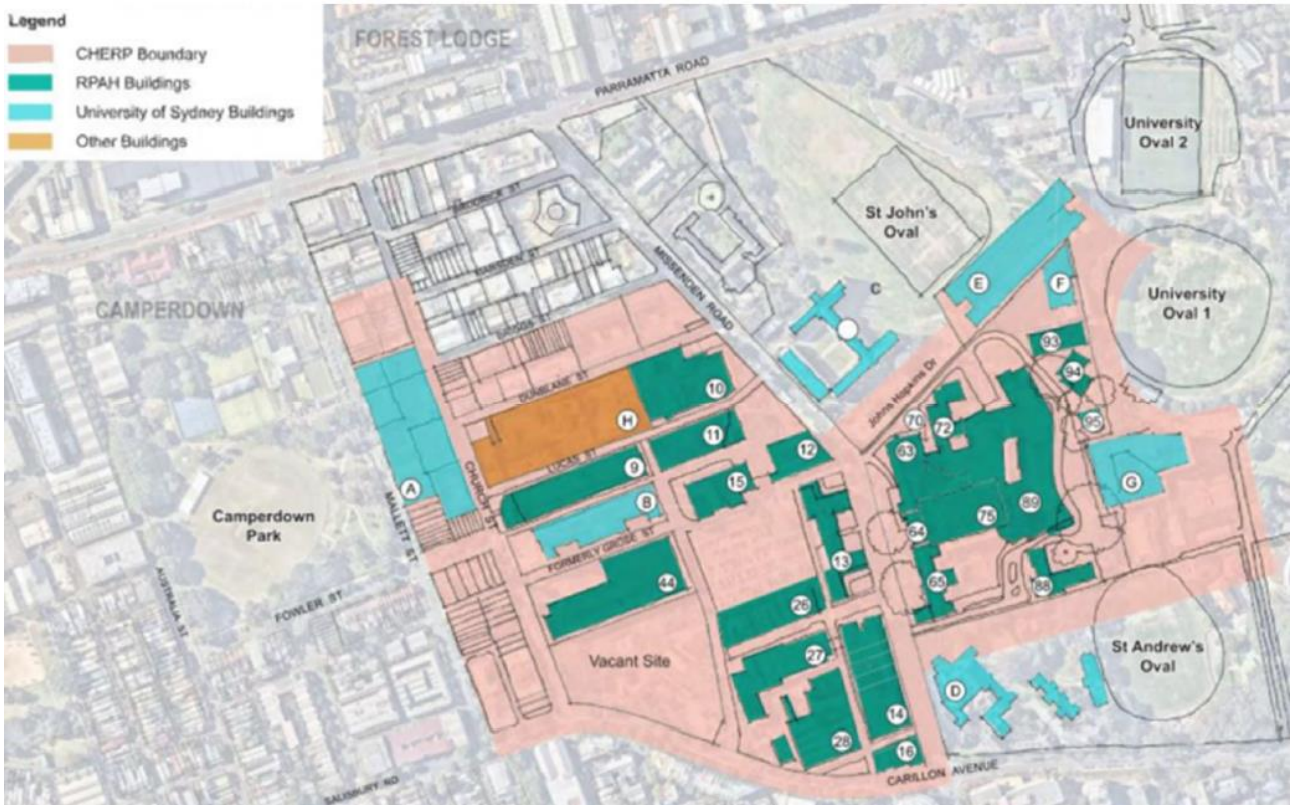


Figure 2-2 RPA Hospital Campus with building numbers

The investigatory boreholes undertaken for the hospital redevelopment are shown in Figure 2-3 below, which are also attached in **Appendix A – Site Plan**:

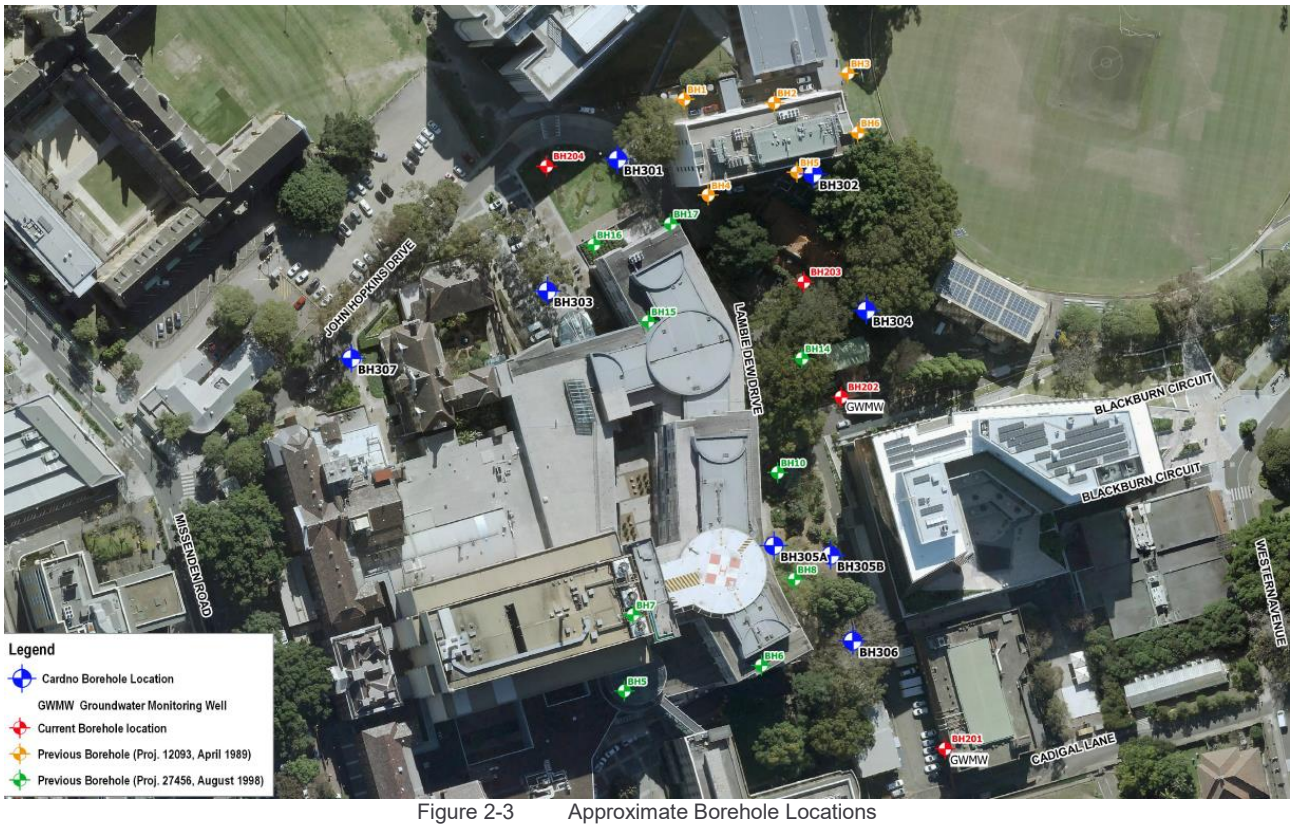


Figure 2-3 Approximate Borehole Locations

2.2 Topography and Drainage

The ground surface levels generally fall towards in an easterly direction with elevation levels varying from approx. RL 29 m AHD (westerly – BH307) to RL 19 m AHD (easterly-BH 302).

Various drainage stormwater pits were present throughout the site; however, their functionality was not assessed at the time of investigation. Majority of the site consisted of hardstand pavement areas and some landscaped / garden areas were present towards the North and East of Building 89.

Based on our site observations, there are no potential risks surrounding the building that may potentially cause landslip risks and the site is not located within high erosion potential area. There is no existing landslip prone area map available for Camperdown as well which suggests that the site is not located within the known occurrence of landslip.

2.3 Regional Geology

The Sydney 1:100 000 Geological Map, Herbert C, 1983, illustrates that the subject site ins underlain by Ashfield Shale (Rwa) of Wianamatta Group from Middle Triassic period of Mesozoic era. The map shows the site is underlain by Ashfield Shale (Rwa) which is charactered as Black to dark-grey shale and laminite.

Regional geology of the site area is presented in Figure 2-4 below:

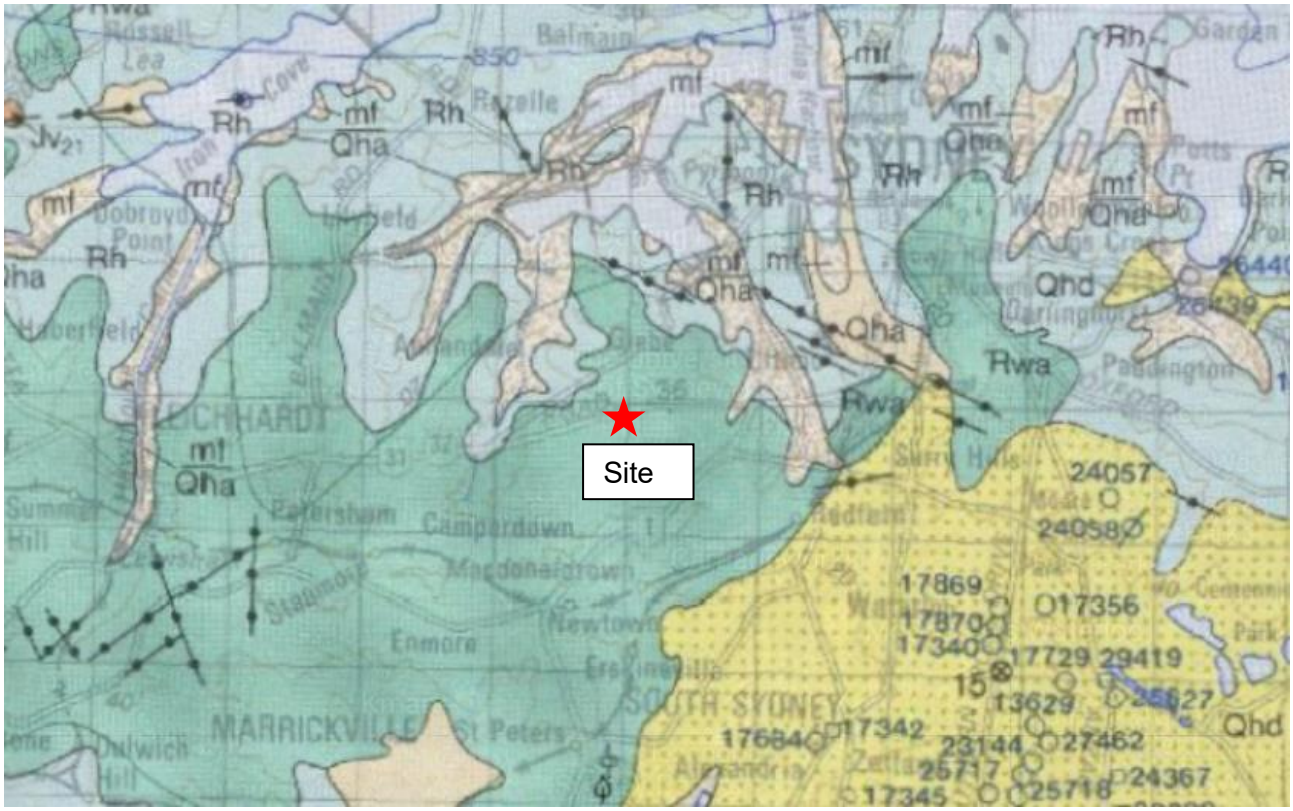


Figure 2-4 Geological Map, Herbert C., 1983, 1st Edition

3 INVESTIGATORY WORKS

3.1 Borehole Locations

The ground coordinates of boreholes are listed in Table 3-1 below. At the time of investigation, all boreholes were located by survey based on nominated borehole positions outside of overhead and underlying utility services. Upon completion of works, all boreholes were picked up with Topcon GNSS Receiver, to determine the ground coordinate marks and collar elevation, referencing to GDA2020, Zone 56 and AHD (m) respectively.

Table 3-1 Borehole Coordinates

ID	Easting (m)	Northing (m)	Elevation (m AHD)
BH301	332016.065	6248761.9	22.9
BH302	332076.300	6248757.4	19.7
BH303	331994.419	6248721.4	27.1
BH304	332092.740	6248715.4	21.9
BH305A	332064.290	6248642.9	24.2
BH305B	332081.752	6248640.0	22.6
BH306	332088.600	6248613.6	23.2
BH307	331934.052	6248700.6	29.8

3.2 Investigation Naming Convention

For fieldworks, the naming convention adopted for investigatory boreholes (BHs) was standardised in a sequential manner, since there are previously known ground investigations undertaken on the site by DP.

i) BH3xx – BH301, BH302, continuing – Represents investigatory boreholes undertaken across the subject site

ii) BH305 was subdivided into BH305A and BH305B. BH305A was shallow borehole undertaken mainly for CBR sampling whereas BH305B was carried out to identify the subsurface profile to deeper depth targeted for eastern extension to Building 89.

3.2.1 Fieldwork Activities

Fieldwork for the investigation was carried out from 29th of November to 3rd of December 2021, comprising of the following sequence of activities;

i) A review of Dial Before You Dig (DBYD) and on-site service search.
ii) Drilling of eight (8) boreholes (BHs) using a track and ute mounted drill rig. Four (4) BHs were drilled up to a depth of 8m below surface level (BSL) and four (4) BHs were drilled up to 15.21m BSL;
iii) Standard Penetration Tests (SPT) were undertaken within the soil profile at 1.50 m intervals;
iv) Collection of disturbed soil samples for laboratory testing;
v) Installation of one GW monitoring well at BH303 location;
vi) Reinstatement of boreholes

All fieldworks, including logging of the subsurface profile, collection of soil samples, was undertaken by Geotechnical Engineers from Cardno. The locations of the completed geotechnical investigations are shown on the borehole location plan, attached to this report in Error! Reference s

ource not found.**Appendix A – Site Plan.**

Subsurface conditions encountered are summarised in Section 6 and detailed in engineering borehole logs attached in **Appendix B** together with explanatory notes. Fieldwork was carried out in accordance with Australian Standard, AS1726-2017 '*Australian Standard - Geotechnical Investigations'*.

A breakdown of fieldwork activities is presented below:

3.2.1.1 Underground Service Search

A Dial Before You Dig (DBYD) underground service search was conducted by the Cardno for the site and surrounding area prior to the fieldworks. A qualified underground service locator, Astrea cleared the borehole locations from utilities, with the use of a pipe/cable locator & transmitter and ground-penetrating radar (GPR) prior to the drilling. Hand auguring was carried out for the first 1m of subsurface profile as non-destructive digging method.

3.2.1.2 Geotechnical Drilling

Investigatory drilling boreholes (BHs) were undertaken with the use of a tracked and Ute mounted rig operated by Stratacore drilling service.

Boreholes were drilled vertically (90 degrees from the horizontal). Drilling through the soil was carried out using solid flight auger with Tungsten Carbide "TC" – bit. Deep boreholes were further advanced with NMLC coring until competent rock was reached, which ever came first. Standard penetration tests (SPT) were undertaken through the soil profile at 1.50 m intervals, proceeding from 1.5m below surface level (BSL). SPT refusal was considered where 30 blows generated less than 150mm penetration.

3.2.1.3 Standard Penetration Testing (SPT)

SPT test involves raising and dropping a 63.5kg slide hammer 760mm to drive a thick-walled sample tube through the underlying layers. The number of blows it requires to penetrate the sample tube across 150mm increments is measured until the tube has penetrated 450mm into the subsurface, or the hammer is bouncing, causing refusal (Blow counts > 25).

SPT tests were undertaken, to assist with the assessment of in-situ soil strength parameters. The tests were performed at 1.0m – 1.5m increments until refusal was achieved. SPT tests are presented in engineering logs provided in **Appendix B**.

3.3 Laboratory Testing

Samples of representative strata were recovered and returned to NATA accredited laboratory. The following tests were carried out on selected samples:

i) Three (3) samples for atterberg limits and particle size distribution testing to aid for material classification;
ii) Two (2) samples for California Bearing Ratio (CBR) testing to aid for pavement design thickness;
iii) One (1) sample for shrink swell testing to aid for characteristic surface movement;
iv) Three (3) samples to aid with strength of the selected rock cores;
v) Three (3) samples to aid with chemical characterisation of the soils;
vi) Four (4) samples for Uniaxial Compressive Strength (UCS) testing to aid for rock strength; and
vii) Point load strength index tests were carried out every 1 m of recovered core where defect spacing provided enough core to carry out testing. A total of twenty (25) point load strength index tests were carried out;

The Laboratory test results for soils and rock are included in **Appendix C**. Laboratory testing was carried out in accordance with Australian Standard AS1289 'Laboratory Testing for Engineering

Purposes'.

4 PROPOSED DEVELOPMENT

The proposed development zone is situated within the Eastern campus as shown in Figures 4-1 below and the concept design plan prepared by Jacobs (Ref: IA0251300- MW- AR- DRG-0102(1)) for Eastern Campus is shown in Figure 4-2 below. The proposed development testing zone will encompass:

i) the building footprints of the new proposed development;
ii) areas between the existing buildings and new proposed development;
iii) John Hopkins Drive and Lambie Dew Drive due to potential civil works for road realignment/ enhancements and service diversions;
iv) Gloucester House Drive due to potential civil works for new in-ground services/ services connections;
v) existing Building 89 which may be subject to vertical expansion and refurbishment works to some levels;
vi) New Mortuary drop off within the access lift between levels 1 and 2 of Building 89;
vii) Relocation of the existing roller shutter door on the eastern side of the Clinical Services Building; and
viii) some departments within some levels of existing Buildings 63, 75, 94 and 95 which may be subject to refurbishment works



Figure 4-1 Proposed Development Zone – East Campus

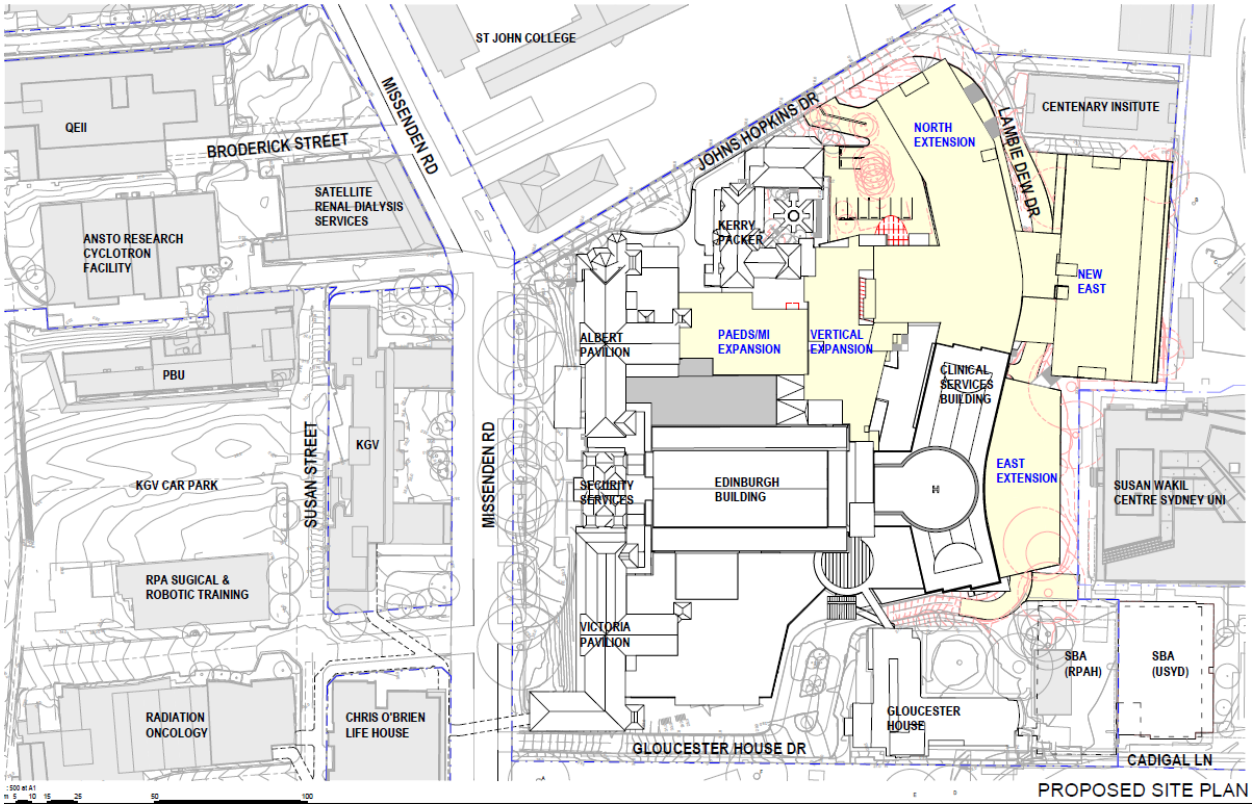


Figure 4-2 Proposed Concept Design Plan – East Campus (Prepared by Jacobs)

5 GROUND CONDITIONS ENCOUNTERED

A brief summary of the typical sub-surface conditions encountered within each investigatory locality is provided below. For full description of the sub-surface profiles encountered, reference can be made to the borehole logs presented in **Appendix B**.

5.1 Subsurface Strata

The ground conditions across the subject site were relatively uniform and resembled with the geology (Rwa – Ashfield Shale) as shown on the published map.
The subsurface profiles encountered across the site were as follows:

> Asphaltic concrete / concrete paver, between 0.00 m and 0.40 m, overlying;
> Fill consisting of Gravelly Sand, Silty/Sandy Clay, between 0.10 m and 3.30 m, overlying;
> Possible residual soil, comprising of silty CLAY, between 0.15 m to 3.30 m, overlying;
> Residual Silty CLAY, between 1.45 m to 7.00 m;
> Bedrock, comprising of Siltstone/Laminite, between 4.10 m to 15.21 m;

The subsurface profile is summarised in Table 5-1 below, and presented in engineering logs attached in Appendix B, together with explanatory notes.

Table 5-1 Subsurface Conditions Summary

BH ID	Soil Description / Depth (m) BSL						
	Asphaltic Concrete / Paver	Fill (Gravelly SAND)	Fill (Silty / Sandy Clay)	Residual Silty CLAY	Bedrock Siltstone/ Laminite	Target Depth	GW Encountered Depth m BSL
BH301	0.0-0.10	0.10-0.50	0.50-2.0	2.0-4.50	4.50-TD	7.90(R)	-
BH302	0.0-0.05	-	0.05-1.45	1.45-4.10	4.10-TD	14.36	-
BH303	0.0-0.40	0.40-0.70	0.70-3.10	3.10-4.70	4.70-TD	14.00	-
BH304	0.0-0.10	0.10-2.00	2.00-3.30	3.30-5.20	5.20-TD	15.21	-
BH305A	-	0.0-0.30	0.30-2.50	2.50-TD	-	3.00	-
BH305B	-	0.0-0.30	0.30-2.50	2.50-7.00	7.00-TD	8.00(R)	-
BH306	-	0.0-0.50	0.50-1.50	1.50-6.40	6.40-TD	14.97	4.50 6.00 (Seepage)
BH307	0.0-0.05	0.05-0.30	0.30-0.60	0.60-5.30	5.30-TD	5.50	-

Notes:
1. All depths measured in metres below ground surface level (Refer to Table 4-1) at the time of the investigation.
2. Refer to attached Soil Description, Rock Description and Glossary of Terms on Appendix B for a full list of symbols and terms.
3. Soil Classification follows United Soil Classification system (USCS).
4. TD = Termination Depth.
5. R = Auger Refusal Depth
6. BSL = Below Surface Level

5.2 Groundwater

Groundwater seepage was encountered at 4.50m and 6.00m BSL within BH306 during investigatory borehole drilling. A groundwater monitoring well was also installed at the BH03 location. There were two monitoring wells previously installed by DP at BH201 and BH202.

It should be noted that groundwater levels may fluctuate depending on the time of year and following periods of wet weather.

The following table shows a summary of the groundwater levels encountered and measured during the investigation:

Table 5-2 Groundwater Monitoring Results

Borehole ID	Date and Time	Depth m BSL	RL m AHD
BH201	12/01/22 @1045	1.69	21.51
BH202	12/01/22 @0930	5.72	20.68
BH303	12/01/22 @0800	7.81	19.29

5.3 Laboratory testing results (Geotechnical)

5.3.1 Soil Properties and classification

A summary of the material classification testing on selected samples are presented below, in Table 5-3. Geotechnical laboratory test results have been presented in **Appendix C**.

Table 5-3 Soil Classification lab results summary

Borehole	Depth (m)	MC (%)	Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)	LS (%)
BH 302	2.0-2.50	20.4	3	8	89	54	20	34	12.5
BH 303	4.0-4.50	17.4	1	10	89	53	20	33	13.0
BH 305B	4.0-4.50	23.1	8	13	79	62	21	41	17.5

Notes:
LL: Liquid Limit
PL: Plastic Limit
PI: Plasticity Index
MC: Field Moisture Content
LS: Linear Shrinkage
NP: Non-Plastic

5.3.2 California Bearing Ratio (CBR)

Results of CBR and Standard Maximum Dry Density (SMDD) tests on selected samples from the investigatory boreholes are summarised below in Table 5-4.

Table 5-4 CBR Laboratory Results

Hole ID	Depth (m BSL)	SMDD (t/m3)	OMC (%)	CBR (%)	Swell (%)
BH 305A	2.50-3.00	1.70	19.5	3.5	2.5
BH 301	0.50-1.00	1.54	25.0	5.0	1.5

Notes:
1. CBR testing was undertaken on remoulded specimens compacted to a target 100% standard maximum dry density with a surcharge of 4.5 kg and soaked for four days. Subgrade strength is moisture and density dependent and where the existing subgrade is compacted to 100% standard compaction and moistures above OMC exist, the in situ CBR values may be less than the above tested values.
2. OMC – Optimum Moisture Content

5.3.3 Shrink Swell Test

The results of the shrink swell test are presented in Table 6-5 below.

Table 5-5 Results of Shrink Swell test

Borehole Number	Depth (m)	Shrink Swell Index %
BH307	1.00 - 1.45	2.2

5.3.4 Uniaxial Compression Strength

The results of uniaxial compression strength (UCS) testing on selected samples are summarised below in Table 6-6 below. The UCS and point load test results are attached in **Appendix C**.

Table 5-6 Uniaxial Compression Strength Results

Hole ID	**Sample Depth** (m BSL)	**Uniaxial Compressive Strength** UCS (MPa)
BH 302	10.68-10.85	52
BH 303	13.45-13.67	50
BH 304	15.00-15.11	36
BH 306	12.28-12.43	10

5.4 Laboratory testing results (Chemical)

5.4.1 Soil Aggressivity Test Results

Results of soil aggressivity tests on selected samples obtained from selected boreholes are summarised in Table 5-7 below:

Table 5-7 Environmental Soil Aggressivity Test results summary

Hole ID	Depth (m BSL)	Chloride (mg/kg)	Conductivity (µS/cm)	pH	Resistivity (ohm.cm)	Sulphate (mg/kg)	Moisture (%)	Exposure Classification [a] (AS2159-2009)
BH302	2.50	31	150	5.1	6800	37	17	Mild aggressive to steel and mild aggressive to concrete
BH303	3.40	<10	64	4.9	16000	17	6.6	
BH306	3.0	11	83	5.4	12000	<10	22	

Notes:
1. Based on AS 2159-2009 and groundwater condition mentioned above in Section 6.2.

6 GEOTECHNICAL ASSESSMENT

6.1 General

Geotechnical parameters for RPA hospital redevelopment have been developed based on available geotechnical information obtained to date for the project, published data and our experience of materials of similar nature and history on projects within Sydney region.

The design values derived are generally obtained from statistical analyses of project specific in-situ and laboratory test results. The values are considered to be representative of the properties of the material in its current condition. Where there are insufficient jn-situ or laboratory tests, empirical correlations are used.

When project specific in-situ and laboratory tests, or empirical correlations are not applicable or not available, design values are then chosen with due consideration of relevant experience from past projects and the application of engineering judgement.

6.2 Subsurface Conditions / Geology

The general ground conditions encountered on site have been discussed in Section 6 of this report. In summary the ground condition encountered are relatively similar comprising asphaltic pavement / concrete paver overlying fill, overlying residual soil and siltstone / laminite bedrock. From the borehole investigation undertaken on site, the subsurface ground profile was generally consistent with the geology maps.

6.3 Earthworks

6.3.1 Site Preparation

The following sections provide advice on preparation, formation and unsuitable materials. The relevant earthworks standards referred to as a basis for design considerations and recommendations include:

i) AS3798-2007 '*Guidelines on Earthworks for Commercial and Residential Developments*'.

ii) Safe Work Australia Excavation Work – Code of Practice

iii) Prior to bulk earthworks, the site shall be cleared of any foreign matter or unsuitable material which includes but may not be limited to the following:

- Vegetation or organic matter including root balls of any larger trees onsite;
- Topsoil or soil significantly affected by roots or root fibres;

- Any scattered waste or dumped materials;
- Uncontrolled filling which may be subject to further assessment;
- Loose or low strength (soft to firm) soils or otherwise 'unsuitable' soils; or
- Expansive soils.

BasedErosion and sediment control plan should be implemented before commencing any earthworks for the proposed development.

6.3.1.1 Structural Fill / Compaction Specification and Quality Control

Prior to the placement of any structural fill, the site should be proof rolled using a minimum 12 tonne roller in the presence of the geotechnical engineer. Should isolated soft/loose areas be encountered during this process, this material should be removed and replaced with suitable granular structural fill. Structural fill could comprise a select well graded granular material such as processed sandstone and road-base (DGB20). Additional filling may also be required for levelling purpose.

Depressions formed by the removal of vegetation should have all disturbed soil cleaned out and be backfilled with compacted select fill material.

To minimise the potential for post compaction volume change due to moisture content variations, any structural clay bearing fill, containing cohesive strata, should be placed in loose layers not greater than 300mm in thickness, and compacted to a minimum 98% of Standard Maximum Dry Density (SMDD) at a moisture content within 2% of standard optimum moisture content.

If the structural fill is located in landscaped areas, then the minimum density ratio can be reduced to 95% of SMDD.

Measures should be adopted to ensure that this clay fill material is not allowed to dry out prior to the placement of succeeding layers of fill and final covering with building slabs and road pavements.

It is recommended that the placement of all structural fill be inspected, tested and certified by Cardno to Level 1 requirements, during the earthworks operations to ensure that all fill is placed in a 'controlled manner', in accordance with AS3798-2007 'Guidelines on Earthworks for Commercial and Residential developments'.

Site observations and laboratory test results have indicated the presence of high plasticity silty clays in majority of areas which could be adversely affected by inclement weathered. Whilst these soils are typically of a stiff to very stiff consistency when dry, they can rapidly lose strength during wet periods. Trafficking over areas where high moisture content and low strength residual clays may not be possible without the use of bridging layers, structural fill and/or geogrids.

Conventional sediment and erosion control measures should also be implemented during the construction phase.

6.3.2 Material Management

The following general comments regarding appropriate material management shall be considered for design;

i) Strict moisture and compaction control, with fill materials placed as close to OMC as practical while not exceeding the OMC. Over compaction shall also be avoided;

ii) The clays would generally be suitable for general fill, and would be expected to provide a suitable subgrade for road construction; however, depending on the material utilised, a select layer and appropriate drainage would be recommended due to the swell potential;

iii) Any oversized material should be screened prior to use as fill material.

iv) The contamination report shall also be read in conjunction to this geotechnical report for the suitability of material re-use on site.

6.3.3 Excavation Conditions

When considering excavation at any of the sites, the findings and recommendations presented in the Contamination Assessment report should also be considered.

It is recommended that construction contractors assess the engineering logs, core photographs and rock cores to make their own assessment of excavation plant and production rates. Below recommendations are preliminary only and based on the geotechnical information across the site. Assessment of material excavatability can be based on the method published by Pettifer and Fookes (1994). The degree of excavatability of rock is based on its Point Load Index (Is50) and fracture spacing.

Excavatability categories range from easy to hard digging, through easy to hard ripping, to blasting.

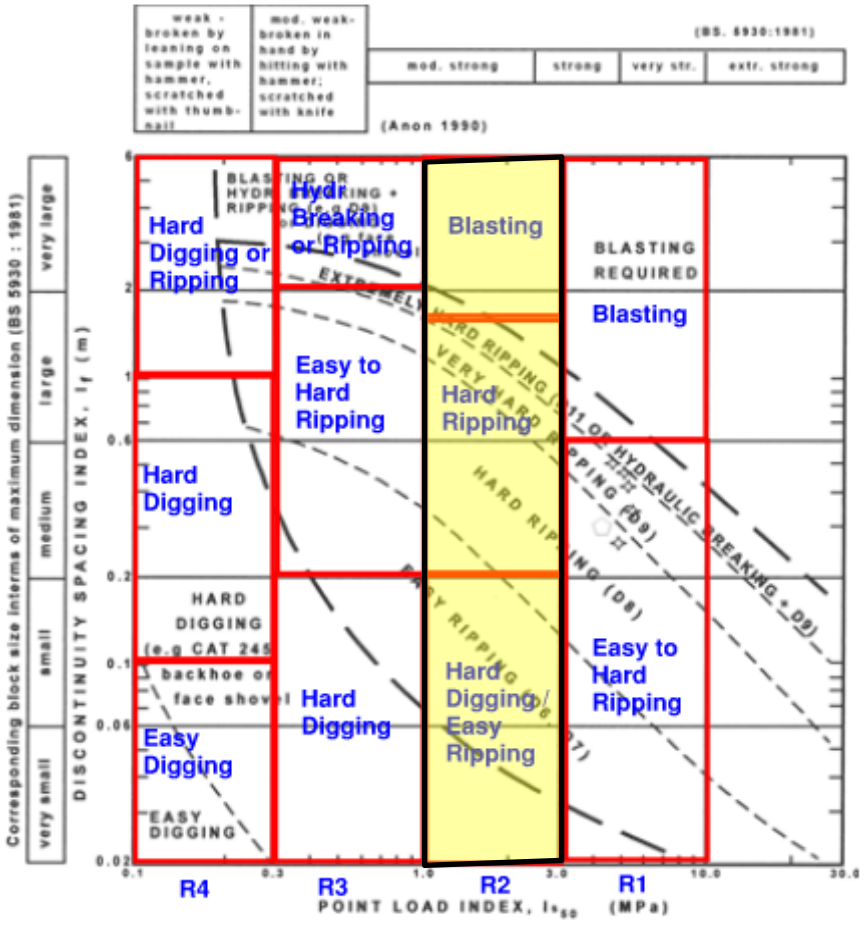


Figure 6-1 Zoning of excavatability based on Pettifer and Fookes (1994)

Examination of Figure 7-1 shows that the excavatability zones are delineated according to rock strength categories (R4-low strength, R3-medium strength, R2-high strength, R1-very high strength), and further subdivided based on the defect spacing of the rock.

Our review of the borehole logs indicates that bedrock conditions encountered were generally moderate with defect spacing in the order of 10mm – 2970mm. It is therefore expected:

i) hard digging to easy ripping conditions in Class III to Class V Siltstone / Laminite
ii) hard ripping to blasting in Class II Siltstone / Laminite

Large size hydraulic excavator or similar should be adequate for hard digging conditions and the use of hydraulic rock breakers / hammer in combination with Caterpillar D9 ripper or similar should be

adequate for hard to very hard ripping conditions.

Where high strength rock (R2 or better) is present at the site, excavation production rates are likely to decrease with the above machinery. Where larger cuts are required the use of chemicals can be used as an alternative option for rock splitting.

6.3.4 Open Cuts / Temporary and Permanent

6.3.4.1 Temporary cuts

Where open cuts are required as part of temporary works during ground support and embankment stability work. Recommendations for temporary unsupported cuts batters (if required) are presented in the following table:

Table 6-1 Cut Batter Recommendations

Geotechnical profile	Temporary Batter (Horizontal to Vertical Ratio)
Fill	2H:1V
Residual Soil	1.5H:1V
Class V / IV Siltstone / Laminite	1V:1H
Class III / II Siltstone / Laminite	Refer to Note (g)

Notes:

1. Table 6-1 applies to temporary unsupported cut batters only, for a period of no greater than 3 months once constructed
2. Temporary batters apply to cuts no greater than 1.50m in vertical height. Where deeper cuts are proposed for each stratum, further geotechnical designed support or retention systems may be required.
3. Excavations in soil have assumed no groundwater table has been encountered;
4. The ground surface at the crest of the excavation is horizontal;
5. There is no surcharge at the crest of the excavation for a distance equal to the depth of the excavation;
6. All cuts are protected from erosion.
7. Temporary sub-vertical excavations in Sandstone/Siltstone (Class III - II = medium strength or better bedrock) may be considered appropriate (where encountered), upon inspection and approval by a Geotechnical Consultant.

6.3.4.2 Permanent cuts

Permanent cuts have not been fully identified at this stage, due to the unknown locality and depth of proposed cuts. However, it is considered where the training facility is proposed, deep cuts are envisaged as part of permanent works, where the following measures would potentially be required.

Table 6-2 Permanent Options

Geotechnical Profile	Permanent Options	Additional Comments
Fill	i) Regrade batter – potentially strip and replace ii) Soil nail and shotcrete	Due to variability of material in fill stratum, the existing fill where cuts are required, the fill recommended to be removed and replaced with controlled fill.
Residual Soils	iii) Regrade batter slope iv) Soil nail and shotcrete	Not much residual soil encountered across subject site
Class II to V Siltstone / Laminite	v) Regrade batter vi) Scaling, block removal and reprofiling vii) Rock / spot bolting viii) Rock fall netting ix) Catch fence and ditches	Requires geotechnical input / site observations during top down excavation works to determine extend of stabilization options required

6.3.5 Excavation Support / Shoring

Where deep excavations are to be proposed, earth pressures for shoring support are provided in Table 6-4 material strength parameters. The options for the lateral support that may be considered are tabulated below:

Table 6-3 Recommendation for Shoring Options

Wall Type	Advantages	Disadvantages	Additional Comments
Open Cut excavation	Simple / Cheap Option	Dependent on batter slope space	i) Consideration of groundwater table required. ii) Base and slope instability and dewatering to be assessed.
Sheet pile wall	i) Provides an economic embedded wall ii) No arising's to be removed iii) Suitable as a water retaining system	iv) Potential declutching in coarse grained soil v) Difficult to impose installation where shallow rock exists	vi) Use of tie back anchors (soil strength and space considerations). Cantilever sheet piles to be evaluated. Groundwater table and tanking to be considered.
Secant Piles	i) A permanent water retaining wall ii) Installed using standard piling plant with high torque rigs	Depth is limited by the vertical tolerance, which may determine the depth of secanting	iii) Use of tie back anchors (soil strength and space iv) considerations). Cantilever option to be evaluated. v) Groundwater table and tanking to be considered.
Contiguous Piles	The cheapest form of concrete piled wall	i) Not a water retaining solution ii) Not a permanent solution in any soil due to gaps between piles unless structural face is applied.	The presence of a shallow groundwater table makes this option unlikely.

Considering the above options, pros and cons, the following recommendations are given.

i) Where excavation is not along another property, use open excavation technique.
ii) Where excavation is along another property the following two options should be considered.
   - Use a tied back sheet pile wall.
   - Use an internally braced sheet pile wall where structures sensitive to settlement / horizontal movement are located within 15m from the excavation. Elsewhere, use cantilevered sheet pile walls with provision for remedial works on the adjacent property.
   - Alternative to the above, install secant piles and use them as part of the permanent basement wall.

6.3.6 Groundwater Conditions

Due to the presence of shallow groundwater level, significant groundwater inflow is likely and is likely to vary with rainfall events as well. Some seepage into excavations is likely to occur through fissures in the residual soil, at the soil / rock interface and from joints and bedding planes in the rock. The permeability of the siltstone/sandstone rock mass is considered to be generally relatively low, although localised inflows could be high through discrete rock defects.

Further detailed investigations and groundwater modelling will be required to predict seepage rates and drawdown in the short and long term, if any basement levels are proposed.

6.3.7 Vibrations

The excavation will have to be carried out in close proximity to other hospital buildings, hence use of impact hammers may result in vibrations that could affect adjacent structures. A rock saw could be used to reduce the lateral transfer of vibrations.

For general guideline purposes, induced vibrations in structures adjacent to the excavation should not exceed a Peak Particle Velocity (PPV) of 5mm/sec for structures in good condition, or 2mm/sec for structures in poor condition or heritage structures. If vibrations in adjacent structures exceed these PPV's or if vibrations appear excessive, this office should be contacted immediately for further advice.

6.4 Aggressiveness Classification

In accordance with AS3600 (2018), exposure classification for concrete 'A2' for the subsurface materials across the investigated areas. Future concrete structures should be designed in accordance with the concrete cover specifications in AS 3600 (2018) for an exposure classification of 'A2'.

6.5 Site Classification

It has been assessed that there is more than 400mm depth of fill across the majority of the subject site, which in the absence of any construction records should be considered as '*uncontrolled*' in accordance with AS2870-2011 "*Design of Footings and Slabs for Residential Construction.* Therefore, the site is classified as Class "P".

However, if the site is prepared in accordance with Section 6.3 of this report, the site can be reclassified based on the shrink swell index (I_{ss}) results. The shrink swell test on natural clay collected from BH307 resulted in 2.2% I_{ss} and three shrink swell tests carried out by Douglas Partner gave I_{ss} in the range of 1.7 – 2.9%. With consideration of these shrink swell indices and the soil profile, the site can be reclassified as moderately reactive clay site (Class 'M1'), which may experience moderate ground movement from moisture changes with a characteristic surface movement of 20 – 40mm.

6.6 Seismic Classification

Based on the subsurface conditions encountered across the site, the site sub-soil Class C_e (shallow soil) can be assigned in accordance with AS1170 - 2007 *"Structural Design Actions, Part 4: Earthquake Actions in Australia"*. A hazard factor (Z) of 0.08 can be applied for sites in Sydney.

6.7 Geotechnical Parameters

Based on the borehole logs and the results of laboratory tests, geotechnical design parameters are inferred and presented to assist with geotechnical design.

6.7.1 Soil Classification

No geotechnical parameters have been assigned to manmade fill layers due to potential variability. Relative density/consistency of natural granular/cohesive layers, if any, shall be assessed based on SPT N values. All manmade (i.e. fill) layers are recommended to be considered loose (for granular soils), as presented below;

Table 6-4 Material Strength Parameters

Material	γ (kN/m^3)	C_u (kPa)	c' (kPa)	φ' (°)	E' (MPa)	ν'	K_a	K_p
Fill	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CLAY (Firm)	18	25	0	24	4	0.35	0.42	2.37
CLAY (Stiff)	19	50	2	26	8	0.35	0.39	2.56
CLAY (Very Stiff)	20	100	5	28	15	0.35	0.36	2.77

Material	γ (kN/m^3)	C_u (kPa)	c' (kPa)	φ' (°)	E' (MPa)	ν'	K_a	K_p
CLAY (Hard)	21	200	10	28	30	0.3	0.36	2.77
Siltstone / Laminite Class V	22	-	10	29	100	0.3	0.34	2.88
Siltstone / Laminite Class IV	23	-	25	30	300	0.3	0.33	3.00
Siltstone / Laminite Class III	23	-	100	32	600	0.2	-	-
Siltstone / Laminite Class II	24	-	300	34	1200	0.2	-	-

Notes:
γ: Unit Weight
c_u: Undrained Shear Strength
c': Drained Shear Strength
K_a: Active Earth Pressure
φ': Internal Friction Angle
E': Elastic Modulus
ν': Poisson's ratio
K_p: Passive Earth Pressure
N/A = No geotechnical parameters have been assigned to topsoil layers due to potential variability.

6.7.2 Rock Classification

The classification of sandstone and shale rock encountered on site is summarised in Table 6-5 which are extracted from current Pells et al (2019) publication "Classification of Sandstone and Shales in the Sydney Region: A Forty Year Review".

Table 6-5 Rock Mass Classification System – Shale – Pells et al (2019)

Rock Mass Classification	Unconfined Compressive Strength q_u (MPa)	Defect Spacing	Allowable Seams
I	>16	>600	<2%
II	>7	>200	<4%
III	>2	>60	<8%
IV	>1	>20	<25%
V	>1	N/A	N/A

Considering the classification system, and UCS and point load testing, the rock classification for each borehole is summarised in the Table 6-6 below.

Table 6-6 Classification of Rock at Borehole Locations

BH ID	Depth from BSL (m)	RL Depth (m AHD)	Thickness (m)	Rock Classification
BH301	4.50 – 7.90	18.496-15.096	3.4	Siltstone Class V
BH302	4.10 – 7.70	15.596-11.996	3.6	Siltstone Class V
	7.70 – 10.40	11.996-9.296	2.7	Laminite Class III
	10.40 – 14.36	9.296-5.336	3.96	Laminite Class II
BH303	4.70 – 10.00	22.398-17.098	5.3	Siltstone Class V
	10.00 – 11.50	17.098-15.598	1.5	Siltstone Class III
	11.50 – 14.00	15.598-13.098	2.5	Siltstone / Laminite Class II
BH304	5.20 – 12.26	16.673-9.613	7.06	Siltstone Class V
	12.26 – 15.21	9.673-6.663	3.01	Siltstone Class III
BH305B	7.00 – 8.00	15.568-14.568	1.0	Siltstone Class V
BH306	6.40 – 9.20	16.765-13.965	2.8	Siltstone Class V
	9.20 – 11.00	13.965-12.165	1.8	Siltstone / Laminite Class IV
	11.00 – 14.97	12.165-8.195	3.97	Laminite Class II
BH307	5.30 – 5.50	24.518-24.318	0.2	Siltstone Class V

Note:
The above classification considers rock substance strength, defect spacing and allowable seams as required by Pells et al (2019). Thereby, a portion of rock mass not meeting an upper class is placed at the next lower class where all three factors are satisfied. A strata of rock is subjected to all three factors in general and combining thin layers of different class into a thick stratum using engineering judgement. The Designer shall review the borehole logs and core photographs to assess the potential impacts of thin layers combined in thicker layers. This is particularly true for end bearing piles which shall be checked not to be adversely impacted by weak/ highly fractured bands of rock below the designed pile toe level.

6.8 Foundation Options

Both shallow and deep options of foundations could be adopted for the proposed development. Parameters for both shallow and deep footing options are provided below;

6.8.1 Shallow / Pad Footings

Due to the unknown loads and footing systems, no specified allowable bearing capacities can be determined at this time. Once specific loadings have been ascertained, Cardno can assist to optimise the footing size and depth to suit the loading on the founding material. Bearing capacity of footings in soil needs to be subjected to geotechnical checking considering footing size, depth, slope (ground surface and/or footing base) and loadings (i.e. bearing capacity is not a soil property but is dependent of footing size, depth, slope and loadings). A footing subjected to pull out forces should be further geotechnical assessment in addition to bearing capacity, overturning and sliding. Conventional shallow footings designed in accordance with engineering principles and nominally embedded 0.5m into the design founding material, may be proportioned on the following ultimate end-bearing pressures, summarised in Table 7-7 below:

Table 6-7 Shallow / Pad Footing Design Parameters

Founding Material	Area (m)	Ultimate Bearing Capacity (kPa)
CLAY - Stiff	1 x1	300
CLAY - Very Stiff	1 x1	500
CLAY - Hard	1 x1	750
Siltstone / Laminite Class V	1 x1	850

Note:
1. Ultimate bearing capacity tabulated above assuming eccentricity of 1/6 x footing width.
2. Horizontal ground is assumed
3. Consideration of Section 6.3 should be considered, prior to selection of founding level.
4. The settlement for shallow footings depends upon the loading conditions, footing size and foundation material, but it should be less than 1% of the footing width if proportioned on the basis of above parameters.
5. A minimum geotechnical strength reduction factor Øg of 0.4 can be applied for the allowable design values.

6.8.2 Deep Foundations

The proposed structures are recommended to be founded on piles that transfer the column loads to more suitable founding strata at depth below the sites. The type of pile will depend on the specific ground and groundwater conditions and relative cost. For the purposes of pile design, the parameters shown in Table 6-8 may be used. However, if bored piles are adopted, the base of the piles must be inspected during construction to ensure that material of adequate capacity supports each pile.

Table 6-8 Pile Design Parameters (Based on Pells 2019)

Class	Serviceability End bearing MPa	Ultimate Shaft adhesion[1] kPa	Typical Efield MPa
Siltstone / Laminite Class II	5	600	1200
Siltstone / Laminite Class III	3.5	350	600
Siltstone / Laminite Class IV	1	150	300
Siltstone / Laminite Class V	0.7	50	100

Note:
1. Clean Sockets for roughness category R2 or better is required.
2. Horizontal ground is assumed
3. The settlement for shallow footings depends upon the loading conditions, footing size and foundation material, but it should be less than 1% of the footing width if proportioned on the basis of above parameters

Further Discussions for Pile Footings

i) Where the design is dependent upon end bearing resistance, piles must extend at least 0.5m into the founding stratum to develop full design end bearing.
ii) The base of the piles must be inspected during construction to ensure that material of adequate capacity supports each pile.
iii) In accordance with the requirements of AS2159-2009, a geotechnical reduction factor is to be applied to the ultimate geotechnical strength to obtain the design geotechnical strength. We have determined that an average risk rating ARR=3.07 (corresponding to a moderate overall risk category) and a geotechnical reduction factor $\phi g = 0.52$ can be adopted for this project. This is based on the following assumptions:
   - Detailed level of construction control is required with professional geotechnical supervision, construction processes that are well established and relatively straightforward;
   - No performance monitoring of the supported structure during and after construction is proposed;
   - Table 6-9 below gives an option table for the proposed deep foundations that can be adopted across the subject site, discussion and comments being noted;

Table 6-9 Deep Foundation Options

Wall Type	Advantages	Disadvantages
Bored Piles	i) Quiet / No Vibration ii) Greater lengths can be installed	iii) Requires the use of liners and possible slurry. iv) Requires additional plant (cranes, etc)
CFA Piles	i) Low Noise / vibration ii) No need for casing due to sloughing/seepage iii) Faster productivity than bored piles	iv) A higher waste of concrete than traditional bored piles v) Requires additional plant (Cranes, etc)

6.9 Ground Anchors

Where required, the use of ground anchor is suggested to provide lateral restraint on the boundary soldier wall. Such ground anchors should be declined below the horizontal to allow anchorage into the stronger materials at depth. It should be noted that installation of ground anchors beyond the site boundaries will require permission to be obtained from relevant authorities and adjacent property owners. The design of temporary ground anchors for the support of pile wall systems may be carried out using the following parameters provide in Table 6-10 below:

Table 6-10 Allowable Bond Stresses for Anchor Design

Material	Allowable Bond Stress[1] (kPa)
Siltstone / Laminite Class III	300
Siltstone / Laminite Class IV	150
Siltstone / Laminite Class V	50

Note:
1. The anchors should have a minimum bond length of 3m. The anchor free length is determined to have the bond length behind the plane of failure starting from the bulk excavation level. The horizontal inclination of the plane of failure is considered to be 45 degrees.
2. All anchors should be proof tested to 1.3 times the working load under the direction of an experienced engineer.

6.10 Pavement Design Evaluation

As presented in Table 6-4, laboratory soaked CBR tests indicates a subgrade swell of between 1.5% to 2.5% considered as moderately expansive soil. Test result for the specimens indicate CBR values of 3.5 % and 5.0%. A review of SPT testing indicates that the residual subgrade material, generally consisted of stiff to hard clay.

Based on the previous results reported by DP on clayey fill and natural clay, CBR value ranged from 2 – 7%.

Taken into consideration of existing and previous CBR test results, a design CBR of 2% can be adopted for pavement design of Lambie Dew Drive.

7 CONSTRUCTION INSPECTION

It is recommended that placement of all structural fill and footing excavations be inspected, tested and certified where necessary, by a suitably qualified geotechnical engineer to ensure recommendations made in this report have been addressed. Should subsurface conditions other than those described in this report be encountered, Cardno should be consulted immediately and appropriate modifications developed and implemented if necessary.

8 CONCLUSION AND RECOMMENDATIONS

The following provides a summary of the conclusions and recommendations with regard to the geotechnical investigation that was undertaken for RPA Eastern Campus. The following conclusions can be drawn from Cardno's geotechnical investigation works undertaken, however the proceeding sections of this report should be read for a full description of the conclusions:

i) Geotechnical investigatory works were undertaken for the proposed redevelopment of RPA Hospital Eastern Campus;
ii) Investigatory works comprised of drilling eight (8) boreholes. Four (4) BHs were drilled up to a depth of 8m below surface level (BSL) and four (4) BHs were drilled up to 15.21m BSL;
iii) Standard Penetration Tests (SPT) were undertaken within the soil profile at 1.50 m intervals;
iv) Installation of one GW monitoring well at BH303 location;
v) The subsurface condition encountered across the site were relatively uniform across the site. The ground profile generally comprised of a pavement/fill overlying residual soil and siltstone/laminate bedrock.
vi) Investigatory laboratory test results can be found in section 6 of this report along with laboratory test certificated in Appendix C.
vii) Recommendations on earthworks and foundation options are discussed in Section 7.

9 REFERENCES

[1] Design Guidance Note No. 030, Rev C, Issue date: 30 May 2018, by NSW Health Infrastructure
[2] Pells et al (2019) “Classification of Sandstone and Shales in the Sydney Region: A Forty Year Review”. Issue date: August 2020, by Douglas Partners.
[3] Report on Geotechnical Investigation “Royal Prince Alfred Hospital Redevelopment”. Issue date: 2 June 2019, by Pells et al.
[4] AS 1170.4 “Structural Design Actions, Part 4: Earthquake Actions in Australia”, 2007, by Australian Standard
[5] AS 1726-2017 “Geotechnical Site Investigation”, 2017, by Australian Standard
[6] AS 2159-2009 “Piling – Design and Installation”, 2009, by Australian Standard
[7] AS 2870-2011 “Residential Slabs and Footing”, 2011, by Australian Standard
[8] AS 3798-2007 “Guidelines on Earthworks for Commercial and Residential Developments”, 2007, by Australian Standard

10 CLOSURE

We appreciate the opportunity to work collaboratively with you on this project. Our team looks forward to
bringing our high level of expertise to deliver successful outcomes in your future projects.
Your attention is drawn to the appended document titled “*Important Information about this Geotechnical Report”.* This document is intended to clarify to the reader what the realistic expectations of this report should be, and what is the correct use of the document. Misinterpretation of geotechnical information presents significant risk to projects: The document includes a discussion on general limitations of geotechnical services, which by nature, are based extensively on opinion and judgement.

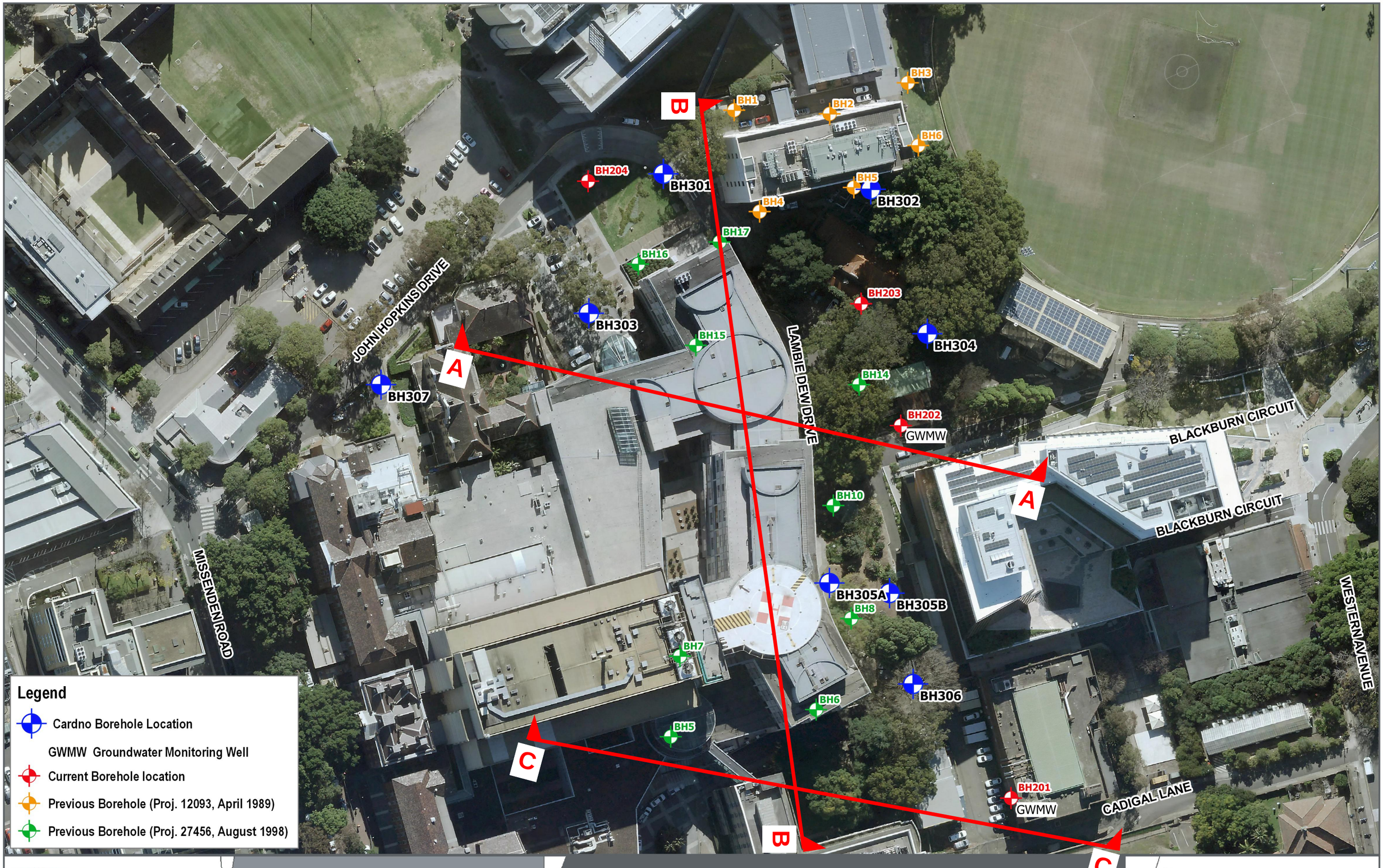
The statements included in this document are not intended to be exculpatory clauses or to reduce the general responsibility accepted by Cardno, but rather to identify where Cardno and our Client’s responsibilities lie. The statements ensure that all parties that may rely on the report are aware of their respective responsibilities.

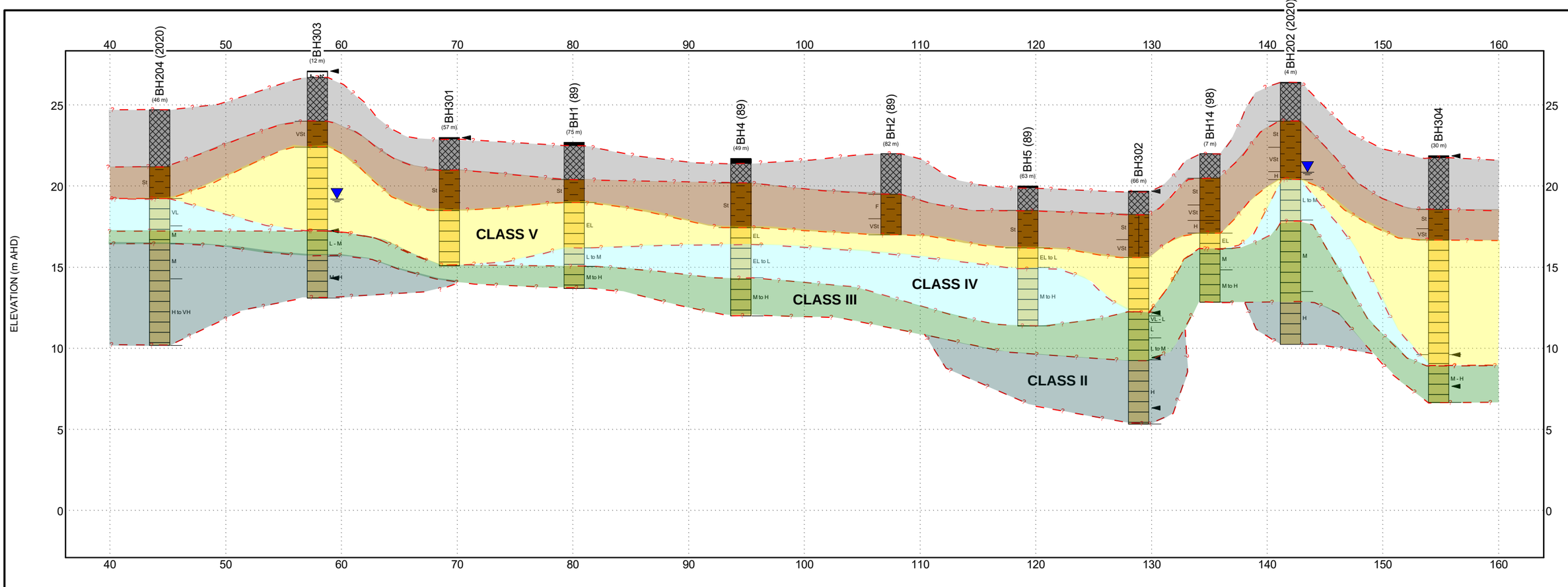
For further enquiries, please do not hesitate to contact Cardno on the information supplied.

APPENDIX A

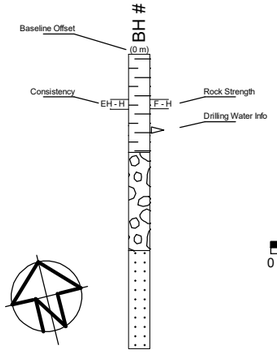
GEOTECHNICAL INVESTIGATION PLAN

Cardno
now
Stantec


BH1
BH2
BH3
BH4
BH5
BH6
BH204
BH301
BH302
BH17
BH16
BH303
BH203
BH304
BH15
BH14
BH307
BH202
GWMW
BH10
BH305A
BH305B
BH8
BH7
BH6
BH5
BH306
BH201
GWMW
A
B
C
JOHN HOPKINS DRIVE
LAMBIE DEW DRIVE
BLACKBURN CIRCUIT
MISSENDEN ROAD
WESTERN AVENUE
CADIGAL LANE
Legend
Cardno Borehole Location
GWMW Groundwater Monitoring Well
Current Borehole location
Previous Borehole (Proj. 12093, April 1989)
Previous Borehole (Proj. 27456, August 1998)
NSW GOVERNMENT Health Infrastructure
1:1000 Scale at A3
0 20 40 60 80 m
Royal Prince Alfred Hospital - East Campus
Geotechnical Investigation
Cardno
Map Produced by Cardno NSW/ACT Pty Ltd (SYD)
Date: 2022-1-10| Project: 80022026
Coordinate System: MGA Zone 56
Aerial imagery supplied by nearmap (2022)



POST LEGEND



MATERIAL GRAPHIC

- ASPHALTIC CONCRETE
- CONCRETE
- SILTSTONE / LAMINITE
- FILL
- HIGH PLASTICITY CLAY
- LOW PLASTICITY CLAY
- CI-CH - Medium to High Plasticity CLAY

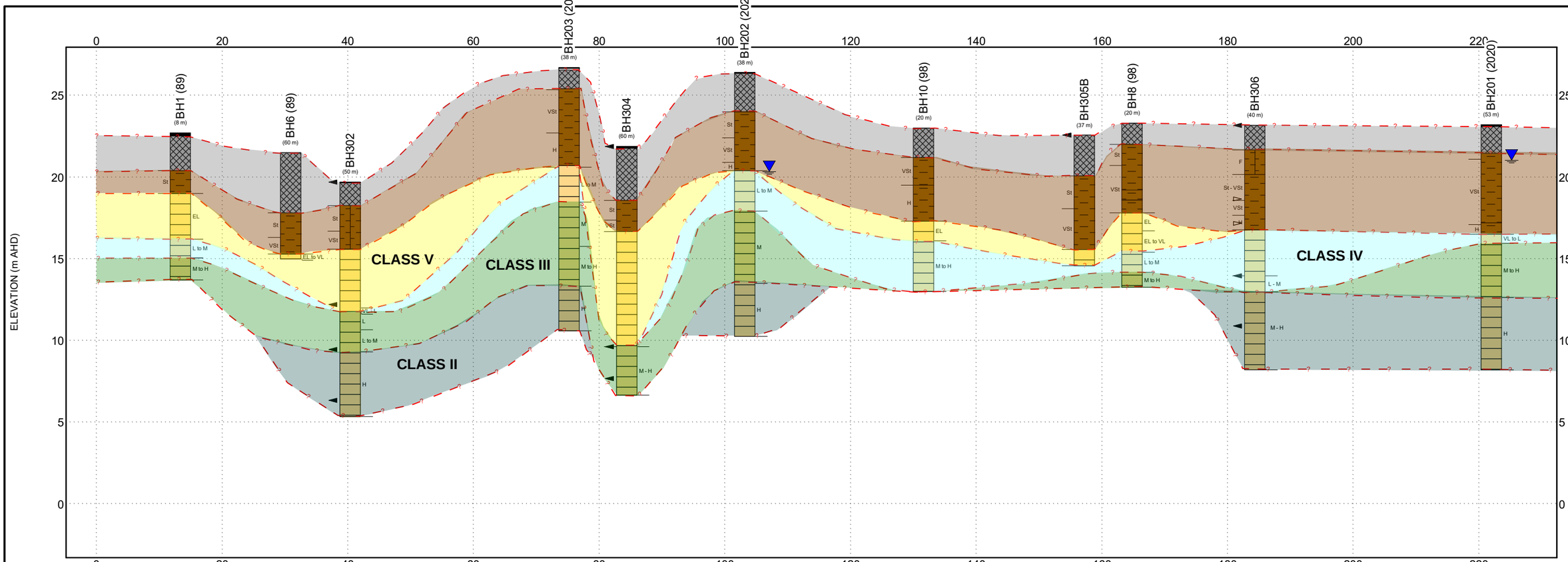
H 1:350
0 4 8 12 16 20m
V 1:250
0 2 4 6 8 10m
Coord.System: MGA94 Zone 56 Height Datum: AHD

Cardno

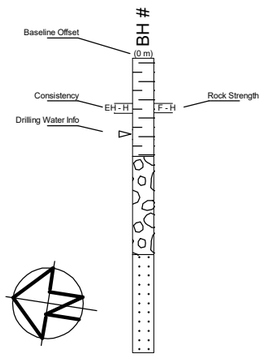
NSW GOVERNMENT Health Infrastructure

CLIENT NSW Health Infrastructure		PROJECT Royal Prince Alfred Hospital	
DRAWN AT	DATE 11/02/2022	TITLE Cross-Section A-A	
CHECKED BD	DATE 11/02/2022		
SCALE H 1:350 V 1:250	A3	PROJECT No 80022026	FIGURE No 1

GAP 8_03 LIB_26 SEPT 2012_ICD - EDITED GLB Fence FENCE A3L 80022026 DRAFT LOGS.GPJ <<DrawingFile>> 11/02/2022 08:55 10.0.000



POST LEGEND



MATERIAL GRAPHIC

- ASPHALTIC CONCRETE
- CONCRETE
- CI-CH - Medium to High Plasticity CLAY
- FILL
- MEDIUM PLASTICITY CLAY
- SILTSTONE / LAMINITE
- LOW PLASTICITY CLAY
- HIGH PLASTICITY CLAY

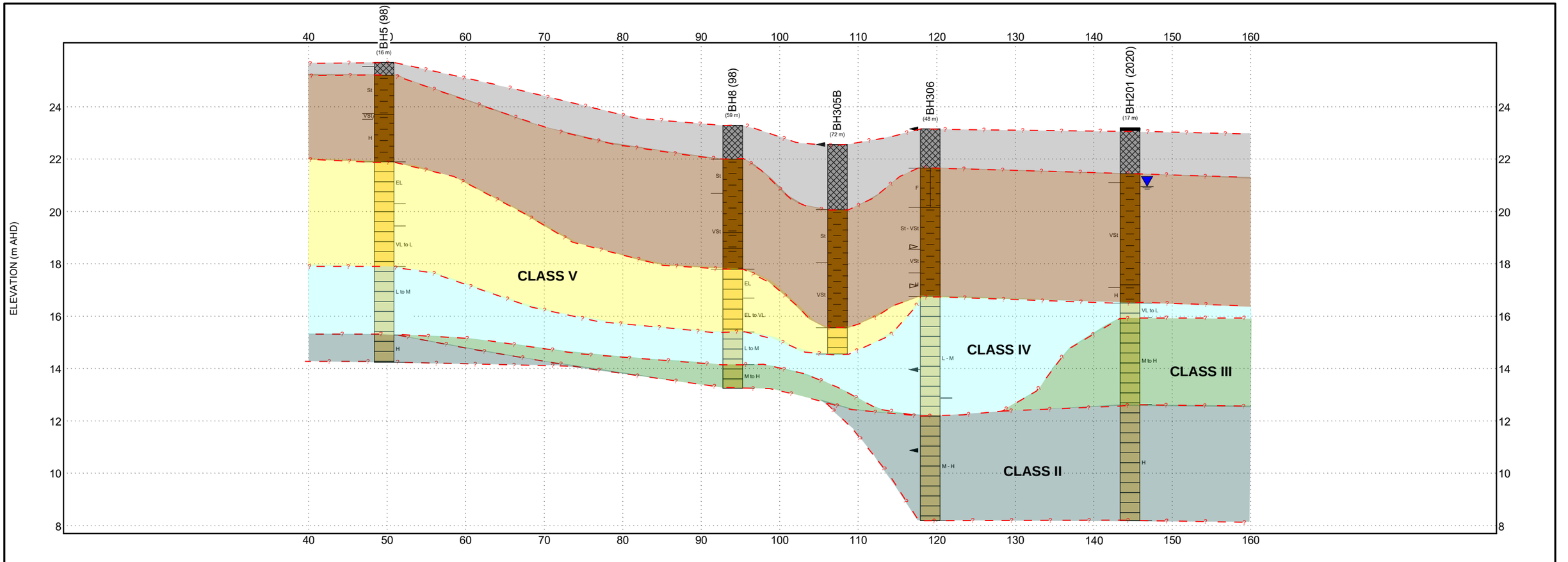
H 1:650
0 5 10 15 20 25m
V 1:250
0 2 4 6 8 10m
Coord.System: MGA94 Zone 56 Height Datum: AHD

Cardno

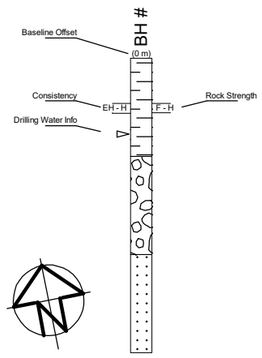
NSW GOVERNMENT Health Infrastructure

CLIENT NSW Health Infrastructure		PROJECT Royal Prince Alfred Hospital	
DRAWN AT	DATE 11/02/2022	TITLE Cross-Section B-B	
CHECKED BD	DATE 11/02/2022		
SCALE H 1:650 V 1:250	A3	PROJECT No 80022026	FIGURE No 2

GAP 8.03.LIB 26 SEPT 2012_ICD - EDITED GLB Fence FENCE A3L 80022026 DRAFT LOGS.GPJ <<DrawingFile>> 11/02/2022 09:26 10.0.000



POST LEGEND



MATERIAL GRAPHIC

- FILL
- LOW PLASTICITY CLAY
- HIGH PLASTICITY CLAY
- CI-CH - Medium to High Plasticity CLAY
- MEDIUM PLASTICITY CLAY
- ASPHALTIC CONCRETE
- SILTSTONE / LAMINITE

H 1:500
0 5 10 15 20 25m
V 1:150
0 1 2 3 4 5m
Coord.System: MGA94 Zone 56 Height Datum: AHD

Cardno

NSW GOVERNMENT Health Infrastructure

CLIENT NSW Health Infrastructure		PROJECT Royal Prince Alfred Hospital	
DRAWN AT	DATE 11/02/2022	TITLE Cross-Section C-C	
CHECKED BD	DATE 11/02/2022		
SCALE H 1:500 V 1:150	A3	PROJECT No 80022026	FIGURE No 3

GAP 8_03.LIB 26 SEPT 2012_ICD - EDITED GLB Fence FENCE A3L 80022026 DRAFT LOGS.GPJ <<DrawingFile>> 11/02/2022 09:39 10.0.000

Royal Prince Alfred Hospital – Eastern Campus

APPENDIX B

ENGINEERING LOGS

Cardno

now

Stantec

Explanatory Notes

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. Material descriptions are deduced from field observation or engineering examination, and may be appended or confirmed by in situ or laboratory testing. The information is dependent on the scope of investigation, the extent of sampling and testing, and the inherent variability of the conditions encountered.

Subsurface investigation may be conducted by one or a combination of the following methods.

Method	
Test Pitting: excavation/trench	
BH	Backhoe bucket
EX	Excavator bucket
R	Ripper
H	Hydraulic Hammer
X	Existing excavation
N	Natural exposure
Manual drilling: hand operated tools	
HA	Hand Auger
Continuous sample drilling	
PT	Push tube
PS	Percussion sampling
SON	Sonic drilling
Hammer drilling	
AH	Air hammer
AT	Air track
Spiral flight auger drilling	
AS	Auger screwing
AD/V	Continuous flight auger: V-bit
AD/T	Continuous spiral flight auger: TC-Bit
HFA	Continuous hollow flight auger
Rotary non-core drilling	
WB	Washbore drilling
RR	Rock roller
Rotary core drilling	
PQ	85mm core (wire line core barrel)
HQ	63.5mm core (wire line core barrel)
NMLC	51.94mm core (conventional core barrel)
NQ	47.6mm core (wire line core barrel)
DT	Diatube (concrete coring)

Sampling is conducted to facilitate further assessment of selected materials encountered.

Sampling method	
Soil sampling	
B	Bulk disturbed sample
D	Disturbed sample
C	Core sample
ES	Environmental soil sample
SPT	Standard Penetration Test sample
U	Thin wall tube ‘undisturbed’ sample
Water sampling	
WS	Environmental water sample

Field testing may be conducted as a means of assessment of the in situ conditions of materials.

Field testing	
SPT	Standard Penetration Test
HP/PP	Hand/Pocket Penetrometer
Dynamic Penetrometers (blows per noted increment)	
DCP	Dynamic Cone Penetrometer
PSP	Perth Sand Penetrometer
MC	Moisture Content
VS	Vane Shear
PBT	Plate Bearing Test
IMP	Borehole Impression Test
PID	Photo Ionization Detector

If encountered, refusal (R), virtual refusal (VR) or hammer bouncing (HB) of penetrometers may be noted.

The quality of the rock can be assessed by the degree of natural defects/fractures and the following.

Rock quality description	
TCR	Total Core Recovery (%) (length of core recovered divided by the length of core run)
RQD	Rock Quality Designation (%) (sum of axial lengths of core greater than 100mm long divided by the length of core run)

Notes on groundwater conditions encountered may include.

Groundwater	
Not Encountered	Excavation is dry in the short term
Not Observed	Water level observation not possible
Seepage	Water seeping into hole
Inflow	Water flowing/flooding into hole

Perched groundwater may result in a misleading indication of the depth to the true water table. Groundwater levels are also likely to fluctuate with variations in climatic and site conditions.

Notes on the stability of excavations may include.

Excavation conditions	
Stable	No obvious/gross short term instability noted
Spalling	Material falling into excavation (minor/major)
Unstable	Collapse of the majority, or one or more face of the excavation

Explanatory Notes: General Soil Description

The methods of description and classification of soils used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. In practice, a material is described as a soil if it can be remoulded by hand in its field condition or in water. The dominant component is shown in upper case, with secondary components in lower case. In general descriptions cover: soil type, plasticity or particle size/shape, colour, strength or density, moisture and inclusions.

In general, soil types are classified according to the dominant particle on the basis of the following particle sizes.

Soil Classification		Particle Size (mm)
CLAY		< 0.002
SILT		0.002 0.075
SAND	fine	0.075 to 0.21
	medium	0.21 to 0.6
	coarse	0.6 to 2.36
GRAVEL	fine	2.36 to 6.7
	medium	6.7 to 19
	coarse	19 to 63
COBBLES		63 to 200
BOULDERS		> 200

Soil types may be qualified by the presence of minor components on the basis of field examination methods and/or the soil grading.

Terminology	In coarse grained soils		In fine soils
	% fines	% coarse	% coarse
Trace	≤5	≤15	≤15
With	>5, ≤12	>15, ≤30	>15, ≤30

The strength of cohesive soils is classified by engineering assessment or field/lab testing as follows.

Strength	Symbol	Undrained shear strength
Very Soft	VS	≤12kPa
Soft	S	12kPa to ≤25kPa
Firm	F	25kPa to ≤50kPa
Stiff	St	50kPa to ≤100kPa
Very Stiff	VSt	100kPa to ≤200kPa
Hard	H	>200kPa

Cohesionless soils are classified on the basis of relative density as follows.

Relative Density	Symbol	Density Index
Very Loose	VL	<15%
Loose	L	15% to ≤35%
Medium Dense	MD	35% to ≤65%
Dense	D	65% to ≤85%
Very Dense	VD	>85%

The plasticity of cohesive soils is defined by the Liquid Limit (LL) as follows.

Plasticity	Silt LL	Clay LL
Low plasticity	≤ 35%	≤ 35%
Medium plasticity	N/A	> 35% ≤ 50%
High plasticity	> 50%	> 50%

The moisture condition of soil (*w*) is described by appearance and feel and may be described in relation to the Plastic Limit (PL), Liquid Limit (LL) or Optimum Moisture Content (OMC).

Moisture condition and description	
Dry	Cohesive soils: hard, friable, dry of plastic limit. Granular soils: cohesionless and free-running
Moist	Cool feel and darkened colour: Cohesive soils can be moulded. Granular soils tend to cohere
Wet	Cool feel and darkened colour: Cohesive soils usually weakened and free water forms when handling. Granular soils tend to cohere

The structure of the soil may be described as follows.

Zoning	Description
Layer	Continuous across exposure or sample
Lens	Discontinuous layer (lenticular shape)
Pocket	Irregular inclusion of different material

The structure of soil layers may include: defects such as softened zones, fissures, cracks, joints and root-holes; and coarse grained soils may be described as strongly or weakly cemented.

The soil origin may also be noted if possible to deduce.

Soil origin and description	
Fill	Anthropogenic deposits or disturbed material
Topsoil	Zone of soil affected by roots and root fibres
Peat	Significantly organic soils
Colluvial	Transported down slopes by gravity/water
Aeolian	Transported and deposited by wind
Alluvial	Deposited by rivers
Estuarine	Deposited in coastal estuaries
Lacustrine	Deposited in freshwater lakes
Marine	Deposits in marine environments
Residual soil	Soil formed by in situ weathering of rock, with no structure/fabric of parent rock evident
Extremely weathered material	Formed by in situ weathering of geological formations, with the structure/fabric of parent rock intact but with soil strength properties

The origin of the soil generally cannot be deduced solely on the appearance of the material and the inference may be supplemented by further geological evidence or other field observation. Where there is doubt, the terms ‘possibly’ or ‘probably’ may be used

Explanatory Notes: General Rock Description

The methods of description and classification of rocks used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. In practice, if a material cannot be remoulded by hand in its field condition or in water, it is described as a rock. In general, descriptions cover: rock type, grain size, structure, colour, degree of weathering, strength, minor components or inclusions, and where applicable, the defect types, shape, roughness and coating/infill.

Rock types are generally described according to the predominant grain or crystal size, and in groups for each rock type as follows.

Rock type	Groups
Sedimentary	Deposited, carbonate (porous or non), volcanic ejection
Igneous	Felsic (much quartz, pale), Intermediate, or mafic (little quartz, dark)
Metamorphic	Foliated or non-foliated
Duricrust	Cementing minerology (iron oxides or hydroxides, silica, calcium carbonate, gypsum)

Reference should be made to AS1726 for details of the rock types and methods of classification.

The classification of rock weathering is described based on definitions in AS1726 and summarised as follows.

Term and symbol		Definition
Residual Soil	RS	Soil developed on rock with the mass structure and substance of the parent rock no longer evident
Extremely weathered	XW	Weathered to such an extent that the rock has 'soil-like' properties. Mass structure and substance still evident
Distinctly weathered	DW	The strength is usually changed and may be highly discoloured. Porosity may be increased by leaching, or decreased due to deposition in pores. May be distinguished into MW (Moderately Weathered) and HW (Highly Weathered).
Slightly weathered	SW	Slightly discoloured; little or no change of strength from fresh rock
Fresh Rock	FR	The rock shows no sign of decomposition or staining

The rock material strength can be defined based on the point load index as follows.

Term and symbol		Point Load Index I_s50 (MPa)
Very Low	VL	0.03 to 0.1
Low	L	0.1 to 0.3
Medium	M	0.3 to 1.0
High	H	1.0 to 3
Very High	VH	3 to 10
Extremely High	EH	> 10

It is important to note that the rock material strength as above is distinct from the rock mass strength which can be significantly weaker due to the effect of defects.

A preliminary assessment of rock strength may be made using the field guide detailed in AS1726, and this is conducted in the absence of point load testing.

The defect spacing measured normal to defects of the same set or bedding, is described as follows.

Definition	Defect Spacing (mm)
Thinly laminated	< 6
Laminated	6 to 20
Very thinly bedded	20 to 60
Thinly bedded	60 to 200
Medium bedded	200 to 600
Thickly bedded	600 to 2000
Very thickly bedded	> 2000

Terms for describing rock and defects are as follows.

Defect Terms			
Joint	JT	Sheared zone	SZ
Bedding Parting	BP	Seam	SM
Foliation	FL	Vein	VN
Cleavage	CL	Drill Lift	DL
Crushed Seam	CS	Handling Break	HB
Fracture Zone	FZ	Drilling Break	DB

The shape and roughness of defects in the rock mass are described using the following terms.

Planarity		Roughness	
Planar	PR	Very Rough	VR
Curved	CU	Rough	RF
Undulose	UN	Smooth	S
Irregular	IR	Slickensided	SL
Stepped	ST	Polished	POL
Discontinuous	DIS		

The coating or infill associated with defects in the rock mass are described as follows.

Infill and Coating		
Clean	CN	
Stained	SN	
Carbonaceous	X	
Minerals	MU	Unidentified mineral
	MS	Secondary mineral
	KT	Chlorite
	CA	Calcite
	Fe	Iron Oxide
	Qz	Quartz
Veneer	VNR	Thin or patchy coating
Coating	CT	Infill up to 1mm

Graphic Symbols Index


CLAY


Silty CLAY


Sandy CLAY


Gravelly CLAY


Silty Gravelly CLAY


Silty Sandy CLAY


Sandy Gravelly CLAY


SILT


Clayey SILT


Sandy SILT


Gravelly SILT


Clayey Sandy SILT


Clayey Gravelly SILT


Sandy Gravelly SILT


SAND


Clayey SAND


Silty SAND


Gravelly SAND


Clayey Silty SAND


Clayey Gravelly SAND


Silty Gravelly SAND


GRAVEL


Clayey GRAVEL


Silty GRAVEL


Sandy GRAVEL


Clayey Silty GRAVEL


Clayey Sandy GRAVEL


Silty Sandy GRAVEL


COBBLES & BOULDERS


PEAT, highly organic soil


TOPSOIL


FILL


FILL: Asphalt or Bituminous Seal


FILL: Ballast


FILL: Concrete


FILL: Roadbase


Sedimentary rock: fine, mostly clay (CLAYSTONE)


Sedimentary rock: fine, mostly silt (SILTSTONE)


Sedimentary rock: fine, silt and clay (MUDSTONE, SHALE, LAMINITE)


Sedimentary rock: medium (SANDSTONE, GREYWACKE)


Sedimentary rock: fine to coarse, angular (BRECCIA)


Sedimentary rock: coarse, rounded (CONGLOMERATE)


Sedimentary rock: Organic (COAL)


Sedimentary rock: Carbonate (LIMESTONE, DOLOMITE)


Sedimentary rock: Volcanic (TUFF, VOLCANIC BRECCIA, AGGLOMERATE)


Igneous rock: Felsic, fine (RHYOLITE)


Igneous rock: Felsic, coarse (GRANITE)


Igneous rock: Mafic, fine to medium (BASALT, DOLERITE)


Igneous rock: Mafic, coarse (GABBRO)


Metamorphic rock: Foliated, fine to medium (SLATE, PHYLLITE, SHIST)


Metamorphic rock: Foliated, coarse (GNEISS)


Metamorphic rock: Non-foliated (QUARTZITE, HORNFELS, MARBLE)

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH301

PROJECT : Royal Prince Alfred Hospital
LOCATION : Lambie Dew Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 1 OF 1

POSITION : E: 332016.07, N: 6248761.91 SURFACE ELEVATION : 22.996 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : D-4T MOUNTING : Ute CONTRACTOR : Stratacore DRILLER : Daniel

DATE STARTED : 3/12/21 DATE COMPLETED : 3/12/21 DATE LOGGED : 3/12/21 LOGGED BY : RKC CHECKED BY : BD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)		GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
CC	N/A	H			22.0 / 0.0	0.10m			CONCRETE			FOOTPATH SURFACE
									Fill: Gravelly SAND fine to coarse grained, dark grey, dark orange, fine to coarse grained, sandstone, ironstone gravel, trace low plasticity clay			FILL
						0.50m						
									Fill: Silty CLAY low to medium plasticity, brown, orange-brown, trace fine to coarse grained, sub-rounded to sub-angular, ironstone gravel			
		E			1.0							
	1.50m			1.50m SPT 3, 3, 4 N=7 1.95m								
					21.0 / 2.0	2.00m						
									Silty CLAY high plasticity, orange-brown mottled grey, trace fine to coarse grained, sub-rounded to sub-angular, ironstone gravel			RESIDUAL SOIL
	2.50m B									M (=PL)		
	3.00m			3.00m SPT 8, 7, 6 N=13	20.0 / 3.0							
		F						CH			St	
	3.50m			3.45m								
AD/T CASING			Not Encountered		19.0 / 4.0							
	4.50m			4.50m SPT 15, 20/150mm N=R 4.80m		4.50m			Siltstone brown, very low strength, extremely weathered, with sandstone band and high plasiticty clay band			BEDROCK
					18.0 / 5.0							
					17.0 / 6.0	6.00m			Siltstone dark grey, very low to low strength, highly weathered to moderately weathered			
		H										
					16.0 / 7.0							
						7.90m						
					15.0 / 8.0				BOREHOLE BH301 TERMINATED AT 7.90 m Refusal			

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH302

PROJECT : Royal Prince Alfred Hospital
LOCATION : Lambie Dew Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 1 OF 3

POSITION : E: 332076.30, N: 6248757.40 SURFACE ELEVATION : 19.696 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Comacchio GEO 305 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : Daniel

DATE STARTED : 29/11/21 DATE COMPLETED : 29/11/21 DATE LOGGED : 29/11/21 LOGGED BY : HF CHECKED BY : BD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T CASING	N/A	H			19.0	0.0			0.05m ASPHALT			ROAD SURFACE
									Fill: Silty CLAY medium to high plasticity, dark brown, with fine grained, sub-angular to angular gravel			FILL
									0.35m Fill: Silty CLAY medium to high plasticity, brown, mottled pale grey and red-brown, trace fine grained, sub-angular to angular gravel			
		E				1.0						
	1.50m			1.50m SPT 4, 5, 8 N=13	18.0				1.45m Silty CLAY medium to high plasticity, pale grey, mottled red-brown and yellow-brown, trace fine grained, sub-angular to angular gravel	w ~ PL		RESIDUAL SOIL
				1.95m		2.0					St	
					17.0			CI-CH				
				3.00m SPT 6, 10, 15 N=25		3.0			3.00m with intermittent ironstone band			
				3.45m						w < PL	VSt	
			Not Encountered		16.0	4.0			4.10m Siltstone grey, very low strength, extremely to highly weathered, with occassional iron staining			BEDROCK
		F		4.00m SPT 17/150mm HB N=R 4.15m								
					15.0	5.0						
					14.0	6.0						
					13.0	7.0			7.50m Continued as Cored Drill Hole			
					12.0							
						8.0						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

CORED DRILL HOLE LOG

HOLE NO : BH302

PROJECT : Royal Prince Alfred Hospital
LOCATION : Lambie Dew Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 2 OF 3

POSITION : E: 332076.30, N: 6248757.40 SURFACE ELEVATION : 19.696 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Comacchio GEO 308 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : Daniel

DATE STARTED : 29/11/21 DATE COMPLETED : 29/11/21 DATE LOGGED : 29/11/21 LOGGED BY : HF CHECKED BY : BD

CASING DIAMETER : N/A BARREL (Length) : 3.00 m BIT : NMLC Stepped BIT CONDITION : Good

DRILLING				MATERIAL			ROCK MASS		
PROGRESS: DRILLING & CASING	PROGRESS: WATER RETURN	(CORE LOSS / RUN %) DRIL. DEPTH	SAMPLES & FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral	RQD (%)	DEFECT SPACING (mm)	DEFECTS (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
				0.0 / 19.0				EL -0.03 VL -0.1 L -0.3 M -1 H -3 VH -10 EH		20 40 100 300 1000	
				1.0 / 18.0							
				2.0 / 17.0							
				3.0 / 16.0							
				4.0 / 15.0							
				5.0 / 14.0							
				6.0 / 13.0							
				7.0 / 12.0							
						7.50m START CORING AT 7.50m					
NMLC	100%	0%				7.70m GRAVELLY SAND fine to coarse grained, dark grey, sub-rounded to sub-angular, ironstone, siltstone	EW HW				7.75: BP, 0°, PR, RF, CN 7.76: BP, 0°, PR, RF, CN 7.77: BP, 0°, PR, RF, CN
				8.0							

DRILLING

AD/T	Auger Drilling with TC Bit
AD/V	Auger Drilling with V Bit
AS	Auger Screwing
DB	Washbore with Drag Bit
DT	Diatube
HMLC	HMLC Core Barrel
HQ3	HQ3 Core Barrel
NMLC	NMLC Core Barrel
NQ3	NQ3 Core Barrel
PQ3	PQ3 Core Barrel
R	Rock Roller

WEATHERING

FR	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
DW	Distinctly Weathered
HW	Highly Weathered
XW	Extremely Weathered

STRENGTH

EH	Extremely High
VH	Very High
H	High
M	Medium
L	Low
VL	Very Low
EL	Extremely Low

ROUGHNESS

POL	Polished
RF	Rough
S	Smooth
SL	Slickensided
VR	Very Rough

DEFECT TYPE

BP	Bedding Plane
CL	Cleavage
CS	Crushed Seam
CZ	Crushed Zone
DB	Drilling Break
FC	Fracture
HB	Handling Break
IS	Infilled Seam
JT	Joint
SM	Seam
SS	Shear Seam
SZ	Shear Zone
VN	Vein
VO	Void
FA	Fault

COATING

CN	Clean
CT	Coating (>= 1.0m)
FILLED	Filled
SN	Stained
VR	Veneer (< 1.0mm)

PLANARITY

CU	Curved
DIS	Discontinuous
IR	Irregular
PR	Planar
ST	Stepped
UN	Undulose

INFILL

CA	Calcite
CLAY	Clay
FE	Iron Oxide
FE	Iron Oxide Clay
CLAY	
KT	Chlorite
MS	Secondary Mineral
MU	Unidentified Mineral
QZ	Quartz
X	Carbonaceous

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

CORED DRILL HOLE LOG

HOLE NO : BH302

PROJECT : Royal Prince Alfred Hospital
LOCATION : Lambie Dew Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 3 OF 3

POSITION : E: 332076.30, N: 6248757.40 SURFACE ELEVATION : 19.696 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Comacchio GEO 308 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : Daniel

DATE STARTED : 29/11/21 DATE COMPLETED : 29/11/21 DATE LOGGED : 29/11/21 LOGGED BY : HF CHECKED BY : BD

CASING DIAMETER : N/A BARREL (Length) : 3.00 m BIT : NMLC Stepped BIT CONDITION : Good

DRILLING

PROGRESS: DRILLING & CASING; WATER RETURN; (CORE LOSS RUN %); DRILL. DEPTH

SAMPLES & FIELD TESTS

ELEVATION (RL) / DEPTH (m)

MATERIAL

GRAPHIC LOG

DESCRIPTION
ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)

Weathering

ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral

ROCK MASS

RQD (%)

DEFECT SPACING (mm)

DEFECTS (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other

DRILLING	WATER RETURN	(CORE LOSS RUN %)	DRILL. DEPTH	SAMPLES & FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION	Weathering	ESTIMATED STRENGTH Is(50)	RQD (%)	DEFECT SPACING (mm)	DEFECTS
NMLC	100%	0%	10.25	Is(50) d=0.01 a=0.25 MPa	11.0	8.0		LAMINITE dark grey and grey, Sandstone (80%), dark grey - grey and Siltstone (20%), interlaminated at 0-10°, closely spaced *(continued)*	HW				7.97: HB 8.10: BP, 0-5°, PR, RF, CN 8.12: BP, 0-5°, PR, RF, CN 8.36: BP, 0-5°, PR, RF, CN
				Is(50) d=0.03 a=0.24 MPa	10.0	9.0					81		8.63: DB 8.73: BP, 0-5°, PR, RF, CN 8.88: HB 8.91: BP, 0-5°, PR, RF, Clay CT 9.08: DB 9.27: DB 9.37-9.38: FZ 9.41-9.43: HB 9.50: BP, 0-5°, PR, S, CN 9.62: DB 9.64: DB 9.76: DB 9.80: DB 9.91-9.96: FZ 9.97: HB 10.04: BP, 0-5°, PR, RF, CN 10.09: BP, 0-5°, PR, RF, CN 10.14: BP, 0-5°, PR, RF, CN 10.32: DB 10.34: DB 10.37: DB 10.40: DB 10.42: DB
				Is(50) d=0.06 a=0.67 MPa		10.0		10.40m					
				Is(50) d=0.99 a=2.3 MPa	9.0	11.0		LAMINITE dark grey and grey, Siltstone (80%), dark grey and Sandstone (20%), grey, fine grained, interlaminated at 0-5°	F				11.49: DB
	100%	0%		Is(50) d=1.42 a=1.52 MPa	8.0	12.0					99		11.91: DB 12.04: DB 12.22: DB 12.43: DB 12.82: DB
				Is(50) d=1.52 a=2.49 MPa	7.0	13.0							13.11: BP, 0-5°, PR, S, CN 13.15: BP, 0-5°, PR, S, CN
			13.36	Is(50) d=1.25 a=2.12 MPa									
	100%	0%	14.36		6.0	14.0		14.36m			100		13.66: DB 14.03: DB 14.30: DB
				Is(50) d=1.46 a=2.06 MPa	5.0	15.0		BOREHOLE BH302 TERMINATED AT 14.36 m Target depth					
					4.0	16.0							

DRILLING

AD/T	Auger Drilling with TC Bit
AD/V	Auger Drilling with V Bit
AS	Auger Screwing
DB	Washbore with Drag Bit
DT	Diatube
HMLC	HMLC Core Barrel
HQ3	HQ3 Core Barrel
NMLC	NMLC Core Barrel
NQ3	NQ3 Core Barrel
PQ3	PQ3 Core Barrel
R	Rock Roller

WEATHERING

FR	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
DW	Distinctly Weathered
HW	Highly Weathered
XW	Extremely Weathered

STRENGTH

EH	Extremely High
VH	Very High
H	High
M	Medium
L	Low
VL	Very Low
EL	Extremely Low

ROUGHNESS

POL	Polished
RF	Rough
S	Smooth
SL	Slickensided
VR	Very Rough

DEFECT TYPE

BP	Bedding Plane
CL	Cleavage
CS	Crushed Seam
CZ	Crushed Zone
DB	Drilling Break
FC	Fracture
HB	Handling Break
IS	Infilled Seam
JT	Joint
SM	Seam
SS	Shear Seam
SZ	Shear Zone
VN	Vein
VO	Void
FA	Fault

COATING

CN	Clean
CT	Coating (>= 1.0m)
FILLED	Filled
SN	Stained
VR	Veneer (< 1.0mm)

PLANARITY

CU	Curved
DIS	Discontinuous
IR	Irregular
PR	Planar
ST	Stepped
UN	Undulose

INFILL

CA	Calcite
CLAY	Clay
FE	Iron Oxide
FE	Iron Oxide Clay
CLAY	
KT	Chlorite
MS	Secondary Mineral
MU	Unidentified Mineral
QZ	Quartz
X	Carbonaceous

See Explanatory Notes for details of abbreviations & basis of descriptions.

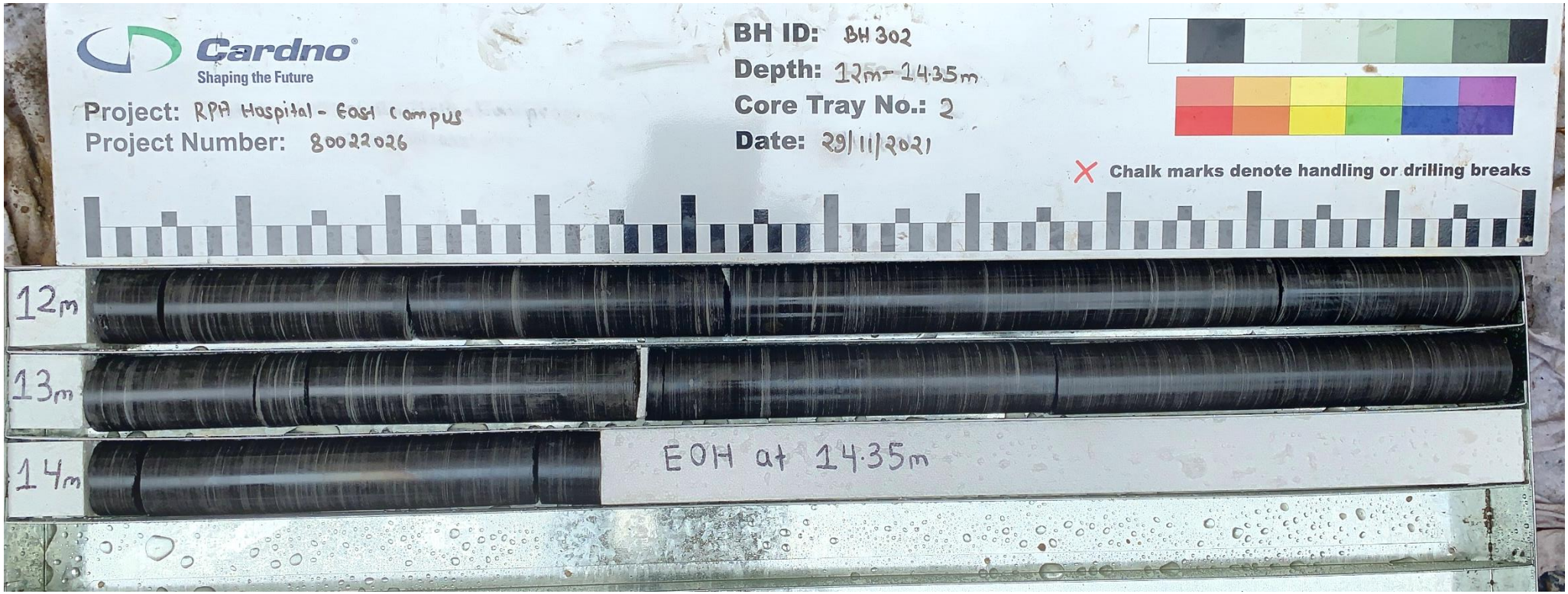
CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

Cardno	TITLE: **Borehole Core Photographs – BH302** **Geotechnical Investigation – RPA East Campus**			
	PROJECT NO: **80022026**	TEST DATE: **29/11/2021**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 1 OF 2** **7.50 m to 12.00 m – 4.50 m Length**
	DRILL RIG: **Comacchio GEO 305**	CONTRACTOR: **Cardno & Stratacore Drilling**	LOGGED BY: **RK**	CHECKED BY: **BD**



Cardno	TITLE: **Borehole Core Photographs – BH302** **Geotechnical Investigation – RPA East Campus**			
	PROJECT NO: **80022026**	TEST DATE: **29/11/2021**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 2 OF 2** **12.00 m to 14.35 m – 2.35 m Length**
	DRILL RIG: **Comacchio GEO 305**	CONTRACTOR: **Cardno & Stratacore Drilling**	LOGGED BY: **RK**	CHECKED BY: **BD**



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH303

PROJECT : Royal Prince Alfred Hospital
LOCATION : Lambie Dew Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 1 OF 3

POSITION : E: 331994.42, N: 6248721.36 SURFACE ELEVATION : 27.098 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : D-4T MOUNTING : Ute CONTRACTOR : Stratacore DRILLER : Daniel

DATE STARTED : 3/12/21 DATE COMPLETED : 3/12/21 DATE LOGGED : 3/12/21 LOGGED BY : RKC CHECKED BY : BD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
	N/A					0.0			0.05m Paver Concrete			ROAD SURFACE
HA		H			27.0				0.40m Fill: Gravelly SAND fine to coarse grained, dark brown, fine to coarse grained, sub-rounded, sandstone, siltstone, igneous gravel, trace low plasticity clay	D		FILL
									0.70m Fill: Sandy CLAY low to medium plasticity, brown, fine to coarse grained sand, trace sub-rounded ironstone, siltstone gravel			0.69: Hand auger refusal due to gravel
	1.00m			1.00m SPT 4, 5, 5 N=10	26.0	1.0						
				1.45m					1.30m Fill: Silty CLAY medium to high plasticity, orange-brown, trace sub-rounded to sub-angular, siltstone, sandstone, ironstone gravel			
		E				2.0				M (=PL)		
					25.0							
	3.00m			3.00m SPT 4, 8, 14 N=22		3.0			3.10m Silty CLAY high plasticity, orange-brown, mottled grey, trace sub-rounded, ironstone gravel, trace rootlets			RESIDUAL SOIL
	3.40m ES			3.45m	24.0			CH				
CASING	4.00m D		Not Encountered			4.0			4.00m Silty CLAY high plasticity, grey, orange-brown, with sub-rounded to sub-angular ironstone gravel		VSt	
AD/T	**4.50m**			4.50m SPT 13, 10, 12 N=22	23.0			CH		w < PL		
				4.95m					4.70m Siltstone dark grey, orange-brown, very low strength, extremely weathered, with clay bands and ironstone bands			BEDROCK
		F			22.0	5.0						
	6.00m			6.00m SPT 8, 23, 18 N=41	21.0	6.0						
				6.45m								
					20.0	7.0						
	7.50m			7.50m SPT 13, 17, 30 N=47					7.60m Siltstone dark grey, very low strength, extremely weathered to highly weathered, with iron indurated bands			
				7.95m		8.0						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH303

PROJECT : Royal Prince Alfred Hospital
LOCATION : John Hopkins Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 2 OF 3

POSITION : E: 331994.42, N: 6248721.36 SURFACE ELEVATION : 27.098 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : D-4T MOUNTING : Ute CONTRACTOR : Stratacore DRILLER : Daniel

DATE STARTED : 3/12/21 DATE COMPLETED : 3/12/21 DATE LOGGED : 3/12/21 LOGGED BY : RKC CHECKED BY : BD

DRILLING						MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T CASING	N/A	F			19.0 / 8.0			Siltstone dark grey, very low strength, extremely weathered to highly weathered, with iron indurated bands *(continued)*			
					18.0 / 9.0			9.85m Continued as Cored Drill Hole			
					17.0 / 10.0						
					16.0 / 11.0						
					15.0 / 12.0						
					14.0 / 13.0						
					13.0 / 14.0						
					12.0 / 15.0						
					16.0						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

CORED DRILL HOLE LOG

HOLE NO : BH303

PROJECT : Royal Prince Alfred Hospital
LOCATION : John Hopkins Drive, Camperdow
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 3 OF 3

POSITION : E: 331994.42, N: 6248721.36 | SURFACE ELEVATION : 27.098 (AHD) | ANGLE FROM HORIZONTAL : 90°

RIG TYPE : D-4T | MOUNTING : Ute | CONTRACTOR : Stratacore | DRILLER : Daniel

DATE STARTED : 3/12/21 | DATE COMPLETED : 3/12/21 | DATE LOGGED : 3/12/21 | LOGGED BY : RKC | CHECKED BY : BD

CASING DIAMETER : N/A | BARREL (Length) : 3.00 m | BIT : NMLC Stepped | BIT CONDITION : Good

DRILLING

PROGRESS: DRILLING & CASING; WATER RETURN

CORE LOSS RUN %: DRILL DEPTH

SAMPLES & FIELD TESTS

ELEVATION (RL) / DEPTH (m)

MATERIAL

GRAPHIC LOG

DESCRIPTION
ROCK TYPE : Colour, Grain size, Structure
(texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)

Weathering

ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral
EL | VL | L | M | H | VH | EH

ROCK MASS

RQD (%)

DEFECT SPACING (mm)

DEFECTS
(joints, partings, seams, zones, etc)
Description, orientation, infilling or coating, shape, roughness, thickness, other

Depth	Description	Weathering	Sample / Test	RQD	Defects
9.85m	START CORING AT 9.85m				
9.85–11.20m	SILTSTONE dark grey, with 5% grey, fine grained sandstone lamination at 0-5°	SW	Is(50) d=0.49 a=0.3 MPa	97	9.84-10.00: FZ; 10.17: DB; 10.29: DB; 10.43: DB; 10.50-10.56: DB; 10.58: BP, 5°, PR, S, Clay VNR; 10.73-10.78: DB; 10.79: BP, 0-5°, IR, RF, CN
10.80-10.86m	SHALE, grey, with 5-10° fine grained sandstone matrix				
11.20–11.50m	SILTSTONE dark grey, indistinctly laminated, with 20% dark grey sandstone		Is(50) d=0.48 a=0.24 MPa		11.06: HB; 11.21-11.38: DB
11.50–12.30m	SILTSTONE dark grey, with 5% grey sandstone laminations at 0°				11.51: HB; 11.61: DB; 11.89: DB
12.30–12.90m	SILTSTONE dark grey, with 10% grey, fine grained sandstone lamination at 0-5°		Is(50) d=0.43 MPa; Is(50) d=0.55 a=0.41 MPa		12.26: DB; 12.61: DB
12.90–14.00m	LAMINITE Siltstone (50%), dark grey and Sandstone (50%), grey, fine grained, interlaminated at at 0-5°		Is(50) d=0.85 a=1.03 MPa; Is(50) d=1.23 a=2.78 MPa	97	12.90: DB; 13.06: DB; 13.46: HB; 13.72: DB
14.00m	BOREHOLE BH303 TERMINATED AT 14.00 m Target depth				

NMLC
100% 0% 12.76
100% 0% 14.00

DRILLING

AD/T	Auger Drilling with TC Bit
AD/V	Auger Drilling with V Bit
AS	Auger Screwing
DB	Washbore with Drag Bit
DT	Diatube
HMLC	HMLC Core Barrel
HQ3	HQ3 Core Barrel
NMLC	NMLC Core Barrel
NQ3	NQ3 Core Barrel
PQ3	PQ3 Core Barrel
R	Rock Roller

WEATHERING

FR	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
DW	Distinctly Weathered
HW	Highly Weathered
XW	Extremely Weathered

STRENGTH

EH	Extremely High
VH	Very High
H	High
M	Medium
L	Low
VL	Very Low
EL	Extremely Low

ROUGHNESS

POL	Polished
RF	Rough
S	Smooth
SL	Slickensided
VR	Very Rough

DEFECT TYPE

BP	Bedding Plane
CL	Cleavage
CS	Crushed Seam
CZ	Crushed Zone
DB	Drilling Break
FC	Fracture
HB	Handling Break
IS	Infilled Seam
JT	Joint
SM	Seam
SS	Shear Seam
SZ	Shear Zone
VN	Vein
VO	Void
FA	Fault

COATING

CN	Clean
CT	Coating (>= 1.0m)
FILLED	Filled
SN	Stained
VR	Veneer (< 1.0mm)

PLANARITY

CU	Curved
DIS	Discontinuous
IR	Irregular
PR	Planar
ST	Stepped
UN	Undulose

INFILL

CA	Calcite
CLAY	Clay
FE	Iron Oxide
FE	Iron Oxide Clay
CLAY	
KT	Chlorite
MS	Secondary Mineral
MU	Unidentified Mineral
QZ	Quartz
X	Carbonaceous

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

Cardno	TITLE: **Borehole Core Photographs – BH303** **Geotechnical Investigation – RPA East Campus**			
	PROJECT NO: **80022026**	TEST DATE: **03/12/2021**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 1 OF 1** **9.85 m to 14.00 m – 4.15 m Length**
	DRILL RIG: **D-4T Ute Rig**	CONTRACTOR: **Cardno & Stratacore Drilling**	LOGGED BY: **RK**	CHECKED BY: **BD**



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH304

PROJECT : Royal Prince Alfred Hospital
LOCATION : Lambie Dew Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 1 OF 3

POSITION : E: 332092.74, N: 6248715.43 SURFACE ELEVATION : 21.873 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Geoprobe 66200DTMOUNTING : Track CONTRACTOR : Stratacore DRILLER : Daniel

DATE STARTED : 29/11/21 DATE COMPLETED : 29/11/21 DATE LOGGED : 29/11/21 LOGGED BY : RKC CHECKED BY : BD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)		GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
	N/A	F			21.0 / 0.0	0.10m			ASPHALT			ROAD SURFACE
									Fill: Gravelly SAND fine to coarse grained, dark brown, fine to coarse grained, sub-rounded to sub-angular, ironstone gravel			FILL
						0.50m			Fill: Gravelly SAND fine to coarse grained, dark brown, fine to coarse grained, sub-rounded to sub-angular, ironstone gravel, trace high plasticity clay, rootlets			
	1.50m			1.50m SPT 2, 5, 6 N=11	20.0 / 1.0							
		E		1.95m		2.00m			Fill: Silty CLAY high plasticity, grey, orange-brown, trace rounded to sub-rounded, siltstone, ironstone gravel			
						2.50m			Fill: Silty CLAY low to medium plasticity, dark grey, dark brown, trace rounded to sub-rounded, siltstone, ironstone gravel, trace fine to coarse grained sand, rootlets			
	3.00m			3.00m SPT 3, 3, 4 N=7	19.0 / 3.0							
						3.30m			Silty CLAY high plasticity, orange-red, mottled grey, trace charcoal, siltstone gravel	M (=PL)	St	RESIDUAL SOIL
	3.45m D			3.45m								
AD/T CASING	4.00m		Not Encountered		18.0 / 4.0			CH				
		F										
	4.50m			4.50m SPT 4, 8, 8 N=16		4.70m			Silty CLAY high plasticity, grey, mottled red, orange-brown, trace sub-rounded, ironstone gravel		VSt	
				4.95m	17.0 / 5.0			CH				
						5.20m			Siltstone grey, very low strength, extremely weathered to highly weathered, with fine to medium grained sandstone, with ocassional clay band			BEDROCK
		H			16.0 / 6.0							
					15.0 / 7.0							
					14.0 / 8.0							

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH304

PROJECT : Royal Prince Alfred Hospital
LOCATION : Lambie Dew Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 2 OF 3

POSITION : E: 332092.74, N: 6248715.43 SURFACE ELEVATION : 21.873 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Geoprobe 66200DTMOUNTING : Track CONTRACTOR : Stratacore DRILLER : Daniel

DATE STARTED : 29/11/21 DATE COMPLETED : 29/11/21 DATE LOGGED : 29/11/21 LOGGED BY : RKC CHECKED BY : BD

DRILLING						MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T CASING	N/A	H	Not Encountered		13.0 / 8.0 12.0 / 9.0 11.0 / 10.0 10.0 / 11.0 12.0			Siltstone grey, very low strength, extremely weathered to highly weathered, with fine to medium grained sandstone, with ocassional clay band *(continued)*			BEDROCK
								12.26m Continued as Cored Drill Hole			
					9.0 / 13.0 8.0 / 14.0 7.0 / 15.0 6.0 / 16.0						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

CORED DRILL HOLE LOG

HOLE NO : BH304

PROJECT : Royal Prince Alfred Hospital
LOCATION : Lambie Dew Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 3 OF 3

POSITION : E: 332092.74, N: 6248715.43 SURFACE ELEVATION : 21.873 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Geoprobe 66200DTMOUNTING : Track CONTRACTOR : Stratacore DRILLER : Daniel

DATE STARTED : 29/11/21 DATE COMPLETED : 29/11/21 DATE LOGGED : 29/11/21 LOGGED BY : RKC CHECKED BY : BD

CASING DIAMETER : N/A BARREL (Length) : 3.00 m BIT : NMLC Stepped BIT CONDITION : Good

DRILLING					MATERIAL			ROCK MASS		
PROGRESS: DRILLING & CASING	PROGRESS: WATER RETURN	(CORE LOSS / RUN %) DRIL. DEPTH	SAMPLES & FIELD TESTS	ELEVATION (RL) DEPTH (m)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral EL VL L M H VH EH -0.03 -0.1 -0.3 -1 -3 -10	RQD (%)	DEFECT SPACING (mm) 20 40 100 300 1000	DEFECTS (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
				8.0							
				13.0 9.0							
				12.0 10.0							
				11.0							
				10.0 12.0		12.26m START CORING AT 12.26m					
NMLC	100%	0% 14.21	Is(50) d=0.46 a=1.39 MPa Is(50) d=0.97 a=1.57 MPa Is(50) d=0.45 a=0.8 MPa	9.0 13.0		SILTSTONE dark grey, with 5% grey, fine grained sandstone lamination at 0-5°	F		81		12.31: DB 12.37: JT, 90°, PR, S, CN 12.38-12.40: FZ 12.44-12.51: DB 12.58: JT, 85-90°, UN, S, CN 12.67-13.09: DB 13.17: BP, 0°, PR, S, CN 13.20: BP, 0°, PR, S, CN 13.24: BP, 5°, PR, S, CN 13.28: BP, 0°, PR, S, CN 13.32: BP, 0°, PR, S, CT 13.43: BP, 0°, PR, S, CN 13.50-13.64: DB 13.68: BP, 0°, PR, S, CN 13.71: JT, 50°, IR, RF, CN 13.76-13.79: DB 13.94: JT, 85°, PR, RF, CN 14.05: JT, 55°, IR, RF, CN 14.07: JT, 55°, IR, RF, CN 14.10: DB 14.15: JT, 85°, PR, RF, CN 14.21: BP, 0°, PR, S, CN 14.26: JT, 65°, IR, RF, CN 14.30: BP, 0-5°, IR, RF, CN 14.40: JT, 75°, IR, RF, CN 14.57: JT, 55°, PR, S, CN 14.60-15.21: DB
	100%	0% 15.21	Is(50) d=1.12 a=1.16 MPa	8.0 14.0 7.0 15.0		13.70m SILTSTONE dark grey, with 5% grey, fine grained sandstone lamination at 0-5° 15.21m			80		
				6.0 16.0		BOREHOLE BH304 TERMINATED AT 15.21 m Target depth					

DRILLING

AD/T	Auger Drilling with TC Bit
AD/V	Auger Drilling with V Bit
AS	Auger Screwing
DB	Washbore with Drag Bit
DT	Diatube
HMLC	HMLC Core Barrel
HQ3	HQ3 Core Barrel
NMLC	NMLC Core Barrel
NQ3	NQ3 Core Barrel
PQ3	PQ3 Core Barrel
R	Rock Roller

WEATHERING

FR	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
DW	Distinctly Weathered
HW	Highly Weathered
XW	Extremely Weathered

STRENGTH

EH	Extremely High
VH	Very High
H	High
M	Medium
L	Low
VL	Very Low
EL	Extremely Low

ROUGHNESS

POL	Polished
RF	Rough
S	Smooth
SL	Slickensided
VR	Very Rough

DEFECT TYPE

BP	Bedding Plane
CL	Cleavage
CS	Crushed Seam
CZ	Crushed Zone
DB	Drilling Break
FC	Fracture
HB	Handling Break
IS	Infilled Seam
JT	Joint
SM	Seam
SS	Shear Seam
SZ	Shear Zone
VN	Vein
VO	Void
FA	Fault

COATING

CN	Clean
CT	Coating (>= 1.0m)
FILLED	Filled
SN	Stained
VR	Veneer (< 1.0mm)

PLANARITY

CU	Curved
DIS	Discontinuous
IR	Irregular
PR	Planar
ST	Stepped
UN	Undulose

INFILL

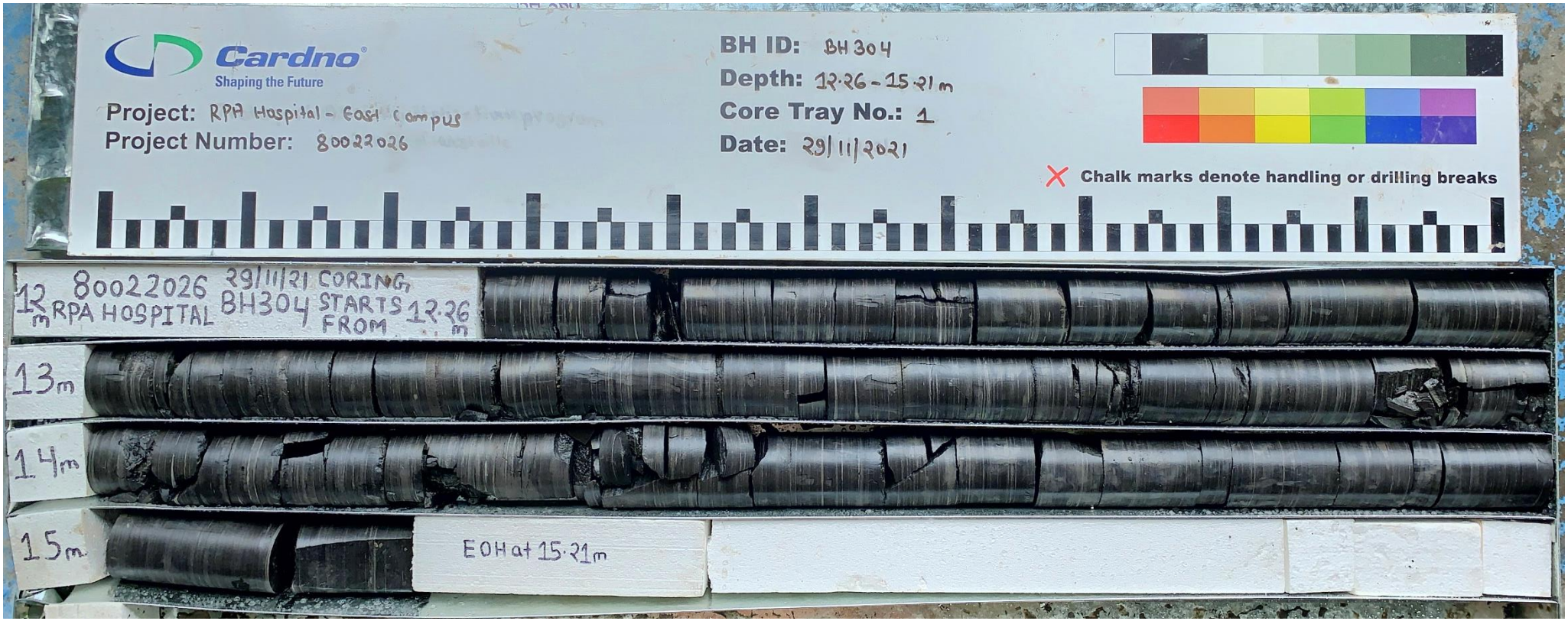
CA	Calcite
CLAY	Clay
FE	Iron Oxide
FE	Iron Oxide Clay
CLAY	
KT	Chlorite
MS	Secondary Mineral
MU	Unidentified Mineral
QZ	Quartz
X	Carbonaceous

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

Cardno	TITLE: **Borehole Core Photographs – BH304** **Geotechnical Investigation – RPA East Campus**			
	PROJECT NO: **80022026**	TEST DATE: **29/11/2021**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 1 OF 1 12.26 m to 15.21 m – 2.95 m Length**
	DRILL RIG: **Geoproble 6620DT**	CONTRACTOR: **Cardno & Stratacore Drilling**	LOGGED BY: **RK**	CHECKED BY: **BD**



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH305A

PROJECT : Royal Prince Alfred Hospital
LOCATION : Lambie Dew Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 1 OF 1

POSITION : E: 332064.29, N: 6248642.95 SURFACE ELEVATION : 24.158 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Geoprobe 66200DTMOUNTING : Track CONTRACTOR : Stratacore DRILLER : Daniel

DATE STARTED : 30/11/21 DATE COMPLETED : 30/11/21 DATE LOGGED : 30/11/21 LOGGED BY : RKC CHECKED BY : BD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)		GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
HA	N/A				24.0	0.0			Fill: Clayey Silty SAND fine to medium grained, brown, dark grey, low plasticity clay	M		FILL
						0.30m			Fill: Silty Sandy CLAY low plasticity, dark brown, trace sub-rounded, sandstone gravel, trace rootlets			
						0.90m			Fill: Silty CLAY medium to high plasticity, dark brown, trace rootlets			
CASING		F	Not Encountered		23.0	1.0			1.50m: colour change to brown	w < PL		
AD/T						1.80m			Fill: Sandy CLAY low plasticity, brown, grey, fine to medium grained sand, trace sub-rounded, ironstone gravel			
					22.0	2.0						
	2.50m B					2.50m		CH	Silty CLAY high plasticity, orange-brown, trace sub-rounded, ironstone gravel		St	RESIDUAL SOIL
	3.00m					3.00m			BOREHOLE BH305A TERMINATED AT 3.00 m Target depth			
					21.0	3.0						
					20.0	4.0						
					19.0	5.0						
					18.0	6.0						
					17.0	7.0						
						8.0						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH305B

PROJECT : Royal Prince Alfred Hospital
LOCATION : Lambie Dew Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 1 OF 1

POSITION : E: 332081.75, N: 6248640.00 SURFACE ELEVATION : 22.568 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : Geoprobe 66200DTMOUNTING : Track CONTRACTOR : Stratacore DRILLER : Daniel

DATE STARTED : 30/11/21 DATE COMPLETED : 30/11/21 DATE LOGGED : 30/11/21 LOGGED BY : RKC CHECKED BY : BD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T CASING	N/A				22.0	0.0			Fill: Clayey Silty SAND fine to medium grained, dark brown, dark grey, low plasticity clay	M		FILL
						0.30m			Fill: Silty Sandy CLAY dark brown, trace sub-rounded, sandstone gravel, trace rootlets	w < PL		
						1.00m			Fill: Silty CLAY medium to high plasticity, dark brown			
	1.50m	E		1.50m SPT 4, 6, 8 N=14 1.95m	21.0	1.0 2.0			1.50-1.95m: trace charcoal			
						2.50m			Silty CLAY high plasticity, orange-brown, pale grey, trace sub-rounded to sub-angular, ironstone and sandstone gravel, trace rootlets, charcoal	w ~ PL		RESIDUAL SOIL
	3.00m			3.00m SPT 6, 6, 8 N=14 3.45m	20.0	3.0			3.20m: colour change to orange-red, mottled grey		St	
	4.00m	D	Not Encountered		19.0	4.0		CH	3.80m: colour change to red			
	4.50m			4.50m SPT 7, 10, 15 N=25 4.95m	18.0	4.50m 5.0		CH	Silty CLAY high plasticity, pale grey, mottled red and orange-brown, with sub-rounded to sub-angular, ironstone gravel			
		F				5.30m			Silty CLAY high plasticity, pale grey, mottled orange-red, with sub-rounded to sub-angular, ironstone, siltstone gravel	w < PL	VSt	
	6.00m			6.00m SPT 8, 12, 16 N=28 6.45m	17.0 16.0	6.0		CH	6.30m: trace pale grey, fine to medium grained sand			
	7.50m	H		7.50m SPT 30/150mm N=R 7.65m	15.0	7.00m 8.0			Siltstone grey, dark grey, very low strength, extremely weathered to highly weathered, with clay bands, trace fine to coarse grained sand 8.00m			BEDROCK

BOREHOLE BH305B TERMINATED AT 8.00 m
Refusal

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH306

PROJECT : Royal Prince Alfred Hospital
LOCATION : Lambie Dew Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 1 OF 3

POSITION : E: 332088.60, N: 6248613.60 SURFACE ELEVATION : 23.165 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : D-4T MOUNTING : Ute CONTRACTOR : Stratacore DRILLER : Daniel

DATE STARTED : 2/12/21 DATE COMPLETED : 2/12/21 DATE LOGGED : 2/12/21 LOGGED BY : RKC CHECKED BY : BD

DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
HA	N/A	H			23.0	0.0			Fill: Gravelly SAND fine to medium grained, dark brown, fine to coarse grained, sandstone, shale gravel, trace low to medium plasticity clay	M		FILL
		E				0.30m			Fill: Silty SAND fine to coarse grained, brown, grey			
						0.50m			Fill: Silty CLAY medium to high plasticity, dark brown, trace sub-rounded, ironstone gravel, trace rootlets			
					22.0	1.0						
	1.50m			1.50m SPT 3, 3, 4 N=7 1.95m		1.50m			Silty CLAY medium to high plasticity, brown, orange-brown, trace sub-rounded, ironstone gravel, trace rootlets			RESIDUAL SOIL
					21.0	2.0		CI-CH			F	
	2.50m D											
	3.00m			3.00m SPT 4, 5, 7 N=12 3.45m		3.00m			Silty CLAY high plasticity, orange-red, mottled grey, trace sub-rounded, siltstone, ironstone gravel	M (=PL)		
					20.0	3.0			3.59m: colour change to red		St - VSt	
						4.0		CH				
CASING		F			19.0							
AD/T	4.50m			4.50m SPT 5, 10, 19 N=29 4.95m		4.60m			Silty CLAY high plasticity, pale grey, mottled orange-brown, with iron indurated bands			
					18.0	5.0		CH			VSt	
						5.50m			Silty CLAY high plasticity, grey, trace sub-rounded to sub-angular, ironstone, siltstone gravel	w < PL		
	6.00m			6.00m SPT 3, 14, 27 N=41 6.45m	17.0	6.0		CH			H	
						6.40m			Siltstone dark grey, very low strength, extremely weathered, with clay bands			BEDROCK
				7.50m SPT 11/150mm N=R 7.65m	16.0	7.0						
						8.0						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH306

PROJECT : Royal Prince Alfred Hospital
LOCATION : Lambie Dew Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 2 OF 3

POSITION : E: 332088.60, N: 6248613.60 SURFACE ELEVATION : 23.165 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : D-4T MOUNTING : Ute CONTRACTOR : Stratacore DRILLER : Daniel

DATE STARTED : 2/12/21 DATE COMPLETED : 2/12/21 DATE LOGGED : 2/12/21 LOGGED BY : RKC CHECKED BY : BD

DRILLING						MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T CASING	N/A	F			8.0 / 15.0			Siltstone dark grey, very low strength, extremely weathered, with clay bands *(continued)*			BEDROCK
					9.0			9.20m Continued as Cored Drill Hole			
					14.0 / 10.0 / 13.0						
					11.0 / 12.0						
					12.0 / 11.0						
					13.0 / 10.0						
					14.0 / 9.0						
					15.0 / 8.0						
					16.0						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

CORED DRILL HOLE LOG

HOLE NO : BH306

PROJECT : Royal Prince Alfred Hospital
LOCATION : Lambie Dew Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 3 OF 3

POSITION : E: 332088.60, N: 6248613.60 | SURFACE ELEVATION : 23.165 (AHD) | ANGLE FROM HORIZONTAL : 90°

RIG TYPE : D-4T | MOUNTING : Ute | CONTRACTOR : Stratacore | DRILLER : Daniel

DATE STARTED : 2/12/21 | DATE COMPLETED : 2/12/21 | DATE LOGGED : 2/12/21 | LOGGED BY : RKC | CHECKED BY : BD

CASING DIAMETER : N/A | BARREL (Length) : 3.00 m | BIT : NMLC Stepped | BIT CONDITION : Good

DRILLING

PROGRESS: DRILLING & CASING; WATER RETURN

(CORE LOSS RUN %): DRILL DEPTH

SAMPLES & FIELD TESTS

ELEVATION (RL) / DEPTH (m)

MATERIAL

GRAPHIC LOG

DESCRIPTION
ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)

Weathering

ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral

ROCK MASS

RQD (%)

DEFECT SPACING (mm)

DEFECTS (joints, partings, seams, zones, etc)
Description, orientation, infilling or coating, shape, roughness, thickness, other

Depth (m)	Drilling & Casing	Water Return	Core Loss / Run %	Drill Depth	Samples & Field Tests	Description	Weathering	RQD (%)	Defects
9.20						START CORING AT 9.20m			
9.40						SANDY CLAY dark grey, low to medium plasticity, fine to coarse grained sand, with siltstone gravel	EW		9.34-9.50: SM, clay
9.50						SILTSTONE dark grey, very low strength, extremely weathered, with clay bands	MW		9.53: BP, 5°, PR, S, clay CT
					Is(50) d=0.12 a=0.57 MPa	LAMINITE dark grey and grey, Siltstone (50%), fine to medium grained grey and Sandstone (50%), dark grey, interlaminated at 0-5°	EW		9.59: BP, 0°, PR, S, CN
							MW		9.62: JT, 85°, IR, RF, CN
					Is(50) d=0.49 a=1.04 MPa		EW		9.68-9.71: FZ
							MW		9.73: BP, 0-5°, PR, S, CN
							EW		9.77: BP, 0-5°, PR, S, CN
							MW		9.82: BP, 0-5°, PR, S, CN
							EW		9.93: BP, 0°, PR, S, CN
							MW		9.97: HB
							EW		10.03: JT, 80°, IR, RF, CN
							MW		10.14: JT, 75°, IR, RF, CN
							EW		10.19: BP, 0°, PR, S, CN
							MW		10.22: BP, 0°, PR, S, CN
							EW		10.25: BP, 0°, PR, S, CN
							MW		10.28: BP, 0°, IR, RF, CN
11.00							EW		10.34: BP, 0°, PR, S, CN
						LAMINITE dark grey and grey, Siltstone (80%), fine to medium grained grey and Sandstone (20%), dark grey, interlaminated at 0-5°	MW		10.38: BP, 0°, PR, S, CN
							EW		10.42-10.46: FZ, clay CT
							MW		10.48: BP, 0°, PR, S, clay CT
							EW		10.52-10.55: FZ
							MW		10.57: BP, 5°, PR, S, CN
							EW		10.61-10.62: FZ
					Is(50) d=0.98 a=0.95 MPa		MW		10.67-10.68: SM, clay
					Is(50) d=0.1 a=0.6 MPa		EW		10.69-10.70: SM, clay
							MW		10.76: BP, 0°, PR, S, CN
							SW		10.84: JT, ST, RF, CN
							F		10.90: BP, 0-5°, PR, RF, gravel FLD
	NMLC	100%	0%	12.28				56	10.93: BP, 0-5°, PR, S, silt CT
									10.98: DB
									11.08: DB
									11.23: DB
									11.35: JT, 70°, UN, RF, CN
									11.50: DB
									11.59: DB
									11.65: DB
									11.77: DB
									11.84: BP, 0°, PR, S, CN
					Is(50) d=0.45 a=1.58 MPa				12.04: DB
									12.20: DB
					Is(50) d=0.17 a=1.13 MPa				12.43: DB
									12.46: DB
									12.49: DB
		100%	0%					93	12.62: BP, 0°, PR, S, CN
									12.82: DB
									12.88: DB
									12.92: DB
									12.96: DB
									13.13: DB
									13.35: BP, 0°, PR, S, CN
									13.45-13.58: 5x BP, 0-5°, PR, S, CN
									13.69: DB
									14.33: DB
									14.42: DB
14.97					Is(50) d=0.98 a=1.52 MPa				14.75: DB
						BOREHOLE BH306 TERMINATED AT 14.97 m Target depth			

DRILLING

AD/T	Auger Drilling with TC Bit
AD/V	Auger Drilling with V Bit
AS	Auger Screwing
DB	Washbore with Drag Bit
DT	Diatube
HMLC	HMLC Core Barrel
HQ3	HQ3 Core Barrel
NMLC	NMLC Core Barrel
NQ3	NQ3 Core Barrel
PQ3	PQ3 Core Barrel
R	Rock Roller

WEATHERING

FR	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
DW	Distinctly Weathered
HW	Highly Weathered
XW	Extremely Weathered

STRENGTH

EH	Extremely High
VH	Very High
H	High
M	Medium
L	Low
VL	Very Low
EL	Extremely Low

ROUGHNESS

POL	Polished
RF	Rough
S	Smooth
SL	Slickensided
VR	Very Rough

DEFECT TYPE

BP	Bedding Plane
CL	Cleavage
CS	Crushed Seam
CZ	Crushed Zone
DB	Drilling Break
FC	Fracture
HB	Handling Break
IS	Infilled Seam
JT	Joint
SM	Seam
SS	Shear Seam
SZ	Shear Zone
VN	Vein
VO	Void
FA	Fault

COATING

CN	Clean
CT	Coating (>= 1.0m)
FILLED	Filled
SN	Stained
VR	Veneer (< 1.0mm)

PLANARITY

CU	Curved
DIS	Discontinuous
IR	Irregular
PR	Planar
ST	Stepped
UN	Undulose

INFILL

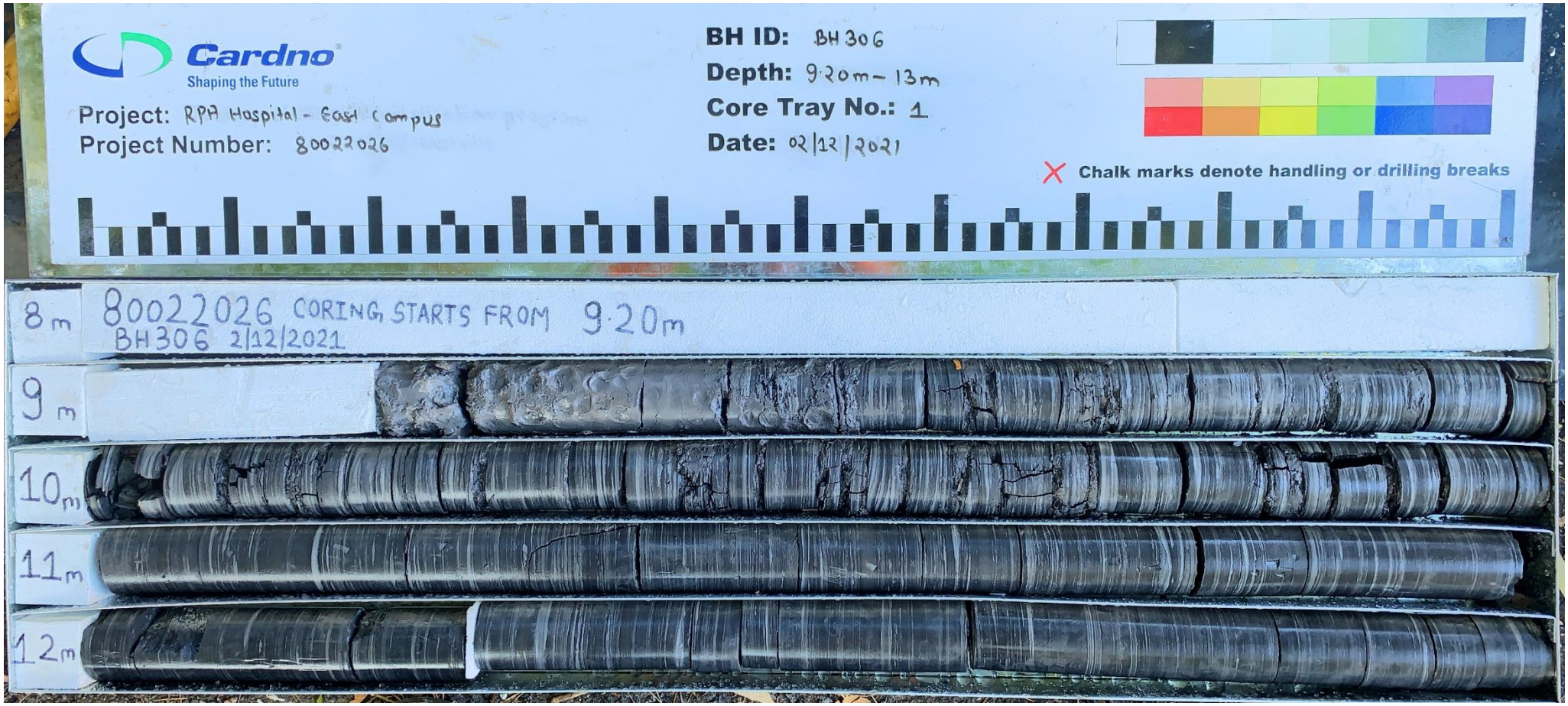
CA	Calcite
CLAY	Clay
FE	Iron Oxide
FE	Iron Oxide Clay
CLAY	
KT	Chlorite
MS	Secondary Mineral
MU	Unidentified Mineral
QZ	Quartz
X	Carbonaceous

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

Cardno	TITLE: **Borehole Core Photographs – BH306** **Geotechnical Investigation – RPA East Campus**			
	PROJECT NO: **80022026**	TEST DATE: **02/12/2021**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 1 OF 2 9.20 m to 13.00 m – 3.80 m Length**
	DRILL RIG: **D-4T Ute Rig**	CONTRACTOR: **Cardno & Stratacore Drilling**	LOGGED BY: **RK**	CHECKED BY: **BD**



Cardno	TITLE: **Borehole Core Photographs – BH306** **Geotechnical Investigation – RPA East Campus**			
	PROJECT NO: **80022026**	TEST DATE: **02/12/2021**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 2 OF 2 13.00 m to 14.97 m – 1.97 m Length**
	DRILL RIG: **D-4T Ute Rig**	CONTRACTOR: **Cardno & Stratacore Drilling**	LOGGED BY: **RK**	CHECKED BY: **BD**



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH307

PROJECT : Royal Prince Alfred Hospital
LOCATION : John Hopkins Drive, Camperdown
CLIENT : Health Infrastructure
FEATURE :
FILE / JOB NO : 80022026
SHEET : 1 OF 1

POSITION : E: 331934.05, N: 6248700.61 SURFACE ELEVATION : 29.818 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : D-4T MOUNTING : Ute CONTRACTOR : Stratacore DRILLER : Daniel

DATE STARTED : 2/12/21 DATE COMPLETED : 2/12/21 DATE LOGGED : 2/12/21 LOGGED BY : RKC CHECKED BY : BD

DRILLING							MATERIAL					
DRILLING & CASING	SAMPLES	DRILLING PENETRATION	GROUND WATER LEVELS	FIELD TESTS	ELEVATION (RL) / DEPTH (m)		GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T CASING	N/A	H			29.818	0.0			0.05m Asphalt			ROAD SURFACE
		E							Fill: Gravelly SAND fine to coarse grained, brown, fine to coarse grained, sub-rounded to sub-angular, ironstone gravel 0.30m	M		FILL
									Fill: Silty CLAY low to medium plasticity, dark brown, trace fine to coarse grained sand 0.60m			
					29.0				Silty CLAY high plasticity, orange-brown, trace sub-rounded, ironstone gravel	M (=PL)		RESIDUAL SOIL
	1.00m U75					1.0			1.0m: with iron indurated bands		St	
	1.45m			1.45m SPT 5, 11, 15 N=26				CH			VSt	
	2.00m			1.90m 2.00m SPT 6, 17, 21 N=38	28.0	2.0						
			Not Encountered	2.45m					2.60m Silty CLAY high plasticity, orange-brown, with iron indurated bands			
	3.00m	F		3.00m SPT 7, 20, 30 N=50	27.0	3.0				w < PL	H	
				3.45m								
	4.00m			4.00m SPT 9, 19, 22 N=41	26.0	4.0						
				4.45m								
	5.00m			5.00m SPT 19, 13/30mm N=R 5.18m	25.0	5.0			5.30m Siltstone 5.50m dark grey, very low strength, extremely weathered with clay bands			WEATHERED ROCK
									BOREHOLE BH307 TERMINATED AT 5.50 m Target depth			
					24.0	6.0						
					23.0	7.0						
					22.0	8.0						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Cardno Shaping the Future

REPORT OF BOREHOLE: BH303

SHEET: 1 OF 1

CLIENT:
PROJECT: Royal Prince Alfred Hospital
LOCATION:
JOB NO: 80022026

DRILL RIG: D-4T
CONTRACTOR: Stratacore
INCLINATION: -90°
HOLE DEPTH: 14.00 m
LOGGED: RKC DATE: 3/12/21
CHECKED: DATE:

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
HA		0					tiles concrete slab dry		Spoils
				SPT 1.00-1.45 m 4, 5, 5 N=10			Gravelly SAND fine to coarse grained, dark brown, fine to coarse grained, sub-rounded, sandstone, shale, igneous gravel, trace low plasticity clay dry		
		2					Sandy CLAY low to medium plasticity, brown, fine to coarse grained sand, trace sub-rounded ironstone, shale gravel		
				SPT 3.00-3.45 m 4, 8, 14 N=22 ES 3.40 m			Silty CLAY medium to high plasticity, orange-brown, trace sub-rounded to sub-angular, shale, sandstone, ironstone gravel		
		4		C 3.85-12.76 m D 4.00-4.50 m			Silty CLAY high plasticity, orange-brown, mottled grey, trace sub-rounded, ironstone gravel, trace rootlets very stiff		
AD/T				SPT 4.50-4.95 m 13, 10, 12 N=22			Silty CLAY high plasticity, grey, orange-brown, with sub-rounded to sub-angular ironstone gravel dry, very stiff		
		6		SPT 6.00-6.45 m 8, 23, 18 N=41			siltstone dark grey, orange-brown, very low strength, extremely weathered, with clay bands and ironstone bands		Bentonite
		8		SPT 7.50-7.95 m 13, 17, 30 N=47			siltstone dark grey, very low strength, extremely weathered to highly weathered, with iron indurated bands		Sand
NMLC	100% Water RETURN	10					SILTSTONE dark grey, with 5% grey, fine grained sandstone lamination at 0-5° slightly weathered, low to medium strength		
							SILTSTONE dark grey, indistinctly laminated, with 20% dark grey sandstone slightly weathered, low to medium strength		
		12					SILTSTONE dark grey, with 5% grey sandstone laminations at 0° slightly weathered, medium strength		
	100% Water RETURN			C 12.76-14.00 m			SILTSTONE dark grey, with 10% grey, fine grained sandstone lamination at 0-5° slightly weathered, medium strength		
							INTERLAMINATED SILTSTONE (50%) AND SANDSTONE (50%) AT 0-5° dark grey siltstone, grey fine grained sandstone slightly weathered, medium to high strength		
		14	14.00				END OF BOREHOLE @ 14.00 m TARGET DEPTH		

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

CARDNO WELL LIB_26 SEPT 2012_ICD - EDITED.GLB Log CARDNO WELL 80022026 RPAH WELLS.GPJ <<DrawingFile>> 21/12/2021 17:34 10.0.000

Royal Prince Alfred Hospital – Eastern Campus

APPENDIX

C

LABORATORY TEST RESULTS

Cardno

now

Stantec

Construction Sciences

Construction Sciences Pty Ltd
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Address:
Unit 2, 4 Kellogg Road,
Glendenning NSW 2761

Laboratory: **Glendenning Laboratory**
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Email: Sydney@constructionsciences.net

PARTICLE SIZE DISTRIBUTION REPORT

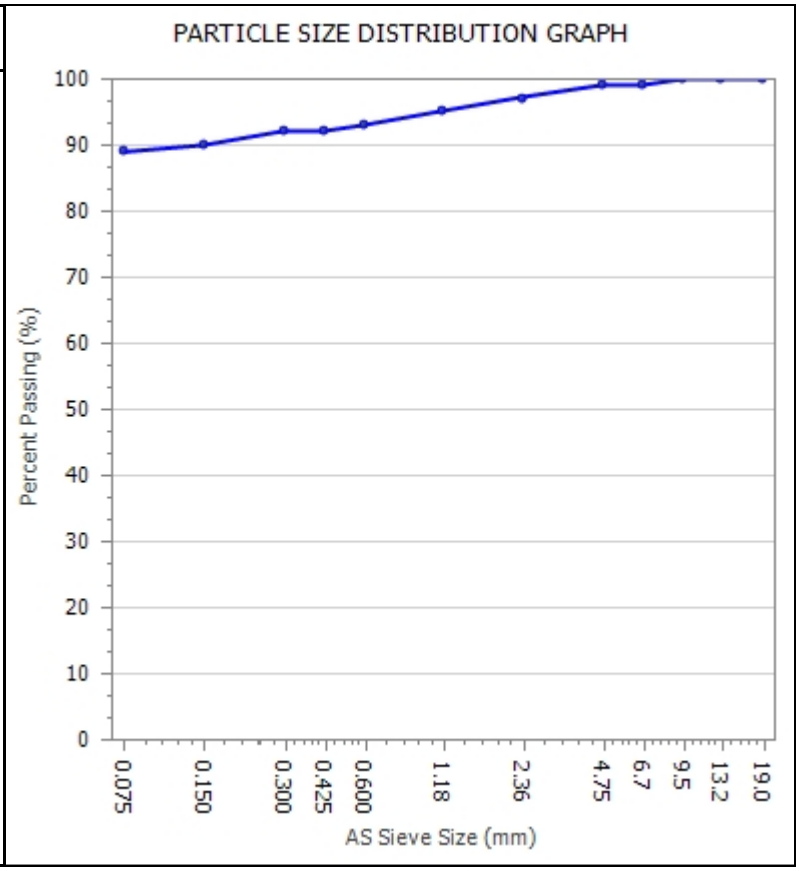
Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/264008-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1543
Project:	Royal Prince Alfred Hospital	Lot Number:	BH302
Location:	St Leonards	Internal Test Request:	12385/T/119353
Component:	Bore Hole Testing	Client Reference/s:	80022026
Area Description:	Lambie Deu Drive, Camperdown	Report Date / Page:	22/12/2021 Page 1 of 3

Test Procedures:	AS1289.3.6.1
Sample Number	12385/S/967183
Sampling Method	Tested As Received
Date Sampled	29/11/2021 12:00
Sampled By	Client Supplied
Date Tested	7/12/2021
Material Source	Not Supplied

Sample Location

Borehole		BH302
Depth	(m)	2.0-2.50
Material Type		Combined

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**100**	
9.5		**100**	
6.7		**99**	
4.75		**99**	
2.36		**97**	
1.18		**95**	
0.600		**93**	
0.425		**92**	
0.300		**92**	
0.150		**90**	
0.075		**89**	



Remarks	Results apply to the sample/s as received.

NATA

Accredited for compliance with ISO/IEC 17025 – Testing

Accreditation Number: 1986
Corporate Site Number: 12385

Approved Signatory: Patrick Deasy
Form ID: W9Rep Rev 2

Construction Sciences

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PARTICLE SIZE DISTRIBUTION REPORT

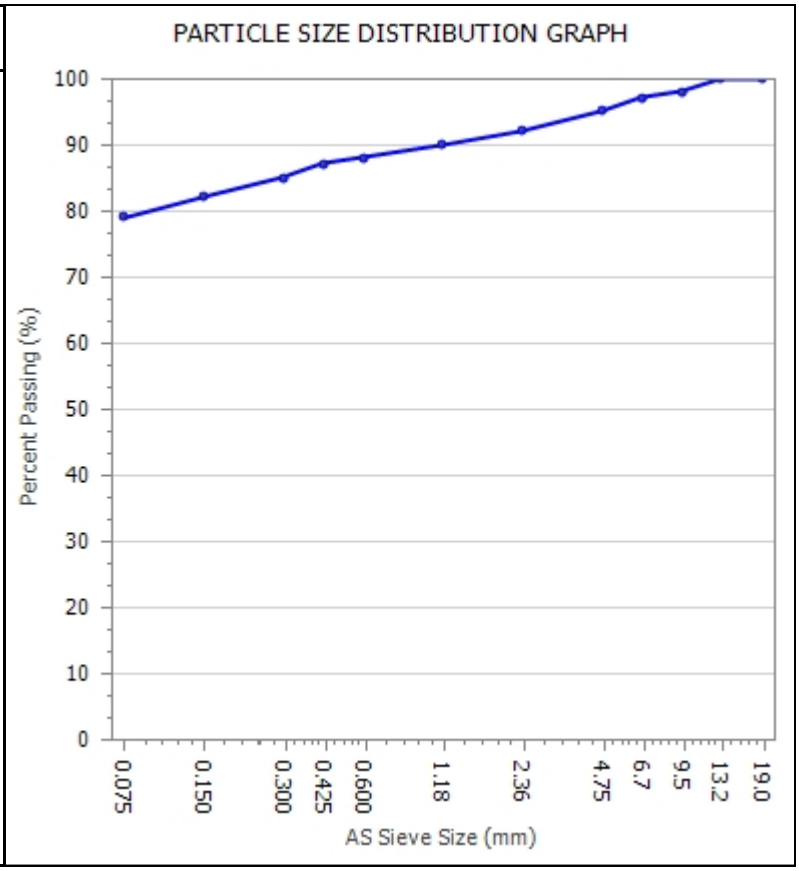
Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/264008-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1543
Project:	Royal Prince Alfred Hospital	Lot Number:	BH305B
Location:	St Leonards	Internal Test Request:	12385/T/119353
Component:	Bore Hole Testing	Client Reference/s:	80022026
Area Description:	Lambie Deu Drive, Camperdown	Report Date / Page:	22/12/2021 Page 2 of 3

Test Procedures:	AS1289.3.6.1
Sample Number	12385/S/967184
Sampling Method	Tested As Received
Date Sampled	29/11/2021 12:00
Sampled By	Client Supplied
Date Tested	7/12/2021
Material Source	Not Supplied

Sample Location

Borehole		BH305B
Depth	(m)	4.0-4.50
Material Type		Combined

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**100**	
9.5		**98**	
6.7		**97**	
4.75		**95**	
2.36		**92**	
1.18		**90**	
0.600		**88**	
0.425		**87**	
0.300		**85**	
0.150		**82**	
0.075		**79**	



Remarks	Results apply to the sample/s as received.

Accredited for compliance with ISO/IEC 17025 – Testing

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Form ID: W9Rep Rev 2

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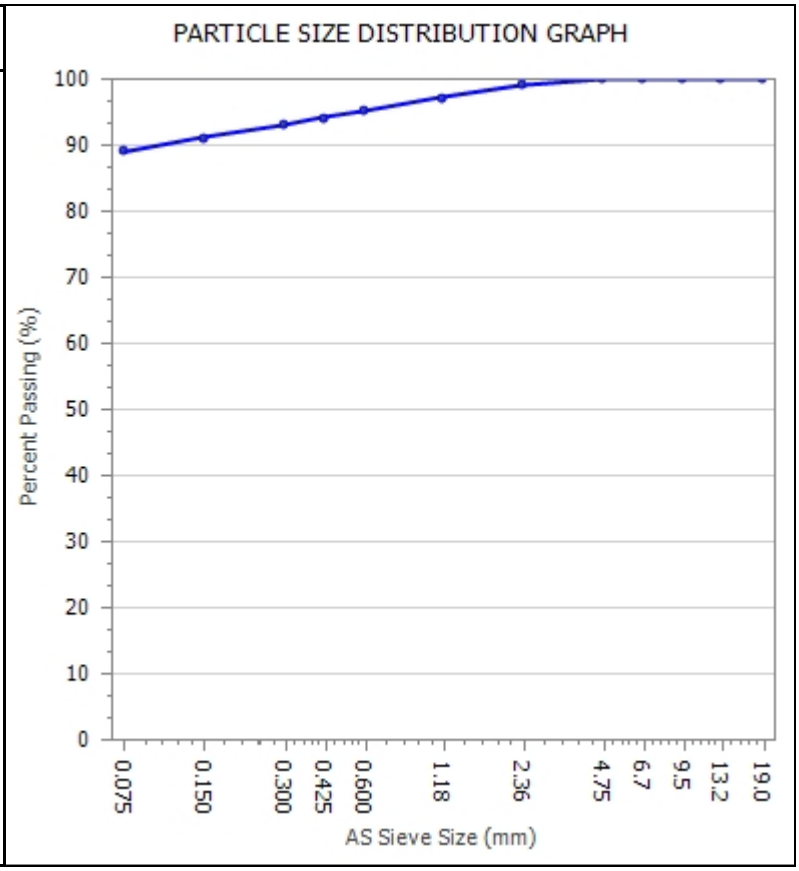
PARTICLE SIZE DISTRIBUTION REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/264008-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1543
Project:	Royal Prince Alfred Hospital	Lot Number:	BH303
Location:	St Leonards	Internal Test Request:	12385/T/119353
Component:	Bore Hole Testing	Client Reference/s:	80022026
Area Description:	Lambie Deu Drive, Camperdown	Report Date / Page:	22/12/2021 Page 3 of 3

Test Procedures:	AS1289.3.6.1

Sample Number	12385/S/967185	Sample Location	
Sampling Method	Tested As Received	Borehole	BH303
Date Sampled	29/11/2021 12:00	Depth (m)	4.0-4.50
Sampled By	Client Supplied		
Date Tested	8/12/2021		
Material Source	Not Supplied	Material Type	Combined

AS Sieve (mm)	Specification Minimum (%)	**Percent Passing (%)**	Specification Maximum (%)
19.0		**100**	
13.2		**100**	
9.5		**100**	
6.7		**100**	
4.75		**100**	
2.36		**99**	
1.18		**97**	
0.600		**95**	
0.425		**94**	
0.300		**93**	
0.150		**91**	
0.075		**89**	



Remarks	Results apply to the sample/s as received.

Accredited for compliance with ISO/IEC 17025 – Testing

NATA

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Corporate Site Number: 12385

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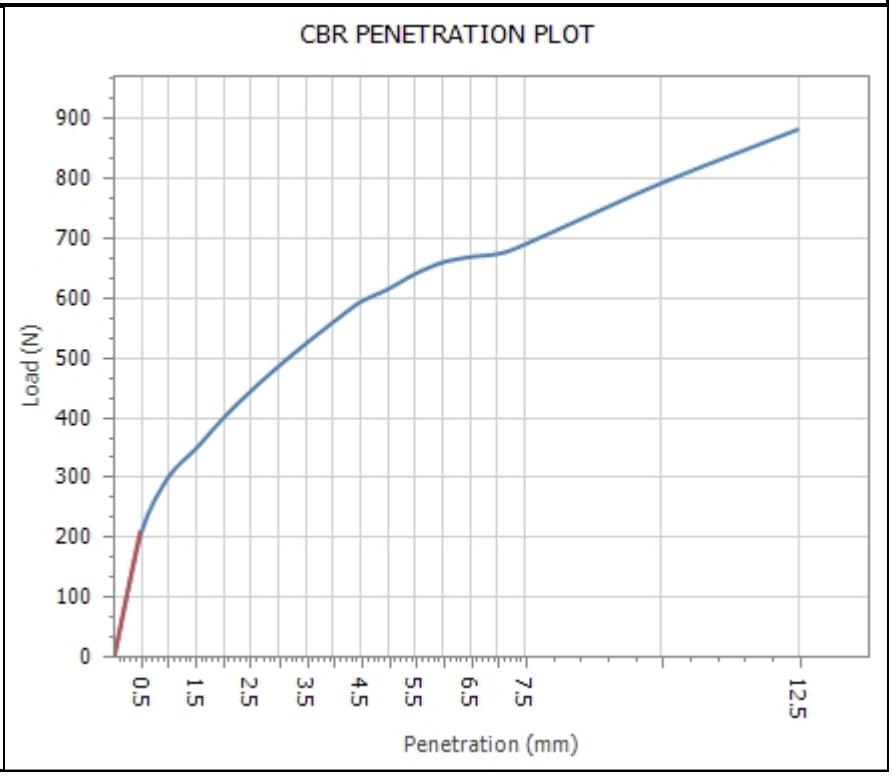
CALIFORNIA BEARING RATIO REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/264009-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1543
Project:	Royal Prince Alfred Hospital	Lot Number:	BH305A
Location:	St Leonards	Internal Test Request:	12385/T/119353
Component:	Bore Hole Testing	Client Reference/s:	80022026
Area Description:	Lambie Deu Drive, Camperdown	Report Date / Page:	22/12/2021 Page 1 of 2

Test Procedures	AS1289.6.1.1, T103 (W0), AS1289.5.1.1, AS1289.2.1.1

		Sample Location		
Sample Number	12385/S/967186	Borehole		BH305A
Sampling Method	Tested As Received	Depth	(m)	2.50 - 3.0
Date Sampled	29/11/2021			
Sampled By	Client Supplied			
Date Tested	13/12/2021			
Material Source	Not Supplied	Material Limit Start		-
Material Type	Combined	Material Limit End		-
Client Reference	80022026	Compactive Effort		Standard
Material Description	Brown clay			

Maximum Dry Density (t/m³):	1.70
Optimum Moisture Content (%):	19.5
Field Moisture Content (%):	22.7
Sample Percent Oversize (%)	0.0
Oversize Included / Excluded	Excluded
Target Density Ratio (%):	100
Target Moisture Ratio (%):	100
Placement Dry Density (t/m³):	1.71
Placement Dry Density Ratio (%):	100.5
Placement Moisture Content (%):	19.2
Placement Moisture Ratio (%):	98.5
Test Condition / Soaking Period:	Soaked / 4 Days
CBR Surcharge (kg)	4.5
Dry Density After Soak (t/m³):	1.67
Total Curing Time (hrs)	3
Liquid Limit Method	Estimation
Moisture (top 30mm) After Soak (%)	25.5
Moisture (remainder) After Soak (%)	21.1
CBR Swell (%):	2.5
Minimum CBR Specification (%):	-
CBR Value @ 2.5mm (%):	**3.5**



Remarks	Results apply to the sample/s as received.

Accredited for compliance with ISO/IEC 17025 – Testing

NATA

Accreditation Number: 1986
Corporate Site Number: 12385

Approved Signatory: Connor Deasy
Form ID: W2ASRep Rev2

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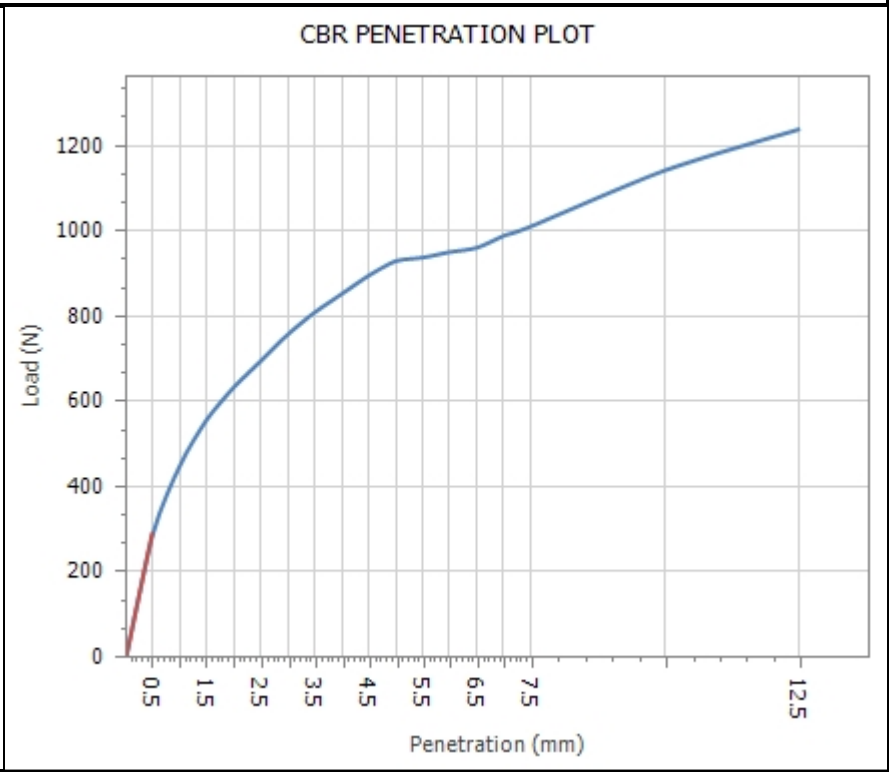
CALIFORNIA BEARING RATIO REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/264009-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1543
Project:	Royal Prince Alfred Hospital	Lot Number:	BH301
Location:	St Leonards	Internal Test Request:	12385/T/119353
Component:	Bore Hole Testing	Client Reference/s:	80022026
Area Description:	Lambie Deu Drive, Camperdown	Report Date / Page:	22/12/2021 Page 2 of 2

Test Procedures	AS1289.6.1.1, T103 (W0), AS1289.5.1.1, AS1289.2.1.1

		Sample Location		
Sample Number	12385/S/967187	Borehole		BH301
Sampling Method	Tested As Received	Depth	(m)	2.5-3.5
Date Sampled	29/11/2021			
Sampled By	Client Supplied			
Date Tested	13/12/2021			
Material Source	Not Supplied	Material Limit Start		-
Material Type	Combined	Material Limit End		-
Client Reference	80022026	Compactive Effort		Standard
Material Description	Brown clay			

Maximum Dry Density (t/m³):	1.54
Optimum Moisture Content (%):	25.0
Field Moisture Content (%):	28.4
Sample Percent Oversize (%)	0.0
Oversize Included / Excluded	Excluded
Target Density Ratio (%):	100
Target Moisture Ratio (%):	100
Placement Dry Density (t/m³):	1.55
Placement Dry Density Ratio (%):	101.0
Placement Moisture Content (%):	24.8
Placement Moisture Ratio (%):	99.0
Test Condition / Soaking Period:	Soaked / 4 Days
CBR Surcharge (kg)	4.5
Dry Density After Soak (t/m³):	1.52
Total Curing Time (hrs)	3
Liquid Limit Method	Estimation
Moisture (top 30mm) After Soak (%)	27.0
Moisture (remainder) After Soak (%)	25.4
CBR Swell (%):	1.5
Minimum CBR Specification (%):	-
CBR Value @ 2.5mm (%):	**5**



Remarks	Results apply to the sample/s as received.

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NATA

Accreditation Number: 1986
Corporate Site Number: 12385

Approved Signatory: Connor Deasy
Form ID: W2ASRep Rev2

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/264010-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1543
Project:	Royal Prince Alfred Hospital	Lot Number:	BH302
Location:	St Leonards	Internal Test Request:	12385/T/119353
Component:	Bore Hole Testing	Client Reference/s:	80022026
Area Description:	Lambie Deu Drive, Camperdown	Report Date / Page:	22/12/2021 Page 1 of 3

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/967183	Sample Location	
Sampling Method	Tested As Received	Borehole	BH302
Date Sampled	29/11/2021	Depth (m)	2.0-2.50
Sampled By	Client Supplied		
Date Tested	9/12/2021		
Att. Drying Method	Oven Dried	Material Source	Not Supplied
Atterberg Preparation	Dry Sieved	Material Type	Combined
LL Device	Cassagrande	Water Type	Potable
Material Description	Silty Gravelly Clay, mottled grey brown		

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**54**	
Plastic Limit (%)		**20**	
Plasticity Index (%)		**34**	
Linear Shrinkage (%)		**12.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 254.0mm / -		

Remarks	Results apply to the sample/s as received.

Accredited for compliance with ISO/IEC 17025 – Testing

NATA

Accreditation Number: 1986
Corporate Site Number: 12385



Approved Signatory: Connor Deasy
Form ID: W11bRep Rev 1

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/264010-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1543
Project:	Royal Prince Alfred Hospital	Lot Number:	BH305B
Location:	St Leonards	Internal Test Request:	12385/T/119353
Component:	Bore Hole Testing	Client Reference/s:	80022026
Area Description:	Lambie Deu Drive, Camperdown	Report Date / Page:	22/12/2021 Page 2 of 3

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/967184	Sample Location	
Sampling Method	Tested As Received	Borehole	BH305B
Date Sampled	29/11/2021	Depth (m)	4.0-4.50
Sampled By	Client Supplied		
Date Tested	9/12/2021		
Att. Drying Method	Oven Dried	Material Source	Not Supplied
Atterberg Preparation	Dry Sieved	Material Type	Combined
LL Device	Cassagrande	Water Type	Potable
Material Description	Silty Clay, trace of gravel, red brown.		

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**62**	
Plastic Limit (%)		**21**	
Plasticity Index (%)		**41**	
Linear Shrinkage (%)		**17.5**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 254.7mm / -		

Remarks: Results apply to the sample/s as received.

Accredited for compliance with ISO/IEC 17025 – Testing

NATA

Accreditation Number: 1986
Corporate Site Number: 12385

Approved Signatory: Connor Deasy
Form ID: W11bRep Rev 1

Construction Sciences

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ATTERBERG LIMITS REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/264010-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1543
Project:	Royal Prince Alfred Hospital	Lot Number:	BH303
Location:	St Leonards	Internal Test Request:	12385/T/119353
Component:	Bore Hole Testing	Client Reference/s:	80022026
Area Description:	Lambie Deu Drive, Camperdown	Report Date / Page:	22/12/2021 Page 3 of 3

Test Procedures:	AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1		
Sample Number	12385/S/967185	Sample Location	
Sampling Method	Tested As Received	Borehole	BH303
Date Sampled	29/11/2021	Depth (m)	4.0-4.50
Sampled By	Client Supplied		
Date Tested	9/12/2021		
Att. Drying Method	Oven Dried	Material Source	Not Supplied
Atterberg Preparation	Dry Sieved	Material Type	Combined
LL Device	Cassagrande	Water Type	Potable
Material Description	Silty Gravelly Clay pale brown		

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		**53**	
Plastic Limit (%)		**20**	
Plasticity Index (%)		**33**	
Linear Shrinkage (%)		**13.0**	
Linear Shrinkage Mould Length / Defects:	Mould Length: 251.0mm / -		

Remarks	Results apply to the sample/s as received.

Accredited for compliance with ISO/IEC 17025 – Testing

NATA

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Corporate Site Number: 12385



Approved Signatory: Connor Deasy
Form ID: W11bRep Rev 1

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MOISTURE CONTENT REPORT

Client:	Cardno (NSW) Pty Ltd	Report Number:	12385/R/264013-1
Client Address:	Level 9, The Forum, 203 Pacific Highway, St Leonards	Project Number:	12385/P/1543
Project:	Royal Prince Alfred Hospital	Lot Number:	BH302
Location:	St Leonards	Internal Test Request:	12385/T/119353
Component:	Bore Hole Testing	Client Reference/s:	80022026
Area Description:	Lambie Deu Drive, Camperdown	Report Date / Page:	22/12/2021 Page 1 of 1

Test Procedures:	AS1289.2.1.1

Sample Number	12385/S/967183	12385/S/967184	12385/S/967185	
ID / Client ID	80022026	80022026	80022026	
Lot Number	BH302	BH305B	BH303	
Date / Time Sampled	29/11/2021 12:00	29/11/2021 12:00	29/11/2021 12:00	
Sampling Method	Tested As Received	Tested As Received	Tested As Received	
Sampled By	Client Supplied	Client Supplied	Client Supplied	
Tested By	Neil Pillay	Neil Pillay	Neil Pillay	
Date Tested	7/12/2021	7/12/2021	7/12/2021	
Material Source	Not Supplied	Not Supplied	Not Supplied	
Material Type	Combined	Combined	Combined	
Borehole	BH302	BH305B	BH303	
Depth	2.0-2.50	4.0-4.50	4.0-4.50	
Moisture Content (%)	**20.4**	**23.1**	**17.4**	

Sample Number				
ID / Client ID				
Lot Number				
Date / Time Sampled				
Sampling Method				
Sampled By				
Tested By				
Date Tested				
Material Source				
Material Type				
Borehole				
Depth (m)				
Moisture Content (%)				

Remarks	Results apply to the sample/s as received.

NATA

Accredited for compliance with ISO/IEC 17025 – Testing

Accreditation Number: 1986
Corporate Site Number: 12385



Approved Signatory: Connor Deasy
Form ID: W20Rep Rev 3

Construction Sciences

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Warabrook NSW 2304

Laboratory: **Warabrook Laboratory**
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Email: Newcastle@constructionsciences.net

SHRINK SWELL INDEX

Client:	Construction Sciences - Professional Services	Report Number:	16822/R/32481-2
Client Address:	31 Anvil Road, Seven Hills	Project Number:	16822/P/185
Project:	Geotechical Services-Testing	Lot Number:	
Location:	Various	Internal Test Request:	16822/T/21226
Supplied To:	Construction Sciences - Professional Services	Client Reference/s:	
Area Description:		Report Date / Page:	14/01/2022 Page 1 of 1

Test Procedures:	AS1289.7.1.1, AS1289.2.1.1	Bore No.	NOT SUPPLIED
Sample Number	16822/S/108081	Sample Type	
Sampling Method	Tested As Received	Sample Depth	m
Date Sampled	29/11/2021		
Sampled By	Client Supplied	Material Source	-
Date Tested	10/01/2022	Material Type	-

Soil Description:	Silty CLAY		
Cracking / Crumbling:	NIL		
Estimated Inert Inclusions (%):	1.00	Swell Pre-Soak Moisture Content (%)	17.7
Shrinkage Moisture Content (%):	21.1	Swell Post-Soak Moisture Content (%)	31.5

Shrinkage Strain (%)	3.3	Shrink / Swell Index	2.2
Swell Strain (%)	1.4		

Remarks	Re-Issued Report Replaces Report No 16822/R/32481-1 (reason:)., Results apply to the sample/s as received.,

NATA

Accredited for compliance with ISO/IEC 17025 – Testing

Accreditation Number: 1986
Corporate Site Number: 16822



Approved Signatory: Blayke Desvaux
Form ID: W21Rep Rev 1

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ABN: 25 131 532 020
Sydney: 12/1 Boden Road Seven Hills NSW 2147 | PO Box 45 Pendle Hill NSW 2145
Ph: (02) 9674 7711 | **Fax:** (02) 9674 7755 | **Email:** info@resourcelab.com.au

Test Report

Customer: Cardno
Job number: 21-0143
Project: 80022026
Report number: 1
Location: Royal Prince Alfred Hospital - East Campus

Uniaxial Compressive Strength of Rock Core

Sampling method: Tested as received
Test method(s): AS 4133.1.1.1, 4.2.2

	Results			
Laboratory sample no.	26327	26328	26329	26330
Customer sample no.	BH304 15.00-15.11m	BH302 10.68-10.85m	BH303 13.45-13.67m	BH306 12.28-12.43m
Sample depth	15.00-15.11m	10.68-10.85m	13.45-13.67m	12.28-12.43m
Date sampled	29/11/2021	29/11/2021	03/12/2021	02/12/2021
Date tested	17/12/2021	17/12/2021	17/12/2021	17/12/2021
Lithological description	LAMINITE	LAMINITE	LAMINITE	LAMINITE
Storage history, curing and environment	Sealed, moist, moisture condition as received	Sealed, moist, moisture condition as received	Sealed, moist, moisture condition as received	Sealed, moist, moisture condition as received
Type of test machine used	Matest 1500kN - Grade A	Matest 1500kN - Grade A	Matest 1500kN - Grade A	Matest 1500kN - Grade A
Description of failure	Tensile dominated	Tensile dominated	Tensile dominated	Mixed mode
Specimen average length (mm)	97.6	145.5	144.5	143.7
Specimen average diameter (mm)	51.6	51.8	51.4	51.5
Moisture content at time of test (%)	2.8	1.9	1.7	4.4
Test duration (mins)	112	18	17	12
Rate of displacement (mm/min)	<0.1	<0.1	<0.1	<0.1
Uniaxial Compressive Strength (MPa)	**36**	**52**	**50**	**10**

Notes: 26327 - Length to diameter ratio less than 2.0

Approved Signatory: C. Greely **Date:** 20/12/2021

resource Laboratories
AGGREGATE, ROCK, AND SOIL TESTING
ABN: 25 131 532 020
Sydney: 12/1 Boden Road Seven Hills NSW 2147 | PO Box 45 Pendle Hill NSW 2145
Ph: (02) 9674 7711 | **Fax:** (02) 9674 7755 | **Email:** info@resourcelab.com.au

Test Report

Customer: Cardno
Project: 80022026
Location: Royal Prince Alfred Hospital - East Campus

Job number: 21-0143
Report number: 1
Page: 2 of 3

Uniaxial Compressive Strength of Rock Core

Specimen prior to testing

Laboratory sample no. 26327
Customer sample no. BH304 15.00-15.11m



Specimen after failure

Laboratory sample no. 26327
Customer sample no. BH304 15.00-15.11m



Laboratory sample no. 26328
Customer sample no. BH302 10.68-10.85m



Laboratory sample no. 26328
Customer sample no. BH302 10.68-10.85m



resource laboratories
AGGREGATE, ROCK, AND SOIL TESTING
ABN: 25 131 532 020
Sydney: 12/1 Boden Road Seven Hills NSW 2147 | PO Box 45 Pendle Hill NSW 2145
Ph: (02) 9674 7711 **| Fax:** (02) 9674 7755 **| Email:** info@resourcelab.com.au

Test Report

Customer: Cardno
Project: 80022026
Location: Royal Prince Alfred Hospital - East Campus

Job number: 21-0143
Report number: 1
Page: 3 of 3

Uniaxial Compressive Strength of Rock Core

Specimen prior to testing

Laboratory sample no. 26329
Customer sample no. BH303 13.45-13.67m



Specimen after failure

Laboratory sample no. 26329
Customer sample no. BH303 13.45-13.67m



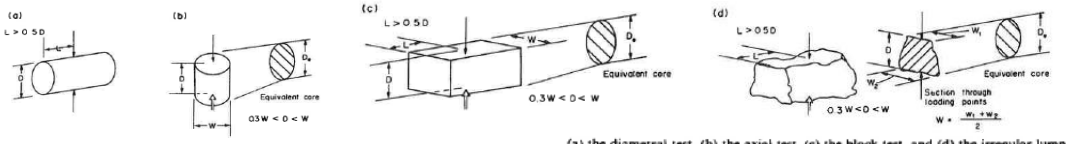
Laboratory sample no. 26330
Customer sample no. BH306 12.28-12.43m



Laboratory sample no. 26330
Customer sample no. BH306 12.28-12.43m



POINT LOAD TEST RESULTS



(a) the diametral test, (b) the axial test, (c) the block test, and (d) the irregular lump test.

PROJECT: 80022026 RPAH

LOCATION: BH302 DATE: 1/12/2021 Coring size NMLC

SAMPLE DEPTH / INTERVAL (m)	TEST No.	ROCK TYPE #	TYPE OF TEST	L LENGTH (mm)	SHAPE OK ?	D DISTANCE (mm)	W WIDTH (mm)	P LOAD (KN)	De^2 (mm)	De (mm)	Is (MPa)	Size Corr. F	Is(50) (MPa)	Empirical UCS (MPa)	Rock Strength (MPa)	FAILURE TYPE *
8.03	1		Diametral	30.0	OK	52.0	n/a	0.03	2704	52	0.01	1.02	0.01	0.23	EL	C
	2		Axial		OK	30.0	52.0	0.52	1986	45	0.26	0.95	0.25	4.97	L	C
											Test Date:		1/12/2021			
9.04	1		Diametral	33.0	OK	52.0	n/a	0.08	2704	52	0.03	1.02	0.03	0.60	VL	C
	2		Axial		OK	33.0	52.0	0.53	2185	47	0.24	0.97	0.24	4.71	L	C
											Test Date:		1/12/2021			
9.57	1		Diametral	45.0	OK	52.0	n/a	0.16	2704	52	0.06	1.02	0.06	1.20	VL	C
	2		Axial		OK	45.0	52.0	1.93	2979	55	0.65	1.04	0.67	13.48	M	C
											Test Date:		1/12/2021			
10.64	1		Diametral	41.0	OK	52.0	n/a	2.62	2704	52	0.97	1.02	0.99	19.72	M	C
	2		Axial		OK	41.0	52.0	6.12	2715	52	2.25	1.02	2.30	45.93	H	C
											Test Date:		1/12/2021			
11.45	1		Diametral	37.0	OK	52.0	n/a	3.76	2704	52	1.39	1.02	1.42	28.31	H	C
	2		Axial		OK	37.0	52.0	3.73	2450	49	1.52	1.00	1.52	30.31	H	C
											Test Date:		1/12/2021			
12.25	1		Diametral	35.0	OK	52.0	n/a	4.03	2704	52	1.49	1.02	1.52	30.34	H	C
	2		Axial		OK	35.0	52.0	5.88	2317	48	2.54	0.98	2.49	49.89	H	C
											Test Date:		1/12/2021			
13.07	1		Diametral	43.0	OK	52.0	n/a	3.33	2704	52	1.23	1.02	1.25	25.07	H	C
	2		Axial		OK	43.0	52.0	5.85	2847	53	2.05	1.03	2.12	42.32	H	C
											Test Date:		1/12/2021			
14.27	1		Diametral	40.0	OK	52.0	n/a	3.89	2704	52	1.44	1.02	1.46	29.28	H	C
	2		Axial		OK	40.0	52.0	5.39	2648	51	2.04	1.01	2.06	41.24	H	C
											Test Date:		1/12/2021			

PLT MODEL No: Geotech. Systems Aust. 6500

SS=Sandstone SL=Siltstone CY=Claystone MD=Mudstone CB=Carbonaceous

CG=Conglomerate CO=Coal IG=Igneous IB=Interbedded (% 1st rock type:% 2nd rock type)

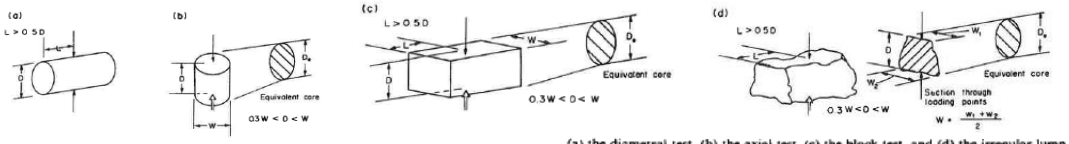
XW or EW = Extremely Weathered SW = Slightly Weathered

DW or (HW & MW) = Distinctly Weathered ** Rocks are FRESH unless otherwise stated.

* P=Partial C=Complete

MACHINE CALIBRATION FACTOR = 1.0 CONVERSION FROM Is(50) to UCS = 20

POINT LOAD TEST RESULTS



(a) the diametral test, (b) the axial test, (c) the block test, and (d) the irregular lump test.

PROJECT: 80022026 RPAH

LOCATION: BH303 **DATE:** 6/12/2021 **Coring size** NMLC

SAMPLE DEPTH / INTERVAL (m)	TEST No.	ROCK TYPE #	TYPE OF TEST	L LENGTH (mm)	SHAPE OK ?	D DISTANCE (mm)	W WIDTH (mm)	P LOAD (KN)	De² (mm)	De (mm)	Is (MPa)	Size Corr. F	Is(50) (MPa)	Empirical UCS (MPa)	Rock Strength (MPa)	FAILURE TYPE *
10.25	1		Diametral	39.0	OK	52.0	n/a	1.29	2704	52	0.48	1.02	0.49	9.71	M	C
	2		Axial		OK	39.0	52.0	0.78	2582	51	0.30	1.01	0.30	6.09	M	C
											Test Date:		6/12/2021			
11.41	1		Diametral	40.0	OK	52.0	n/a	1.27	2704	52	0.47	1.02	0.48	9.56	M	C
	2		Axial		OK	40.0	52.0	0.64	2648	51	0.24	1.01	0.24	4.90	L	C
											Test Date:		6/12/2021			
12.28	1		Diametral	25.0	NOT OK	52.0	n/a	1.13	2704	52	0.42	1.02	0.43	8.51	M	C
											Test Date:		6/12/2021			
12.56	1		Diametral	49.0	OK	52.0	n/a	1.46	2704	52	0.54	1.02	0.55	10.99	M	C
	2		Axial		OK	49.0	52.0	1.24	3244	57	0.38	1.06	0.41	8.11	M	P
											Test Date:		6/12/2021			
12.95	1		Diametral	40.0	OK	52.0	n/a	2.25	2704	52	0.83	1.02	0.85	16.94	M	C
	2		Axial		OK	40.0	52.0	2.68	2648	51	1.01	1.01	1.03	20.50	H	C
											Test Date:		6/12/2021			
13.67	1		Diametral	50.0	OK	52.0	n/a	3.28	2704	52	1.21	1.02	1.23	24.69	H	C
	2		Axial		OK	50.0	52.0	8.64	3310	58	2.61	1.07	2.78	55.60	H	C
											Test Date:		6/12/2021			

PLT MODEL No: Geotech. Systems Aust. 6500

SS=Sandstone SL=Siltstone CY=Claystone MD=Mudstone CB=Carbonaceous

CG=Conglomerate CO=Coal IG=Igneous IB=Interbedded (% 1st rock type:% 2nd rock type)

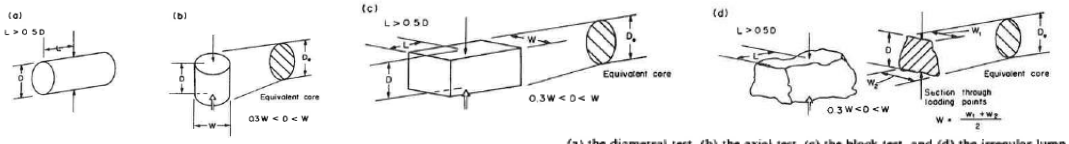
XW or EW = Extremely Weathered SW = Slightly Weathered

DW or (HW & MW) = Distinctly Weathered ** Rocks are FRESH unless otherwise stated.

* P=Partial C=Complete

MACHINE CALIBRATION FACTOR = 1.0 CONVERSION FROM Is(50) to UCS = 20

POINT LOAD TEST RESULTS



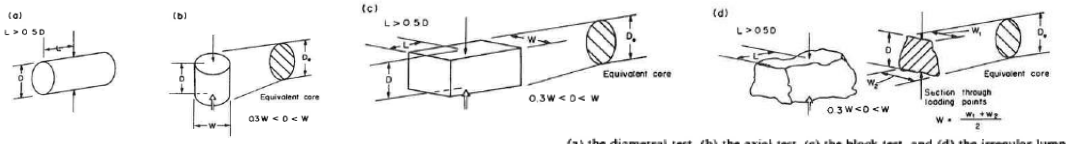
(a) the diametral test, (b) the axial test, (c) the block test, and (d) the irregular lump test.

PROJECT: 80022026 RPAH

LOCATION: BH304 DATE: 1/12/2021 Coring size NMLC

SAMPLE DEPTH / INTERVAL (m)	TEST No.	ROCK TYPE #	TYPE OF TEST	L LENGTH (mm)	SHAPE OK ?	D DISTANCE (mm)	W WIDTH (mm)	P LOAD (KN)	De^2 (mm)	De (mm)	Is (MPa)	Size Corr. F	Is(50) (MPa)	Empirical UCS (MPa)	Rock Strength (MPa)	FAILURE TYPE *
12.63	1		Diametral	28.0	OK	52.0	n/a	1.23	2704	52	0.45	1.02	0.46	9.26	M	C
	2		Axial		OK	28.0	52.0	2.75	1854	43	1.48	0.93	1.39	27.74	H	C
											Test Date:		1/12/2021			
12.95	1		Diametral	31.0	OK	52.0	n/a	2.58	2704	52	0.95	1.02	0.97	19.42	M	C
	2		Axial		OK	31.0	52.0	3.36	2052	45	1.64	0.96	1.57	31.32	H	C
											Test Date:		1/12/2021			
13.39	1		Diametral	40.0	OK	52.0	n/a	1.19	2704	52	0.44	1.02	0.45	8.96	M	C
	2		Axial		OK	40.0	52.0	2.10	2648	51	0.79	1.01	0.80	16.07	M	P
											Test Date:		1/12/2021			
14.95	1		Diametral	36.0	OK	52.0	n/a	2.97	2704	52	1.10	1.02	1.12	22.36	H	C
	2		Axial		OK	36.0	52.0	2.79	2384	49	1.17	0.99	1.16	23.16	H	C
											Test Date:		1/12/2021			

POINT LOAD TEST RESULTS



(a) the diametral test, (b) the axial test, (c) the block test, and (d) the irregular lump test.

PROJECT: 80022026 RPAH

LOCATION: BH306 DATE: 6/12/2021 Coring size NMLC

SAMPLE DEPTH / INTERVAL (m)	TEST No.	ROCK TYPE #	TYPE OF TEST	L LENGTH (mm)	SHAPE OK ?	D DISTANCE (mm)	W WIDTH (mm)	P LOAD (KN)	De² (mm)	De (mm)	Is (MPa)	Size Corr. F	Is(50) (MPa)	Empirical UCS (MPa)	Rock Strength (MPa)	FAILURE TYPE *
9.88	1		Diametral	39.0	OK	52.0	n/a	0.31	2704	52	0.11	1.02	0.12	2.33	L	C
	2		Axial		OK	39.0	52.0	1.47	2582	51	0.57	1.01	0.57	11.47	M	C
											Test Date:		6/12/2021			
10.3	1		Diametral	34.0	OK	52.0	n/a	1.31	2704	52	0.48	1.02	0.49	9.86	M	C
	2		Axial		OK	34.0	52.0	2.39	2251	47	1.06	0.98	1.04	20.74	H	C
											Test Date:		6/12/2021			
11.41	1		Diametral	41.0	OK	52.0	n/a	2.61	2704	52	0.97	1.02	0.98	19.65	M	C
	2		Axial		OK	41.0	52.0	2.53	2715	52	0.93	1.02	0.95	18.99	M	C
											Test Date:		6/12/2021			
11.73	1		Diametral	45.0	OK	52.0	n/a	0.27	2704	52	0.10	1.02	0.10	2.03	L	C
	2		Axial		OK	45.0	52.0	1.72	2979	55	0.58	1.04	0.60	12.01	M	C
											Test Date:		6/12/2021			
12.79	1		Diametral	41.0	OK	52.0	n/a	1.19	2704	52	0.44	1.02	0.45	8.96	M	C
	2		Axial		OK	41.0	52.0	4.22	2715	52	1.55	1.02	1.58	31.67	H	C
											Test Date:		6/12/2021			
13.33	1		Diametral	37.0	OK	52.0	n/a	0.44	2704	52	0.16	1.02	0.17	3.31	L	C
	2		Axial		OK	37.0	52.0	2.79	2450	49	1.14	1.00	1.13	22.67	H	C
											Test Date:		6/12/2021			
14.78	1		Diametral	41.0	OK	52.0	n/a	2.61	2704	52	0.97	1.02	0.98	19.65	M	C
	2		Axial		OK	41.0	52.0	4.04	2715	52	1.49	1.02	1.52	30.32	H	C

PLT MODEL No: Geotech. Systems Aust. 6500

* P=Partial C=Complete

SS=Sandstone SL=Siltstone CY=Claystone MD=Mudstone CB=Carbonaceous

CG=Conglomerate CO=Coal IG=Igneous IB=Interbedded (% 1st rock type:% 2nd rock type)

XW or EW = Extremely Weathered SW = Slightly Weathered

DW or (HW & MW) = Distinctly Weathered ** Rocks are FRESH unless otherwise stated.

MACHINE CALIBRATION FACTOR = 1.0 CONVERSION FROM Is(50) to UCS = 20

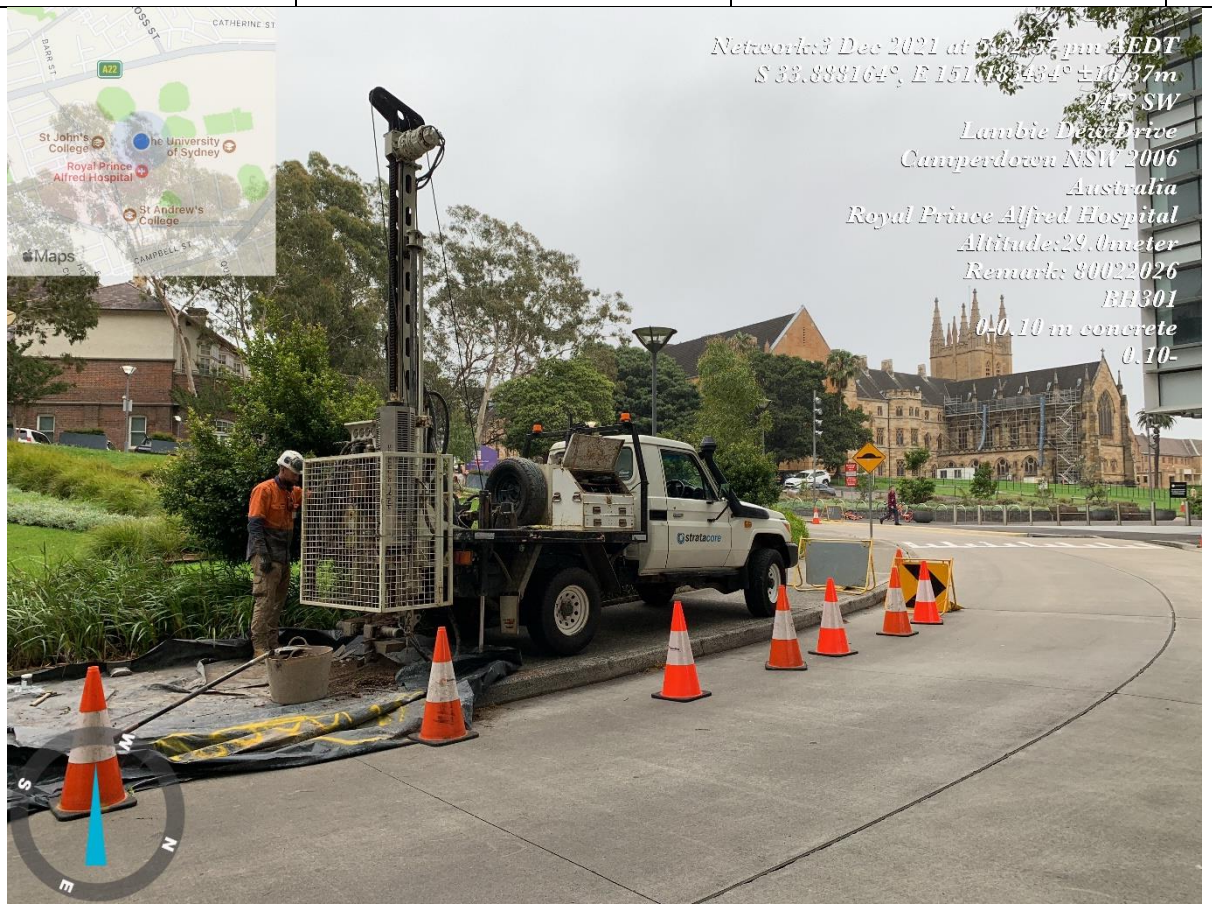
Royal Prince Alfred Hospital – Eastern Campus

APPENDIX D

SITE PHOTOGRAPHS

Cardno now Stantec

Cardno	TITLE **Photographs – BH301** **Geotechnical Investigation – Lambie Dew Drive Footpath**			
	Drawn **RKC**	DATE: **09/02/2022**	Scale: **Not to Scale**	**A4**
	Checked: **BD**	DATE: **09/02/2022**	Project No: **80022026**	Photograph No: **1/8**



Cardno	TITLE: **Photographs – BH302** **Geotechnical Investigation – Centenary Institute and Tissue Pathology and Diagnostic Oncology**			
	Drawn **RKC**	DATE: **09/02/2022**	Scale: **Not to Scale**	**A4**
	Checked: **BD**	DATE: **09/02/2022**	Project No: **80022026**	Photograph No: **2/8**



Cardno	TITLE: **Photographs – BH303** **Geotechnical Investigation – Maternity Building**			
	Drawn **RKC**	DATE: **09/02/2022**	Scale: **Not to Scale**	**A4**
	Checked: **BD**	DATE: **09/02/2022**	Project No: **80022026**	Photograph No: **3/8**



Cardno	TITLE: **Photographs – BH304** **Geotechnical Investigation – Rear of Centenary Institute and Tissue Pathology and Diagnostic Oncology and Chapel**			
	Drawn **RKC**	DATE: **09/02/2022**	Scale: **Not to Scale**	**A4**
	Checked: **BD**	DATE: **09/02/2022**	Project No: **80022026**	Photograph No: **4/8**



Cardno	TITLE: **Photographs – BH305A** **Geotechnical Investigation – Lambie Dew Drive**			
	Drawn **RKC**	DATE: **09/02/2022**	Scale: **Not to Scale**	**A4**
	Checked: **BD**	DATE: **09/02/2022**	Project No: **80022026**	Photograph No: **5/8**



	TITLE: **Photographs – BH305B** **Geotechnical Investigation – Lambie Dew Drive**			
Cardno	Drawn **RKC**	DATE: **09/02/2022**	Scale: **Not to Scale**	**A4**
	Checked: **BD**	DATE: **09/02/2022**	Project No: **80022026**	Photograph No: **6/8**



Cardno	TITLE: **Photographs – BH306** **Geotechnical Investigation – South end of Clinical Services Building**			
	Drawn **RKC**	DATE: **09/02/2022**	Scale: **Not to Scale**	**A4**
	Checked: **BD**	DATE: **09/02/2022**	Project No: **80022026**	Photograph No: **7/8**



	TITLE: **Photographs – BH307** **Geotechnical Investigation – Cyclotron Building**			
Cardno	Drawn **RKC**	DATE: **09/02/2022**	Scale: **Not to Scale**	**A4**
	Checked: **BD**	DATE: **09/02/2022**	Project No: **80022026**	Photograph No: **8/8**



Royal Prince Alfred Hospital – Eastern Campus

APPENDIX E

PREVIOUS BOREHOLE LOGS AND LABORATORY TEST RESULTS

Cardno now Stantec

TEST BORE REPORT

BORE No. 1

CLIENT G. W. STACE & CO. PTY. LTD. **DATE** 7/4/89

SITE INSTITUTE OF CANCER & CELL BIOLOGY BUILDING **CONTRACT No.** SSI/12093

LOCATION ROYAL PRINCE ALFRED HOSPITAL, CAMPERDOWN **SURFACE LEVEL** Approx. 22.7 m

Description of Strata	Depth metres	Sampling and in-situ Testing			
		Type	Depth	'N' value	Core recovery
	S.L.				%
BITUMEN	0.05				
CONCRETE	0.20				
FILLING - crushed shale, sand, clay and ash with gravel and brick fragments to 25mm		S	0.50 - 0.95	3,4,4 N=8	
		S	1.70 - 2.15	8,8,4 N=12	
	2.30				
SILTY CLAY - stiff to very stiff, grey and red brown silty clay with minor ironstone gravels to 10mm		S	2.90 - 3.35	7,10,15 N=25	
	3.70				
		S	4.10 - 4.45	10,12,10/50mm	
CLAYEY SHALE - extremely weak to very weak, grey and red brown clayey shale with ironstone layers to 25mm		C	5.00 - 6.00		95
*core loss 5.00-5.05 m					
*core loss 6.00-6.20 m		C	6.00 - 9.00		94
	6.50				
LAMINITE - weak to medium strong, highly fractured to fractured, dark grey shale and pale grey fine grained sandstone with some extremely weak to very weak layers					
	7.65				
LAMINITE - medium strong to strong, fractured to slightly fractured dark grey shale and pale grey fine grained sandstone with some extremely weak fragmented layers					
*fragmented from 8.40-8.50 m	9.00				

BORE DISCONTINUED AT 9.00 METRES

RIG B20 **DRILLER** Bannister **CASING**

TYPE OF BORING Solid flight auger to 5.00 m, NMLC coring thereafter

WATER LEVEL OBSERVATIONS No free ground water observed

REMARKS $Is_{(50)}$ = 1.69MPa at 7.35 m
= 1.11MPa at 8.75 m

TYPE

A — auger sample
S — standard penetration test sample
U — mm diameter undisturbed sample
C — continuous diamond core
V — field vane shear test

"N" VALUE

blows of a 63.5 kg hammer falling 760 mm to drive a standard 50 mm O.D. split penetrometer for the last 300 mm of test (where thin walled undisturbed sample tubes are driven in the same manner, the values are shown bracketed).

D.J.Douglas & Partners

TEST BORE REPORT

BORE No. 2

CLIENT G. W. STACE & CO. PTY. LTD. DATE 6/4/89

SITE INSTITUTE OF CANCER & CELL BIOLOGY BUILDING CONTRACT No. SSI/12093

LOCATION ROYAL PRINCE ALFRED HOSPITAL, CAMPERDOWN SURFACE LEVEL Approx. 22.0 m

Description of Strata	Depth metres	Sampling and in-situ Testing			
		Type	Depth	'N' value	Core recovery
	S.L.				%
		U	0.50 - 0.90		
FILLING - dark brown clay with some roots		S	1.70 - 2.15	1 for N=3	300mm
	2.50				
SILTY CLAY - stiff, mottled grey and red brown silty clay with minor ironstone gravel to 4mm		S	2.90 - 3.35	1,2,3 N=5	
	4.00				
SILTY CLAY - very stiff grey silty clay with ironstone gravel to 20mm		S	4.10 - 4.55	5,7,11 N=18	
	5.00				
REFUSAL AT 5.00 METRES					

RIG Jacro DRILLER Bannister CASING

TYPE OF BORING Solid flight auger

WATER LEVEL OBSERVATIONS Free ground water observed at 2.50 m

REMARKS

TYPE

A — auger sample
S — standard penetration test sample
U — mm diameter undisturbed sample
C — continuous diamond core
V — field vane shear test

"N" VALUE

blows of a 63.5 kg hammer falling 760 mm to drive a standard 50 mm O.D. split penetrometer for the last 300 mm of test (where thin walled undisturbed sample tubes are driven in the same manner, the values are shown bracketed).

D.J.Douglas & Partners

TEST BORE REPORT

BORE No. 3

CLIENT G. W. STACE & CO. PTY. LTD. **DATE** 5/4/89

SITE INSTITUTE OF CANCER & CELL BIOLOGY BUILDING **CONTRACT No.** SSI/12093

LOCATION ROYAL PRINCE ALFRED HOSPITAL, CAMPERDOWN **SURFACE LEVEL** Approx. 22.1 m

Description of Strata	Depth metres	Sampling and in-situ Testing			
		Type	Depth	'N' value	Core recovery
	S.L.				%
		S	0.50 - 0.95	1,1,2 N=3	
FILLING - dark brown grey clay, gravel and ash					
		S	1.70 - 2.15	2,3,5 N=8	
		S	2.90 - 3.35	2,2,3 N=5	
	3.10				
FILLING - grey and brown clay with some shale fragments		S	4.10 - 4.55	2,3,5 N=8	
	5.30				
		S	5.30 - 5.75	4,6,8 n=14	
SILTY CLAY - stiff to very stiff, grey silty clay with some ironstone gravel to 20mm - grades into shaley clay		C	6.00 - 7.00		100
	6.10				
CLAYEY SHALE - extremely weak pale grey clayey shale with sandy laminations to 8mm *ironstone layer 6.90-6.95 m *core loss 7.00-7.10 m	7.10	C	7.00 - 8.00		90
LAMINITE - weak highly fractured to fractured, dark grey shale and pale grey fine grained sandstone with some extremely weak and medium strong layers *laminations at 10-15° *core loss 8.00-8.20 m		C	8.00 - 9.00		80
	9.00				
BORE DISCONTINUED AT 9.00 METRES					

RIG Jacro **DRILLER** Bannister **CASING**

TYPE OF BORING Solid flight auger to 6.00 m, NMLC coring thereafter

WATER LEVEL OBSERVATIONS No free ground water observed

REMARKS Two bores at this location, first attempt encountered a pipe at 2.2 m

$Is_{(50)}$ = 0.80MPa at 8.50 m
= 0.13MPa at 8.85 m
= 0.19MPa at 8.95 m

TYPE

A — auger sample
S — standard penetration test sample
U — mm diameter undisturbed sample
C — continuous diamond core
V — field vane shear test

"N" VALUE

blows of a 63.5 kg hammer falling 760 mm to drive a standard 50 mm O.D. split penetrometer for the last 300 mm of test (where thin walled undisturbed sample tubes are driven in the same manner, the values are shown bracketed).

D.J.Douglas & Partners

TEST BORE REPORT

BORE No. 4

CLIENT G. W. STACE & CO. PTY. LTD. **DATE** 10/4/89

SITE INSTITUTE OF CANCER & CELL BIOLOGY BUILDING **CONTRACT No.** SSI/12093

LOCATION ROYAL PRINCE ALFRED HOSPITAL, CAMPERDOWNE **SURFACE LEVEL** Approx 21.7 m

Description of Strata	Depth metres	Sampling and in-situ Testing			
		Type	Depth	'N' value	Core recovery
					%
BITUMEN ROADBASE	S.L.				
	0.30				
FILLING - crushed sandstone to 0.7 m then clay and gravel		S	0.50 - 0.95	5,4,5 N=9	
	1.50				
SILTY CLAY - stiff to very stiff, mottled grey and red brown silty clay with minor ironstone gravel to 4mm		S	1.70 - 2.15	3,4,7 N=11	
		S	4.10 - 4.25	15 for 150mm Bouncing	
SHALE - extremely weak grey shale	4.25				
	5.30				
SHALE - very weak to weak, highly fractured to fractured, dark grey shale with high angle jointing and thinly laminated fine grained sandstone layers and some extremely weak and fragmented layers with some medium strong ferruginous layers		C	5.50 - 8.50		86
*core loss 5.50-5.90 m	7.35				
LAMINITE - medium strong to strong, fractured to slightly fractured, dark grey shale and pale grey fine grained sandstone with some extremely weak to very weak and fragmented layers		C	8.50 - 9.70		100
*extremely weak pale yellow grey clay layer from 8.35-8.45 m	9.70				

BORE DISCONTINUED AT 9.70 METRES

RIG B20 **DRILLER** Bannister **CASING**

TYPE OF BORING Solid flight auger to 5.5 m, NMLC coring thereafter

WATER LEVEL OBSERVATIONS Free ground water observed at 5 m

REMARKS

TYPE

A — auger sample
S — standard penetration test sample
U — mm diameter undisturbed sample
C — continuous diamond core
V — field vane shear test

"N" VALUE

blows of a 63.5 kg hammer falling 760 mm to drive a standard 50 mm O.D. split penetrometer for the last 300 mm of test (where thin walled undisturbed sample tubes are driven in the same manner, the values are shown bracketed).

D.J.Douglas & Partners

TEST BORE REPORT

BORE No. 5

CLIENT G. W. STACE & CO. PTY. LTD. DATE 10/4/89

SITE INSTITUTE OF CANCER & CELL BIOLOGY BUILDING CONTRACT No. SSI/12093

LOCATION ROYAL PRINCE ALFRED HOSPITAL, CAMPERDOWN SURFACE LEVEL Approx. 20.0 m

Description of Strata	Depth metres	Sampling and in-situ Testing			
		Type	Depth	'N' value	Core recovery
	S.L.				%
BITUMEN & ROADBASE	0.10				
FILLING - crushed sandstone to 0.6 m then clay and gravel		S	0.50 - 0.90	5,4,4 N=8	
	1.50				
SILTY CLAY - stiff to very stiff mottled grey and red brown silty clay		S	1.70 - 2.15	2,4,5 N=9	
	2.50				
SILTY CLAY - very stiff light grey silty clay		S	2.90 - 3.35	3,6,9 N=15	
	3.80				
		S	4.10 - 4.40	12,30 N 50	Bouncing
SHALE - extremely weak to very weak grey and brown shale *core loss 4.60-5.00 m		C	4.60 - 6.60		80
	5.00				
LAMINITE - medium strong to strong, highly fractured to fractured, dark grey shale and pale grey fine grained sandstone with some extremely to very weak layers		C	6.60 - 8.60		100
	8.60				
BORE DISCONTINUED AT 8.60 METRES					

RIG B20 DRILLER Bannister CASING

TYPE OF BORING Solid flight auger from G.L. to 4.6 m then NMLC coring thereafter

WATER LEVEL OBSERVATIONS No free ground water observed

REMARKS $Is_{(50)}$ = 1.19MPa at 8.45 m
= 0.56MPa at 6.10 m

TYPE

A — auger sample
S — standard penetration test sample
U — mm diameter undisturbed sample
C — continuous diamond core
V — field vane shear test

"N" VALUE

blows of a 63.5 kg hammer falling 760 mm to drive a standard 50 mm O.D. split penetrometer for the last 300 mm of test (where thin walled undisturbed sample tubes are driven in the same manner, the values are shown bracketed).

D.J.Douglas & Partners

TEST BORE REPORT

BORE No. 6

CLIENT G. W. STACE & CO. PTY. LTD. **DATE** 5/4/89

SITE INSTITUTE OF CANCER & CELL BIOLOGY BUILDING **CONTRACT No.** SSI/12093

LOCATION ROYAL PRINCE ALFRED HOSPITAL, CAMPERDOWN **SURFACE LEVEL** Approx. 21.5 m

Description of Strata	Depth metres	Sampling and in-situ Testing			
		Type	Depth	'N' value	Core recovery
	S.L.				%
		S	0.50 - 0.95	2,3,2 N=5	
FILLING - stiff grey brown clay with shale fragments and gravel to 15mm and some ash		S	1.70 - 2.15	2,2,5 N=7	
		S	2.90 - 3.35	2,2,3 N=5	
	3.70				
SILTY CLAY - stiff grey brown and red brown silty clay with ironstone gravel to 12mm		S	4.10 - 4.55	3,5,7 N=12	
	5.20	S	5.30 - 5.75	4,7,11 N=18	
SILTY CLAY - very stiff to hard light grey silty clay					
CLAYEY SHALE - extremely weak to very weak grey clayey shale	6.20				
	6.50				
REFUSAL AT 6.50 METRES					

RIG Jacro **DRILLER** Bannister **CASING**

TYPE OF BORING Solid flight auger from G.L. to 6.5 m

WATER LEVEL OBSERVATIONS No free ground water observed

REMARKS Two bores at this location, first attempt encountered a pipe at 2.2 m

TYPE

A — auger sample
S — standard penetration test sample
U — mm diameter undisturbed sample
C — continuous diamond core
V — field vane shear test

"N" VALUE

blows of a 63.5 kg hammer falling 760 mm to drive a standard 50 mm O.D. split penetrometer for the last 300 mm of test (where thin walled undisturbed sample tubes are driven in the same manner, the values are shown bracketed).

D.J.Douglas & Partners

TEST BORE REPORT

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: PROPOSED REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

DATE: 7 JULY 98
PROJECT No.: 27456
SURFACE LEVEL: 29.1

BORE No. 1
SHEET 1 OF 1

Depth m	Description of Strata	Sampling & In Situ Testing: Type	Depth (m)	Test Results	Core Recovery %
0	CLAY – stiff, grey brown mottled orange clay	A	0.5	pp=150kPa	
1.0	SILTY CLAY – hard, grey brown silty clay	U_{50}	1.1		
2		A	2.0	pp=450kPa	
2.4	SHALY CLAY – hard, grey brown shaly clay	A	3.0	pp>450kPa	
3.5	SHALE – low strength, grey brown shale	A	3.6		
4.0	SHALE – low to medium strength, brown shale	A	4.5		
5		A	5.5		
6.4	SHALE – medium strength, brown shale	A	6.5		
7.1	TEST BORE DISCONTINUED AT 7.1 METRES – due to auger refusal				
8					
9					
10					

RIG: PENGO **DRILLER:** ROBAR **LOGGED:** KAWALSKY **CASING:** –

TYPE OF BORING: 300mm DIAMETER ROCK AUGER

GROUND WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS: SLOW DRILLING FROM 6.4m

SAMPLING & IN SITU TESTING LEGEND

A Auger sample	M Moisture content (%)
B Bulk sample	pp Pocket Penetration (kPa)
D Disturbed sample	Ux x mm dia. tube
HV Hand Vane	Wp Plastic limit (%)

CHECKED:
Initials: KCSB
Date: 16/10/98

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TEST BORE REPORT

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE **DATE:** 30 SEPTEMBER 98 **BORE No.** 2
PROJECT: RPAH REDEVELOPMENT, EASTERN PRECINCT **PROJECT No.:** 27456 **SHEET** 1 **OF** 1
LOCATION: MISSENDEN ROAD, CAMPERDOWN **SURFACE LEVEL:** 28.3

Depth m	Description of Strata	Sampling & In Situ Testing: Type	Depth (m)	Test Results	Core Recovery %
0	FILLING – loose, light yellow grey, fine grained sand and dark brown and grey gravelly silty clay filling				
1.2	CLAY – very stiff to hard, light red brown mottled, light grey clay with some silt and sugary ironstone bands	A	2.0		
2.3	SHALY CLAY – hard, red brown mottled, light grey shaly clay with ironstone bands	A	2.7		
3.0	– auger cuttings red brown between 2.7m and 2.8m depth	A	3.0		
3.2	SHALE – extremely low strength, light grey shale with ironstone bands	A	3.2		
4	SHALE – very low to low strength, grey shale with ironstone bands				
4.5	SHALE – low to medium strength, dark grey and grey brown shale with some ironstone bands	A	4.5		
5		A	5.0		
6					
6.3	SHALE – medium strength, grey to grey brown shale	A	6.3		
6.7	TEST BORE DISCONTINUED AT 6.7 METRES – due to auger refusal				
7					
8					
9					
10					

RIG: PACIFIC 375 **DRILLER:** DUMMETT **LOGGED:** STEWART **CASING:** NIL
TYPE OF BORING: 300mm DIAMETER SPIRAL FLIGHT AUGER
GROUND WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A Auger sample	M Moisture content (%)
B Bulk sample	pp Pocket Penetration (kPa)
D Disturbed sample	Ux x mm dia. tube
HV Hand Vane	Wp Plasitc limit (%)

CHECKED:
Initials: WJB
Date: 16/10/98

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TEST BORE REPORT

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: RPAH REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

DATE: 30 SEPTEMBER 98
PROJECT No.: 27456
SURFACE LEVEL: 27.1

BORE No. 3
SHEET 1 OF 1

Depth m	Description of Strata	Sampling & In Situ Testing: Type	Depth (m)	Test Results	Core Recovery %
0	CLAY – very stiff, brown mottled light grey clay with some silt and ironstone gravel	A	1.0		
		U_{50}			
2.0	SHALY CLAY – hard, red brown mottled grey clay with some sugary ironstone bands and ironstone gravel	A	2.0		
3.5	SHALE – very low strength, light grey to red brown shale (bands of extremely low strength, light grey shale, ironstone and low strength grey brown shale)	A	4.0		
4.2	SHALE – low to medium strength, grey to grey brown shale				
5.0	SHALE – medium strength grey shale	A	5.0		
5.6	TEST BORE DISCONTINUED AT 5.6 METRES – due to auger refusal	A	5.6		

RIG: PACIFIC 375 **DRILLER:** DUMMETT **LOGGED:** STEWART **CASING:** NIL
TYPE OF BORING: 300mm DIAMETER SPIRAL FLIGHT AUGER
GROUND WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A Auger sample	M Moisture content (%)
B Bulk sample	pp Pocket Penetration (kPa)
D Disturbed sample	Ux x mm dia. tube
HV Hand Vane	Wp Plastic limit (%)

CHECKED:
Initials: KJB
Date: 16/10/98

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TEST BORE REPORT

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: RPAH REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

DATE: 30 SEPTEMBER 98
PROJECT No.: 27456
SURFACE LEVEL: 26.6

BORE No. 4
SHEET 1 OF 1

Depth m	Description of Strata	Sampling & In Situ Testing: Type	Depth (m)	Test Results	Core Recovery %
0	FILLING – dark brown to grey sandy silty clay with gravel, concrete, bricks and other fragments of building rubble				
1.8	CLAY – very stiff, light brown and red brown mottled light grey clay with some silt and sugary ironstone bands	A	2.0		
2.1	SHALE – extremely low strength, light brown mottled light grey shale with some ironstone gravel	A	3.0		
3.4	SHALE – very low strength, light grey to light brown and dark grey shale (bands of extremely low strength, light grey shale, ironstone and low strength, dark grey shale)	A	4.0		
		A	5.0		
6.0	SHALE – low to medium strength, dark grey and grey brown shale with some ironstone bands	A	6.0		
6.9	SHALE – medium strength, dark grey and brown shale	A	7.0		
7.7	TEST BORE DISCONTINUED AT 7.7 METRES – due to auger refusal	A	7.6		

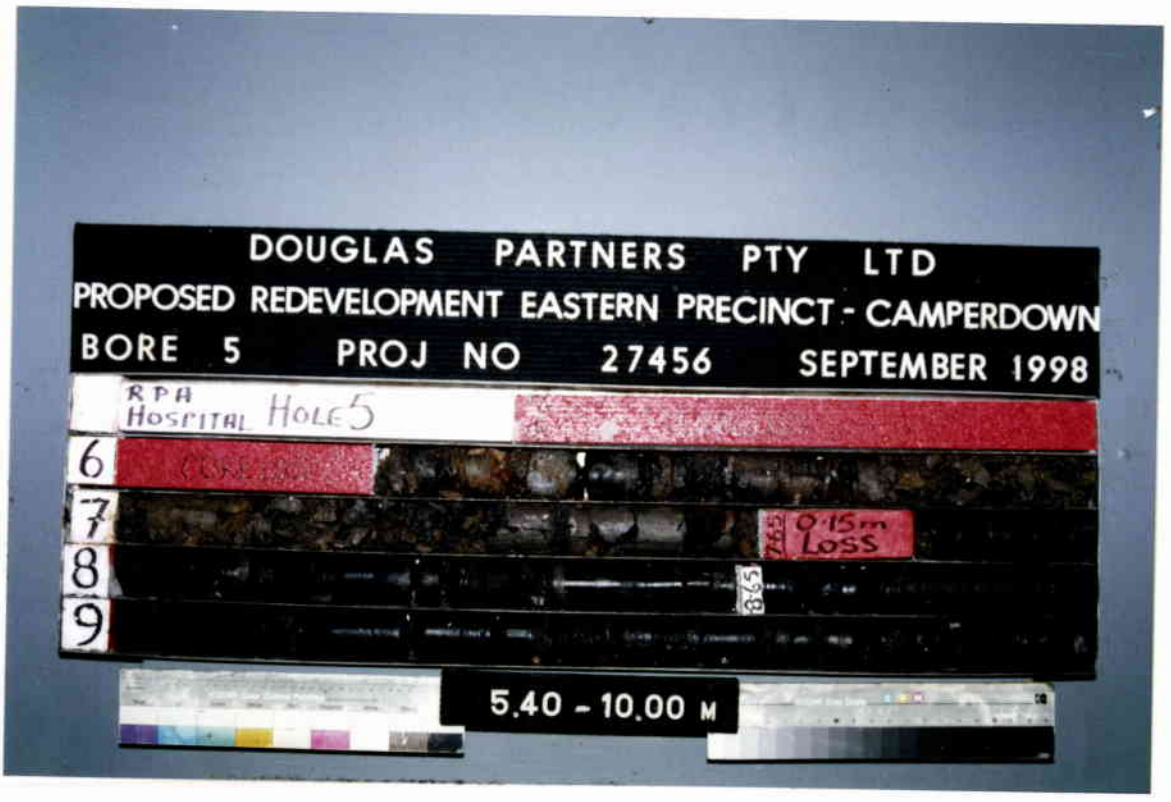
RIG: PACIFIC 375 **DRILLER:** DUMMETT **LOGGED:** STEWART **CASING:** NIL
TYPE OF BORING: 300mm DIAMETER SPIRAL FLIGHT AUGER
GROUND WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A Auger sample	M Moisture content (%)
B Bulk sample	pp Pocket Penetration (kPa)
D Disturbed sample	Ux x mm dia. tube
HV Hand Vane	Wp Plasitc limit (%)

CHECKED:
Initials: WSB
Date: 16/10/98

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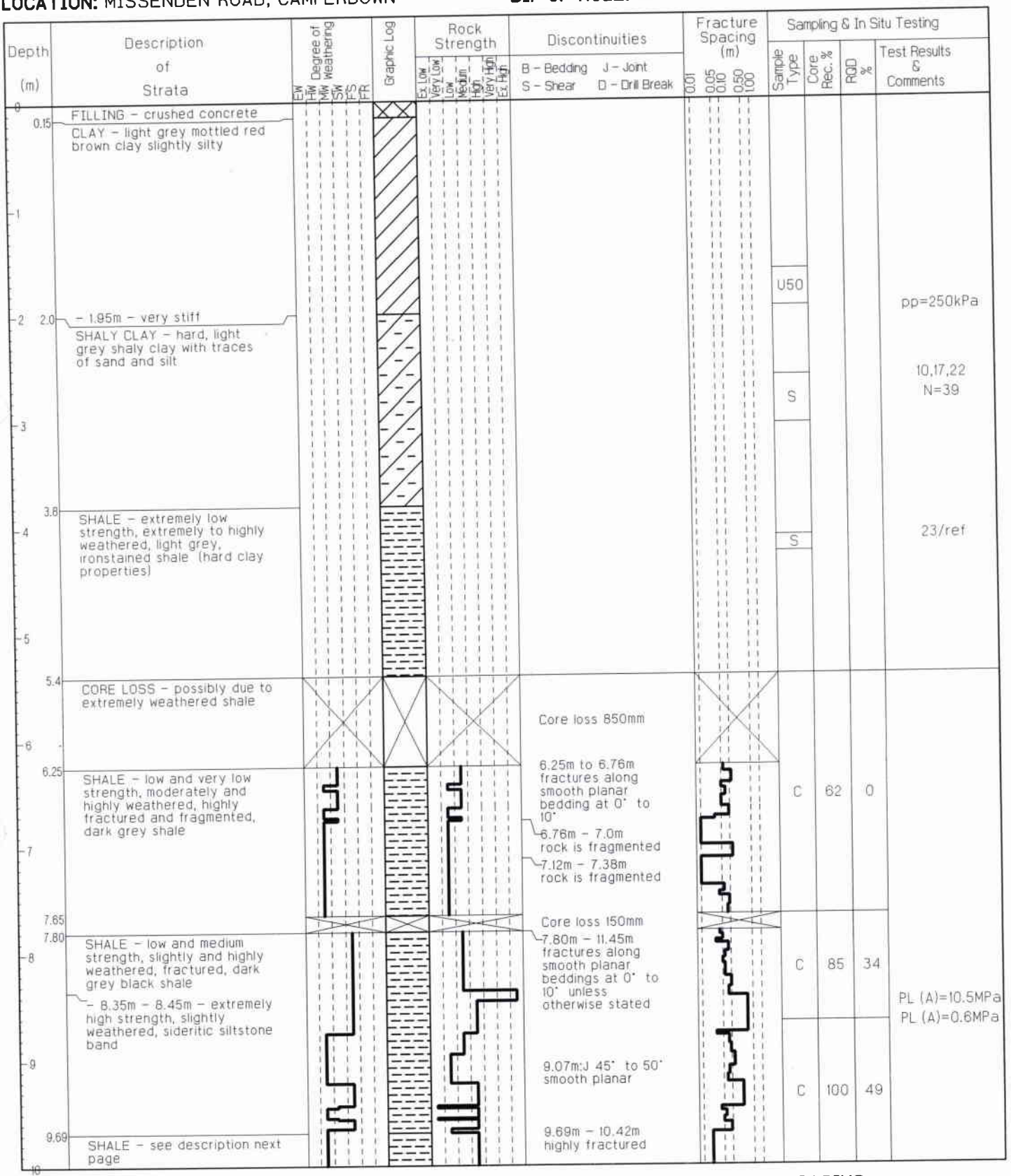

DOUGLAS PARTNERS PTY LTD
PROPOSED REDEVELOPMENT EASTERN PRECINCT - CAMPERDOWN
BORE 5 PROJ NO 27456 SEPTEMBER 1998
RPA HOSPITAL HOLE 5
6
7
8
9
0.15m LOSS
5.40 - 10.00 M

TEST BORE REPORT

BORE No: 5
DATE: 26 AUGUST 98
SHEET 1 **OF** 2
AZIMUTH:

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: RPAH REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

PROJECT No: 27456
SURFACE LEVEL: 25.67
DIP OF HOLE: 90°



RIG: APS 300 **DRILLER:** McNULTY **LOGGED:** PARMAR **CASING:** GL TO 2.6m

TYPE OF BORING: ROTARY TO 5.40m, NMLC CORING TO 11.45m

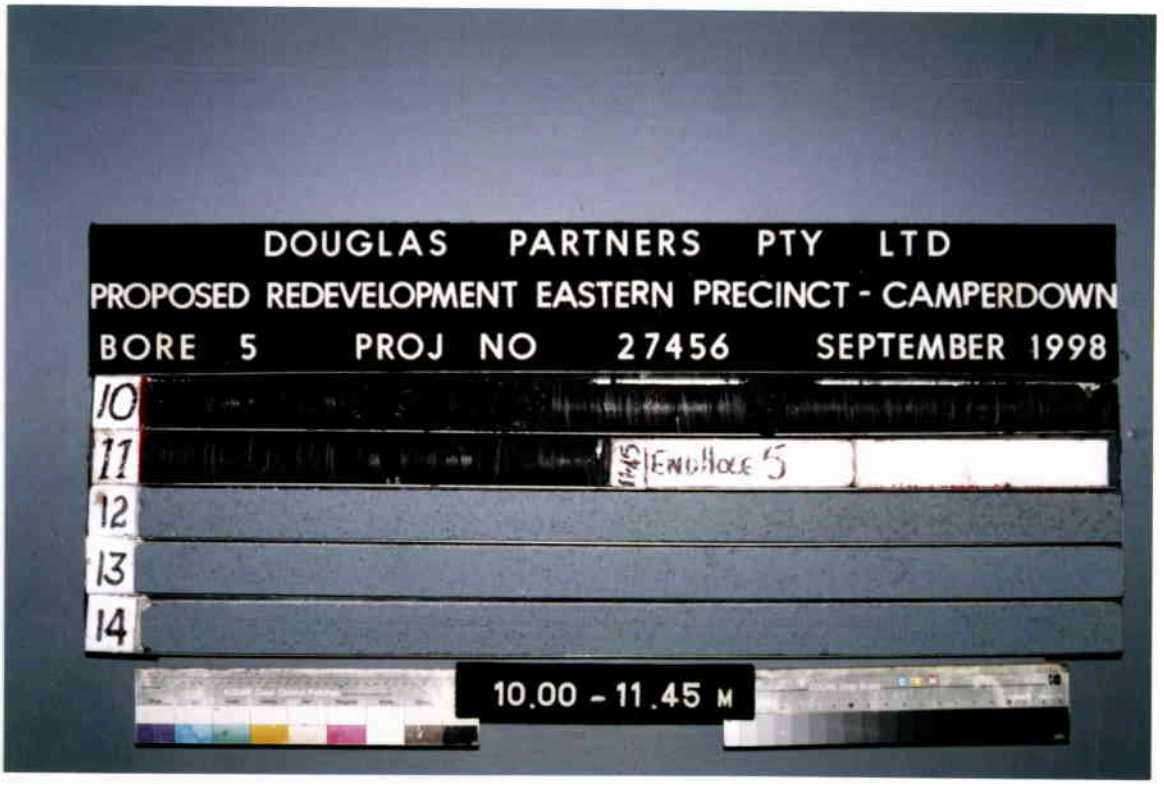
WATER OBSERVATIONS: WATER LEVEL AT 4.9m AFTER ½ HOUR

REMARKS:

SAMPLING & IN SITU TESTING LEGEND	
A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials: MKL
Date: 31.8.'98

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DOUGLAS PARTNERS PTY LTD
PROPOSED REDEVELOPMENT EASTERN PRECINCT - CAMPERDOWN
BORE 5 PROJ NO 27456 SEPTEMBER 1998
10
11
11.45 End Hole 5
12
13
14
10.00 - 11.45 M

TEST BORE REPORT

BORE No: 5
DATE: 26 AUGUST 98
SHEET 2 **OF** 2
AZIMUTH:

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: RPAH REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

PROJECT No: 27456
SURFACE LEVEL: 25.67
DIP OF HOLE: 90°

Depth (m)	Description of Strata	Degree of weathering (EW, HW, MW, SW, FS, FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Discontinuities (B – Bedding, J – Joint, S – Shear, D – Drill Break)	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Sampling & In Situ Testing: Sample Type	Core Rec. %	RQD %	Test Results & Comments
10										
10.42	SHALE – medium and low strength, highly weathered, highly fractured to fragmented, dark grey black shale									PL (A0=1.3MPa
	SHALE – high strength, slightly weathered, slightly fractured, dark grey black shale with 15 to 20% silty sandy laminae				10.62m:J 45° smooth planar		C	100	49	PL (A)=1.2MPa
11.45	TEST BORE DISCONTINUED AT 11.45 METRES									
12										
13										
14										
15										
16										
17										
18										
19										
20										

RIG: APS 300 **DRILLER:** McNULTY **LOGGED:** PARMAR **CASING:** GL TO 2.6m
TYPE OF BORING: ROTARY TO 5.40m, NMLC CORING TO 11.45m
WATER OBSERVATIONS: WATER LEVEL AT 4.9m AFTER ½ HOUR
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials: UKE
Date: 31-8-98

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DOUGLAS PARTNERS PTY LTD
PROPOSED REDEVELOPMENT EASTERN PRECINCT - CAMPERDOWN
BORE 6 PROJ NO 27456 SEPTEMBER 1998
RPA HOLE 6 5.10
6
7
8
9
10
10.20 END HOLE 6
5.10 - 10.20 m

TEST BORE REPORT

BORE No: 6
DATE: 25 AUGUST 98
SHEET 1 **OF** 2
AZIMUTH:

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: PROPOSED REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

PROJECT No: 27456
SURFACE LEVEL: 24.32
DIP OF HOLE: 90°

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, Firm, Stiff, Very Stiff, Hard) / Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	FILLING – concrete and cobble to 150mm							
0.30	SILTY CLAY – dark grey silty clay							
0.60	CLAY – firm to stiff, light grey mottled red brown clay with ironstone bands				S			2,3,5 N=8
					A			
2.6	SHALY CLAY – very stiff to hard, light grey mottled red brown shaly clay with ironstone bands				U_{50}			pp=400kPa
					A			
3.80	SHALE – extremely low to very low strength, highly weathered, light grey brown shale with ironstone bands				S			12,28/ref
5.10	SHALE – very low to low strength, highly and extremely weathered, fractured to fragmented, light brown and grey shale				C	100	0	
6.3								
6.4					C	93	3	
7.75	SHALE – medium strength, slightly weathered, slightly fractured to fractured, dark grey black shale with 15% to 20% silty sandy laminae				C	100	84	PL (A)=0.4MPa PL (A)=0.5MPa PL (A)=1.0MPa PL (A)=2.0MPa
10								

RIG: APS 300 **DRILLER:** McNULTY **LOGGED:** PARMAR **CASING:** GL TO 5.10m

TYPE OF BORING: SFA TO 5.10m, NMLC CORING TO 10.20m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials: KJB
Date: 16/10/98

Douglas Partners
Geotechnics · Environment · Groundwater

TEST BORE REPORT

BORE No: 6
DATE: 25 AUGUST 98
SHEET 2 **OF** 2
AZIMUTH:

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: PROPOSED REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

PROJECT No: 27456
SURFACE LEVEL: 24.32
DIP OF HOLE: 90°

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, Firm, Stiff, Very Stiff, Hard)	Soil: Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sample Type	Core Rec. %	RQD %	Test Results & Comments
10	SHALE - see description previous page					C	100	84	PL (A)=0.7MPa
10.20	TEST BORE DISCONTINUED AT 10.20 METRES								
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

RIG: APS 300 **DRILLER:** McNULTY **LOGGED:** PARMAR **CASING:** GL TO 5.10m

TYPE OF BORING: SFA TO 5.10m, NMLC CORING TO 10.20m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

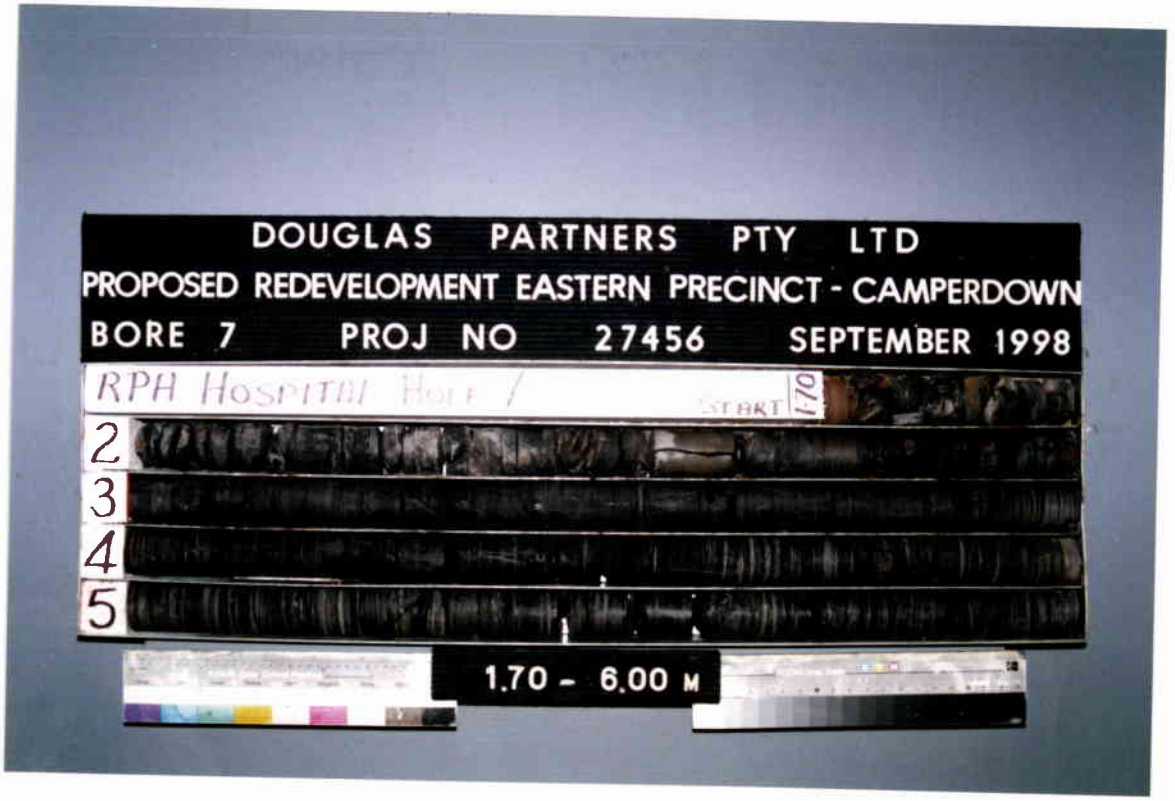
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials: KJB
Date: 16/10/98

Douglas Partners
Geotechnics · Environment · Groundwater


DOUGLAS PARTNERS PTY LTD
PROPOSED REDEVELOPMENT EASTERN PRECINCT - CAMPERDOWN
BORE 7 PROJ NO 27456 SEPTEMBER 1998
RPH HOSPITAL HOLE 1
START 1.70
2
3
4
5
1.70 - 6.00 M

TEST BORE REPORT

BORE No: 7

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE | **PROJECT No:** 27456 | **DATE:** 28 AUGUST 98

PROJECT: RPAH REDEVELOPMENT, EASTERN PRECINCT | **SURFACE LEVEL:** 19.96 | **SHEET** 1 **OF** 1

LOCATION: MISSENDEN ROAD, CAMPERDOWN | **DIP OF HOLE:** 90° | **AZIMUTH:**

Depth (m)	Description of Strata	Degree of Weathering (FW, HW, MW, SW, FS, FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Discontinuities (B – Bedding, J – Joint, S – Shear, D – Drill Break)	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Sampling & In Situ Testing: Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	CONCRETE									
0.25										
0.35	GRAVEL – well graded to 40mm									
	CLAYEY SHALE – weak, grey and brown clayey shale (Drillers' description)				Unless otherwise stated factures are smooth planar bedding planes dipping at 0° to 10°					
1										
1.7	SHALE – medium strength, slightly weathered, highly fractured to fragmented, dark grey shale				1.7m to 2.09m highly fractured to fragmented		C	100	29	PL (A)=0.4MPa
2					2.36m:J 50° smooth planar					
2.64	– 2.54m to 2.64m – extremely high strength sideritic siltstone band				2.54m:J 85° to 90° smooth undulating					PL (A)=0.6MPa
3	SHALE – medium and high strength, slightly weathered, slightly fractured, dark grey black shale with 15 to 20% silty sandy laminae				3.08m:J 65° smooth planar					
					3.41m:J 45° smooth planar					PL (A)=1.4MPa
4					3.54m to 4.84m 1–2mm clayey laminae along bedding planes		C	100	92	
										PL (A)=1.4MPa
5					5.30m:J 35° smooth planar					
6							C	100	100	PL (A)=1.7MPa
6.0	TEST BORE DISCONTINUED AT 6.0 METRES									
7										
8										
9										
10										

RIG: APS 300 **DRILLER:** McNULTY **LOGGED:** PARMAR **CASING:** GL TO 1.7m

TYPE OF BORING: DIATUBE TO 0.25m,SFA TO 1.7m,NMLC CORING TO 6.0m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

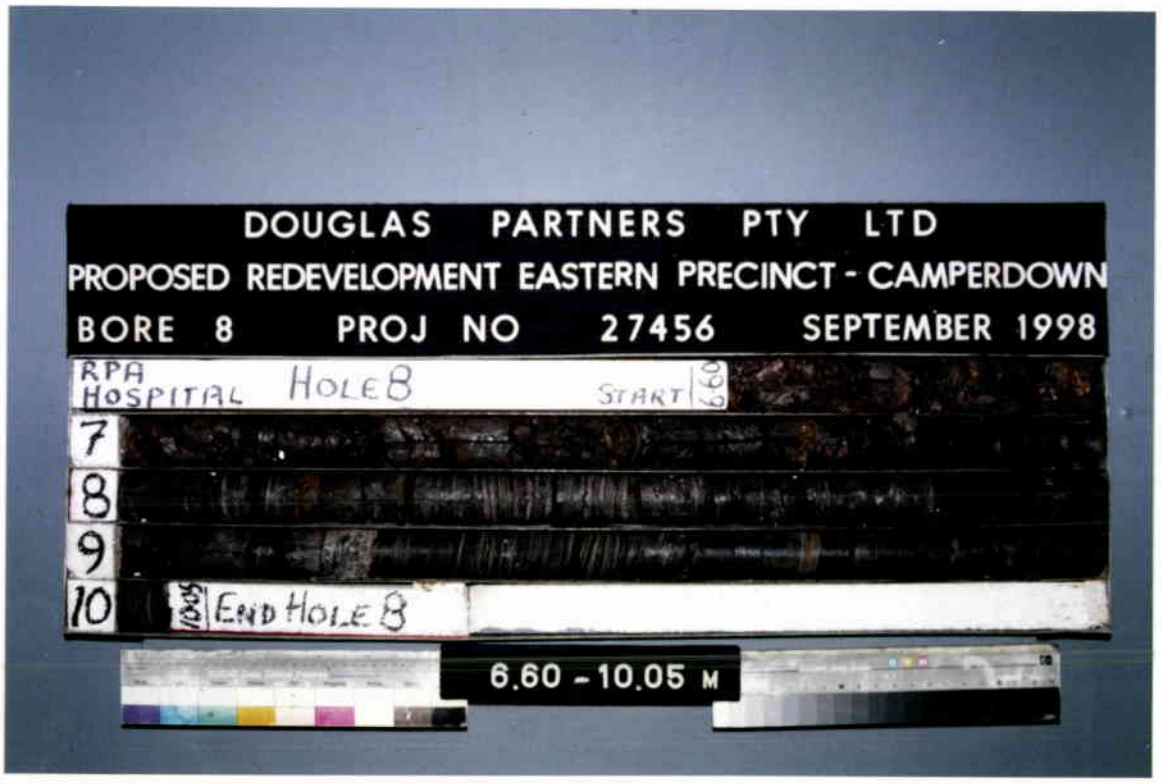
REMARKS: V-bit refusal at 1.70m

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED: Initials: MRe Date: 31-8-98

Douglas Partners
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DOUGLAS PARTNERS PTY LTD
PROPOSED REDEVELOPMENT EASTERN PRECINCT - CAMPERDOWN
BORE 8 PROJ NO 27456 SEPTEMBER 1998
RPA HOSPITAL HOLE 8 START 6.60
7
8
9
10
END HOLE 8
6.60 - 10.05 M

TEST BORE REPORT

BORE No: 8
DATE: 31 AUGUST 98
SHEET 1 **OF** 2
AZIMUTH:

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: PROPOSED REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

PROJECT No: 27456
SURFACE LEVEL: 23.30
DIP OF HOLE: 90°

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (very soft, soft, firm, stiff, very stiff, hard) / Non-Cohesive (very loose, loose, med. dense, dense, very dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	FILLING – dark grey brown clay, ironstone gravel and sandstone filling							
					S			3,3,5 N=8
1.30	CLAY – light yellow brown mottled red clay with ironstone bands				A			
2	– 2.60m – very stiff				A,U_{50}			pp=325kPa
4.10	SILTY GRAVELLY CLAY – very stiff, light grey mottled red brown silty gravelly clay with ironstone gravel and traces of sand				S			8,10,14 N=24
4.70	SHALY CLAY – very stiff to hard, grey, shaly clay with ironstone bands				A			
5.50	SHALE – extremely low strength, extremely to highly weathered, grey shale with ironstone bands				S			17,28/ref
6.60	SHALE – extremely low and very low strength, extremely and highly weathered, dark grey, shale with low strength bands				C	100	0	
7.90	SHALE – low and medium strength, highly and slightly weathered, fractured to slightly fractured, dark grey shale with 10% to 15% silty sandy laminae and extremely weathered bands				C	100	40	
9.14	SHALE – medium and medium to high strength, slightly weathered, fractured to slightly fractured, dark grey black shale with 15% to 20% silty sandy laminae							
10								

RIG: APS 300 **DRILLER:** McNULTY **LOGGED:** PARMAR **CASING:** GL TO 6.60m

TYPE OF BORING: HAND AUGER 0.7m, SFA 6.60m, NMLC CORING 10.05m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials: KJB
Date: 16/10/98

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TEST BORE REPORT

BORE No: 8

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT No: 27456
DATE: 31 AUGUST 98

PROJECT: PROPOSED REDEVELOPMENT, EASTERN PRECINCT
SURFACE LEVEL: 23.30
SHEET 2 **OF** 2

LOCATION: MISSENDEN ROAD, CAMPERDOWN
DIP OF HOLE: 90°
AZIMUTH:

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, Firm, Stiff, Very Stiff, Hard)	Soil: Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sampling & In Situ Testing: Sample Type	Core Rec. %	RQD %	Test Results & Comments
10	10.05 SHALE – see description previous page TEST BORE DISCONTINUED AT 10.05 METRES								
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

RIG: APS 300 **DRILLER:** McNULTY **LOGGED:** PARMAR **CASING:** GL TO 6.60m

TYPE OF BORING: HAND AUGER 0.7m, SFA 6.60m, NMLC CORING 10.05m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials: KJB
Date: 16/10/98

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TEST BORE REPORT

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: PROPOSED REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

DATE: 7 JULY 98
PROJECT No.: 27456
SURFACE LEVEL: 23.3

BORE No. 8A
SHEET 1 OF 1

Depth m	Description of Strata	Sampling & In Situ Testing: Type	Depth (m)	Test Results	Core Recovery %
0					
0.3	ASPHALTIC CONCRETE		0.3		
0.5	FILLING – brown grey and mottled orange sandy clay filling	B	0.6		
		B	0.7		
1.0	FILLING – brown, fine to medium grained, crushed sandstone filling		1.0		
	TEST BORE DISCONTINUED AT 1.0 METRES				
2					
3					
4					
5					
6					
7					
8					
9					
10					

RIG: PENGO **DRILLER:** ROBAR **LOGGED:** KAWALSKY **CASING:** –

TYPE OF BORING: 300mm DIAMETER ROCK AUGER

GROUND WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A Auger sample	M Moisture content (%)
B Bulk sample	pp Pocket Penetration (kPa)
D Disturbed sample	Ux x mm dia. tube
HV Hand Vane	Wp Plasitc limit (%)

CHECKED:
Initials: WSB
Date: 16/10/98

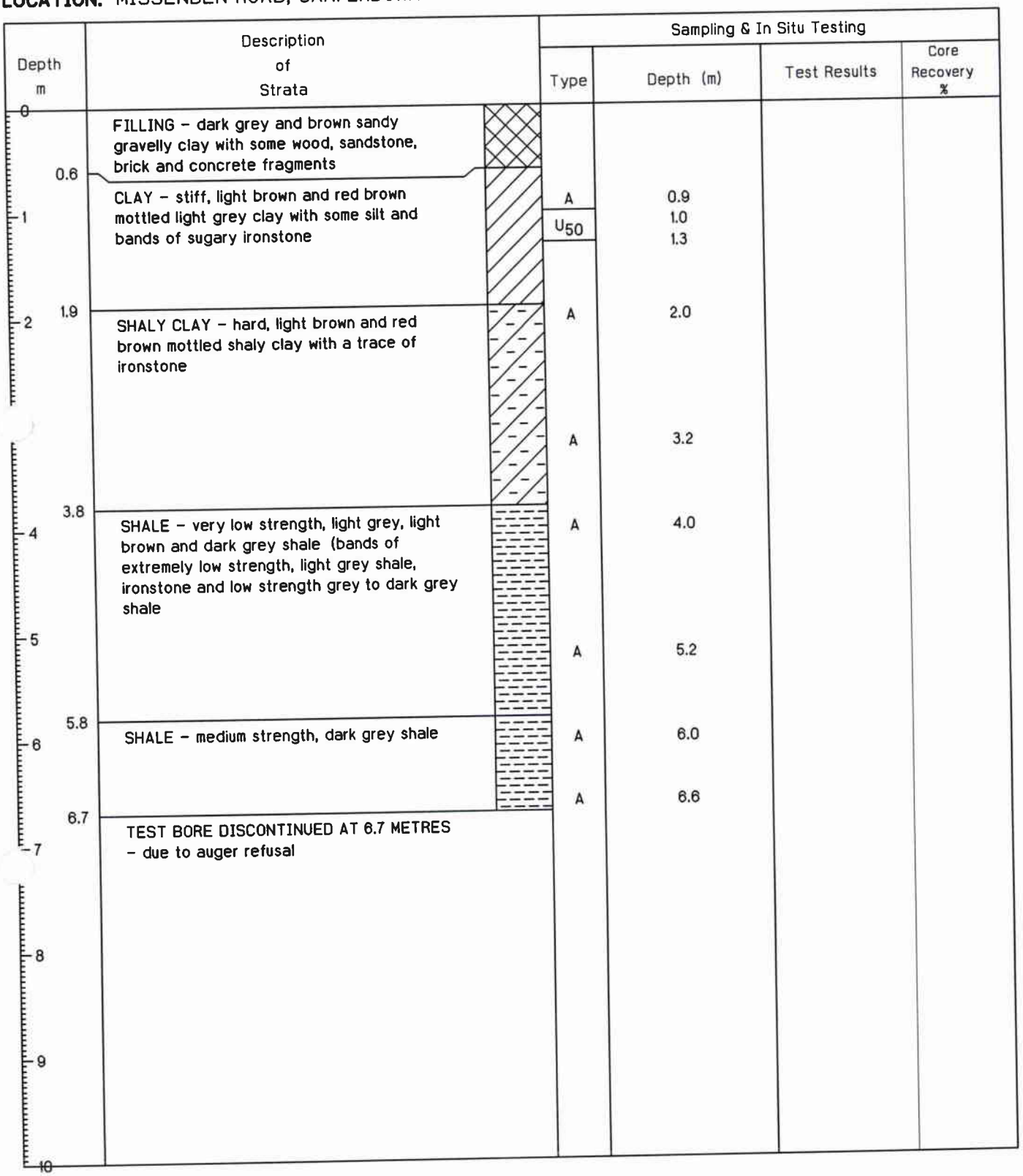
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TEST BORE REPORT

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: RPAH REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

DATE: 30 SEPTEMBER 98
PROJECT No.: 27456
SURFACE LEVEL: 24.9

BORE No. 9
SHEET 1 OF 1



RIG: PACIFIC 375 **DRILLER:** DUMMETT **LOGGED:** STEWART **CASING:** NIL

TYPE OF BORING: 300mm DIAMETER SPIRAL FLIGHT AUGER

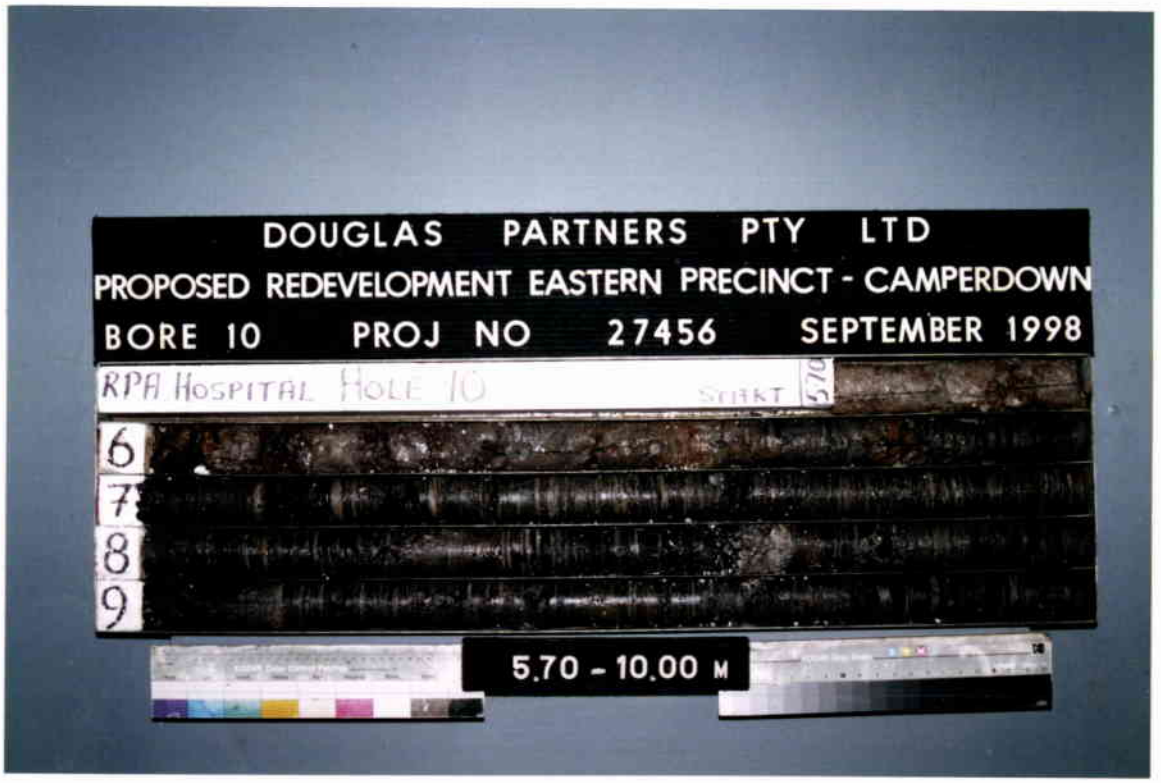
GROUND WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND	
A Auger sample	M Moisture content (%)
B Bulk sample	pp Pocket Penetration (kPa)
D Disturbed sample	Ux x mm dia. tube
HV Hand Vane	Wp Plasitc limit (%)

CHECKED:
Initials: KSB
Date: 16/10/98

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DOUGLAS PARTNERS PTY LTD
PROPOSED REDEVELOPMENT EASTERN PRECINCT - CAMPERDOWN
BORE 10 PROJ NO 27456 SEPTEMBER 1998
RPA HOSPITAL HOLE 10
START
5.70
6
7
8
9
5.70 - 10.00 M

TEST BORE REPORT

BORE No: 10
DATE: 27-28 AUGUST 98
SHEET 1 OF 1
AZIMUTH:

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: RPAH REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

PROJECT No: 27456
SURFACE LEVEL: 23.04
DIP OF HOLE: 90°

Depth (m)	Description of Strata	Degree of Weathering (EW, HW, MW, SW, FS, FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Discontinuities (B – Bedding, J – Joint, S – Shear, D – Drill Break)	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Sampling & In Situ Testing: Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	FILLING – firm, dark grey, moist, gravelly clay filling, bricks and concrete (Drillers' description)									
1										2,4,5 N=9
1.30	FILLING – dark brown gravelly clay filling with crushed sandstone						S			
1.8	CLAY – very stiff to hard light grey mottled orange red clay with ironstone						A			
2										
3							U_{50}			pp=400kPa
3.5	SHALY CLAY – hard, light grey mottled brown, shaly clay with ironstone bands						A			
4										8,12,23 N=35
5							S			
5.5	CLAYEY SHALE – dark grey and brown clayey shale (Drillers' description)									
5.7	SHALE – extremely low strength, extremely weathered, light grey shale with low strength ironstone bands (very stiff to hard clay properties)				5.70m to 6.90m extremely weathered rock – not possible to identify fracture spacing and discontinuities		C	100	0	
6										
6.9	SHALE – medium then medium to high strength, slightly weathered, fractured to slightly fractured, dark grey black shale with very low strength and highly weathered bands				6.90m to 10.0m fractures along smooth planar bedding planes at 0° to 10°					PL (A)=0.4MPa
7										PL (A)=0.6MPa
8							C	100	68	
9										PL (A)=0.5MPa
10 10.0	TEST BORE DISCONTINUED AT 10.0 METRES									PL (A0=1.0MPa

RIG: APS 300 **DRILLER:** McNULTY **LOGGED:** PARMAR **CASING:**

TYPE OF BORING: HA – 1.0m, SFA – 4.2m, ROTARY – 5.7m, NMLC – 10.0m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

REMARKS: WATER LEVEL AT 3.20m AFTER 14 HOURS

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials: MK
Date: 31-8-98

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TEST BORE REPORT

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: RPAH REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

DATE: 30 SEPTEMBER 98
PROJECT No.: 27456
SURFACE LEVEL: 27.6

BORE No. 11
SHEET 1 **OF** 1

Depth m	Description of Strata	Sampling & In Situ Testing: Type	Depth (m)	Test Results	Core Recovery %
0	FILLING – brown, grey, yellow grey and red brown sandy silty gravelly clay filling with fragments of shale, sandstone and concrete				
0.6	CLAY – stiff, light brown and red brown mottled light grey clay with some silt and ironstone	A	0.9		
1		U_{50}	1.0 1.3		
1.2	SHALY CLAY – hard light brown and red brown mottled light grey shaly clay with a trace of ironstone gravel	A	2.0		
2					
2.2	SHALE – extremely low strength, light grey shale with some ironstone nodules to 40mm				
2.7	SHALE – very low strength, light grey, brown and grey shale (bands of extremely low strength, light grey shale, ironstone and grey low strength shale)				
4					
5		A	5.0		
5.9	SHALE – low to medium strength, dark grey and grey brown shale	A	6.0		
6					
7					
8		A	8.0		
8.3	SHALE – medium strength, grey shale	A	8.6		
8.7	TEST BORE DISCONTINUED AT 8.7 METRES – due to auger refusal				
9					
10					

RIG: PACIFIC 375 **DRILLER:** DUMMETT **LOGGED:** STEWART **CASING:** NIL

TYPE OF BORING: 300mm DIAMETER SPIRAL FLIGHT AUGER

GROUND WATER OBSERVATIONS: GROUNDWATER OBSERVED AT 7.5m

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A Auger sample	M Moisture content (%)
B Bulk sample	pp Pocket Penetration (kPa)
D Disturbed sample	Ux x mm dia. tube
HV Hand Vane	Wp Plasitc limit (%)

CHECKED:
Initials: KSB
Date: 16/10/98

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TEST BORE REPORT

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE **DATE:** 30 SEPTEMBER 98 **BORE No. 12**

PROJECT: RPAH REDEVELOPMENT, EASTERN PRECINCT **PROJECT No.:** 27456 **SHEET** 1 **OF** 1

LOCATION: MISSENDEN ROAD, CAMPERDOWN **SURFACE LEVEL:** 25.7

Depth m	Description of Strata	Sampling & In Situ Testing: Type	Depth (m)	Test Results	Core Recovery %
0	FILLING – brown sand and silty clay with some organic material				
0.5	FILLING – stiff, brown silty clay filling				
1.3	CLAY – stiff, to very stiff, light brown and red brown mottled light grey slightly silty clay with a trace of sugary ironstone bands	U_{50}	1.3		
			1.6		
2		A	2.0		
2.8	SHALY CLAY – hard, red brown and light brown mottled light grey shaly clay with some ironstone nodules	A	3.0		
3.9	SHALE – very low strength, light grey, grey and brown shale (bands of extremely low strength, light grey shale, ironstone and low strength, grey brown shale)	A	4.0		
5		A	5.0		
6.5	SHALE – low to medium strength, dark grey shale				
7	– medium strength from 7.0m	A	7.0		
		A	7.2		
7.5	TEST BORE DISCONTINUED AT 7.5 METRES – due to auger refusal				
8					
9					
10					

RIG: PACIFIC 375 **DRILLER:** DUMMETT **LOGGED:** STEWART **CASING:** NIL

TYPE OF BORING: 300mm DIAMETER SPIRAL FLIGHT AUGER

GROUND WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED

REMARKS:

SAMPLING & IN SITU TESTING LEGEND	
A Auger sample	M Moisture content (%)
B Bulk sample	pp Pocket Penetration (kPa)
D Disturbed sample	Ux x mm dia. tube
HV Hand Vane	Wp Plasitc limit (%)

CHECKED:

Initials: KSB

Date: 16/10/98

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TEST BORE REPORT

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE **DATE:** 30 SEPTEMBER 98 **BORE No. 13**
PROJECT: RPAH REDEVELOPMENT, EASTERN PRECINCT **PROJECT No.:** 27456 **SHEET 1 OF 1**
LOCATION: MISSENDEN ROAD, CAMPERDOWN **SURFACE LEVEL:** 26.9

Depth m	Description of Strata	Sampling & In Situ Testing: Type	Depth (m)	Test Results	Core Recovery %
0					
0.2	FILLING – very stiff, dark brown to dark grey sandy silty clay with some gravel and organic matter (strong odour)				
1	FILLING – stiff to very stiff, brown mottled dark grey brown clay with some silt, and a trace of sandstone gravel, mixed with dark brown organic clay	A	1.0		
1.7	SHALY CLAY – very stiff to hard, light grey shaly clay with very low strength ironstone layers	A	1.8		
2		A	2.3		
2.2	SHALE – extremely low strength, light grey shale with some ironstone and shaly clay layers	A	2.7		
2.6		A	3.0		
3	SHALE – very low strength, dark grey brown and red brown and light grey shale (bands of extremely low strength, light grey shale, ironstone and low strength grey brown shale)				
4		A	4.0		
5		A	5.0		
6					
6.1	SHALE – low to medium strength, dark grey brown shale	A	6.2		
7		A	7.0		
7.9	SHALE – medium strength, dark grey shale	A	8.0		
8	– layer of very low strength ironstone observed between 8.0m and 8.2m	A	8.5		
9		A	8.9		
9.0	TEST BORE DISCONTINUED AT 9.0 METRES – reach of rig				
10					

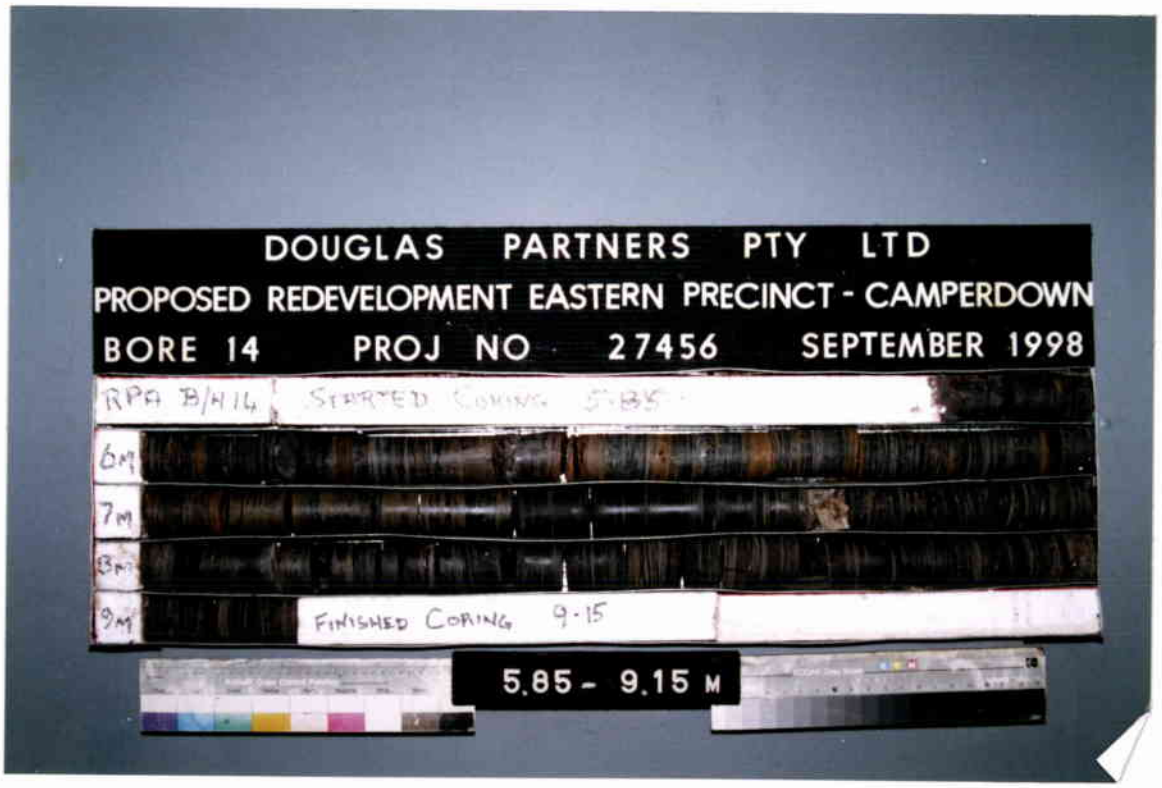
RIG: PACIFIC 375 **DRILLER:** DUMMETT **LOGGED:** STEWART **CASING:** NIL
TYPE OF BORING: 300mm DIAMETER SPIRAL FLIGHT AUGER
GROUND WATER OBSERVATIONS: FREE GROUNDWATER OBSERVED AT 6.2m
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A Auger sample	M Moisture content (%)
B Bulk sample	pp Pocket Penetration (kPa)
D Disturbed sample	Ux x mm dia. tube
HV Hand Vane	Wp Plasitc limit (%)

CHECKED:
Initials: WJB
Date: 16/10/98

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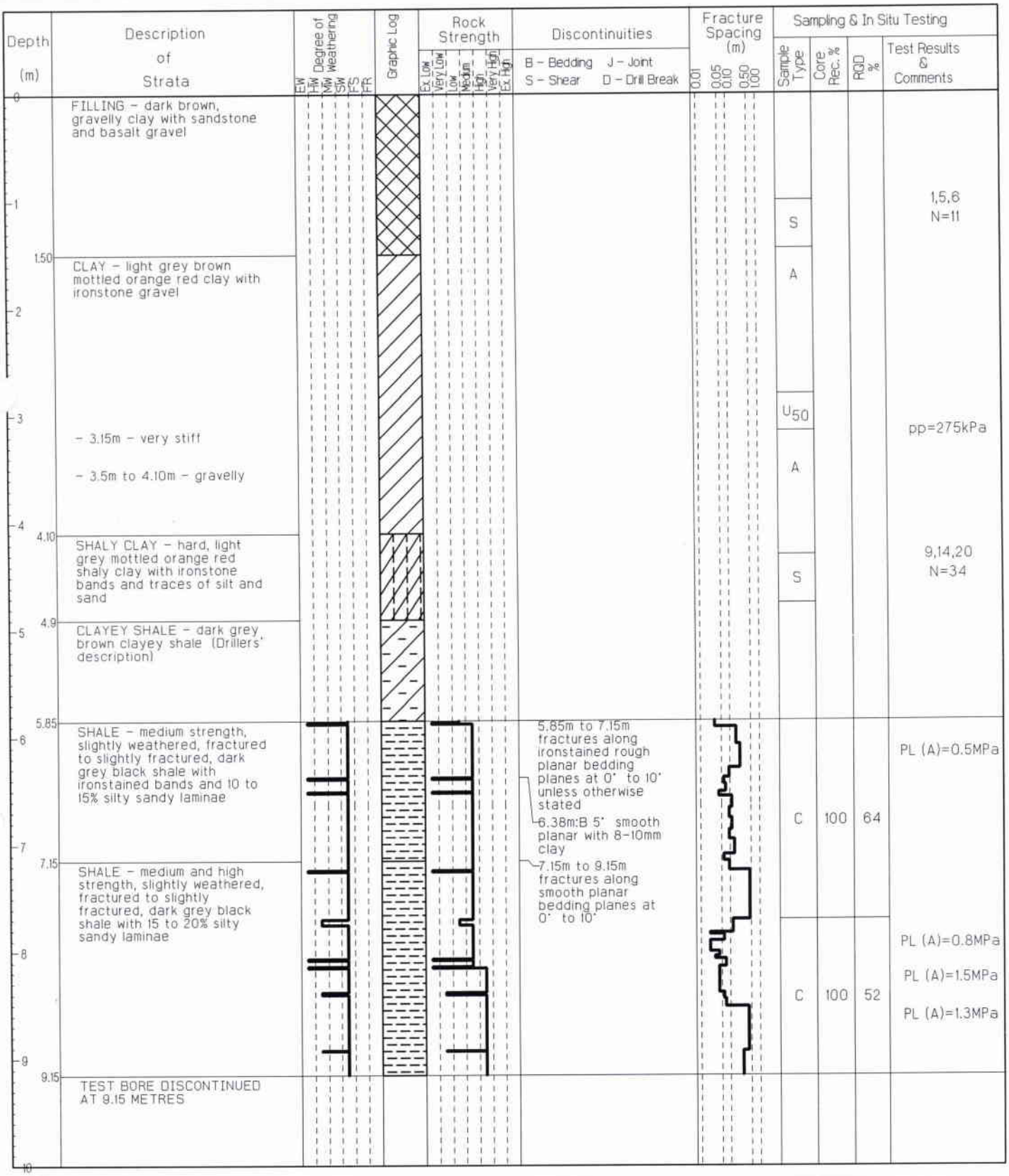

DOUGLAS PARTNERS PTY LTD
PROPOSED REDEVELOPMENT EASTERN PRECINCT - CAMPERDOWN
BORE 14 PROJ NO 27456 SEPTEMBER 1998
RPA B/H 14
STARTED CORING 5.85
6M
7M
8M
9M
FINISHED CORING 9.15
5.85 - 9.15 M

TEST BORE REPORT

BORE No: 14
DATE: 27 AUGUST 98
SHEET 1 **OF** 1
AZIMUTH:

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: RPAH REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

PROJECT No: 27456
SURFACE LEVEL: 21.95
DIP OF HOLE: 90°



RIG: EDSON 3000 **DRILLER:** CHAPMAN **LOGGED:** PARMAR **CASING:** GL TO 5.85m

TYPE OF BORING: SFA TO 5.85m, NMLC CORING TO 9.15m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials: MKe
Date: 31·8·98

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DOUGLAS PARTNERS PTY LTD
PROPOSED REDEVELOPMENT EASTERN PRECINCT - CAMPERDOWN
BORE 15 PROJ NO 27456 SEPTEMBER 1998
RPA Hosp Hole 15
6
7
8
9
5.10 - 10.00 M

TEST BORE REPORT

BORE No: 15

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE | **PROJECT No:** 27456 | **DATE:** 1 SEPTEMBER 98

PROJECT: PROPOSED REDEVELOPMENT, EASTERN PRECINCT | **SURFACE LEVEL:** 24.28 | **SHEET** 1 **OF** 1

LOCATION: MISSENDEN ROAD, CAMPERDOWN | **DIP OF HOLE:** 90° | **AZIMUTH:**

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, Firm, Stiff, Very Stiff, Hard) / Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sampling & In Situ Testing: Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	FILLING - brick and concrete							
0.60	CLAY - yellow brown clay							
2.0	SILTY CLAY - light grey, mottled red brown silty clay with ironstone bands - 2.60m - very stiff				A S			8,10,14 N=24
3.70	SHALE - extremely low to very low strength, highly weathered, grey shale				A A S			30/ref
5.10	SHALE - very low to low strength, highly and extremely weathered, highly fractured to fragmented, brown and dark grey shale with medium strength ironstone bands				C	100	0	
6.55 6.65	SHALE - medium and low to medium strength, highly and slightly weathered, fractured to slightly fractured, dark grey black shale with very low strength bands along bedding				C	96	40	PL (A)=0.4MPa PL (A)=0.5MPa PL (A)=0.3MPa
					C	100	0	PL (A)=0.4MPa
10.00	TEST BORE DISCONTINUED AT 10.00 METRES							

RIG: APS 300 **DRILLER:** McNULTY **LOGGED:** PARMAR **CASING:** GL TO 5.10m

TYPE OF BORING: SFA 5.1m, NMLC CORING 10.0m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:

Initials: WSB

Date: 16/10/98

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DOUGLAS PARTNERS PTY LTD
PROPOSED REDEVELOPMENT EASTERN PRECINCT - CAMPERDOWN
BORE 16 PROJ NO 27456 SEPTEMBER 1998
RPA HOSPITAL HOLE 16
START
6
7
8
9
5.80 - 9.95 M

TEST BORE REPORT

BORE No: 16

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE | **PROJECT No:** 27456 | **DATE:** 1 SEPTEMBER 98

PROJECT: PROPOSED REDEVELOPMENT, EASTERN PRECINCT | **SURFACE LEVEL:** 24.32 | **SHEET** 1 **OF** 1

LOCATION: MISSENDEN ROAD, CAMPERDOWN | **DIP OF HOLE:** 90° | **AZIMUTH:**

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, Firm, Stiff, Very Stiff, Hard) / Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	FILLING – grey brown clay filling with gravel							
0.30	SILTY CLAY – dark grey silty clay							
0.60	SILTY CLAY – light grey, silty clay with traces of sand and ironstone gravel							
	– 1.55m to 3.2m – very stiff				U_{50}			pp=325kPa
					S			8,9,14 N=23
3.20	SHALY CLAY – very stiff to hard, light grey shaly clay with ironstone bands				A			
4.40	SHALE – extremely low strength, extremely weathered, dark grey shale				S			17,26/ref
5.80	SHALE – extremely low to low strength, highly and extremely weathered, highly fractured to fragmented, light brown and grey shale				C	100	0	PL (A)=6.1MPa
7.15	SIDERITIC SILTSTONE – very high strength, slightly weathered, light grey sideritic siltstone							
7.20	SHALE – medium strength, slightly weathered, fractured to slightly fractured, dark grey black shale with 10% to 15% silty sandy laminae							PL (A)=0.6MPa
					C	100	75	PL (A)=0.7MPa
9.95	TEST BORE DISCONTINUED AT 9.95 METRES							PL (A)=0.8MPa

RIG: APS 300 **DRILLER:** McNULTY **LOGGED:** PARMAR **CASING:**

TYPE OF BORING: SFA 5.8m, NMLC CORING 9.95m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:

Initials: WJB

Date: 16/10/98

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TEST BORE REPORT

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: PROPOSED REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

DATE: 7 JULY 98
PROJECT No.: 27456
SURFACE LEVEL: 27.9

BORE No. 18
SHEET 1 **OF** 1

Depth m	Description of Strata	Sampling & In Situ Testing: Type	Depth (m)	Test Results	Core Recovery %
0					
0.15	CONCRETE		0.3		
0.30	GRAVEL – up to 30mm	B	0.6		
0.6	CLAY – stiff, grey brown clay		0.8		
1	SILTY CLAY – very stiff, grey brown silty clay	B	1.1		
1.2	TEST BORE DISCONTINUED AT 1.2 METRES				
2					
3					
4					
5					
6					
7					
8					
9					
10					

RIG: PENGO **DRILLER:** ROBAR **LOGGED:** KAWALSKY **CASING:** –
TYPE OF BORING: 300mm DIAMETER ROCK AUGER
GROUND WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A Auger sample	M Moisture content (%)
B Bulk sample	pp Pocket Penetration (kPa)
D Disturbed sample	Ux x mm dia. tube
HV Hand Vane	Wp Plastic limit (%)

CHECKED:
Initials: KSB
Date: 16/10/98

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TEST BORE REPORT

CLIENT: CENTRAL SYDNEY AREA HEALTH SERVICE
PROJECT: PROPOSED REDEVELOPMENT, EASTERN PRECINCT
LOCATION: MISSENDEN ROAD, CAMPERDOWN

DATE: 7 JULY 98
PROJECT No.: 27456
SURFACE LEVEL: 33.8

BORE No. 19
SHEET 1 **OF** 1

Depth m	Description of Strata	Sampling & In Situ Testing: Type	Depth (m)	Test Results	Core Recovery %
0					
0.15	CONCRETE		0.3		
	FILLING – brown grey, sandy clay filling	B	0.6		
0.6	SHALY CLAY – stiff, grey brown shaly clay		0.8		
1		B	1.1		
1.1	TEST BORE DISCONTINUED AT 1.1 METRES				
2					
3					
4					
5					
6					
7					
8					
9					
10					

RIG: PENGO **DRILLER:** ROBAR **LOGGED:** KAWALSKY **CASING:** –
TYPE OF BORING: 300mm DIAMETER ROCK AUGER
GROUND WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A Auger sample	M Moisture content (%)
B Bulk sample	pp Pocket Penetration (kPa)
D Disturbed sample	Ux x mm dia. tube
HV Hand Vane	Wp Plasitc limit (%)

CHECKED:
Initials: KJB
Date: 16/10/98

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RESULTS OF DYNAMIC PENETROMETER TESTS

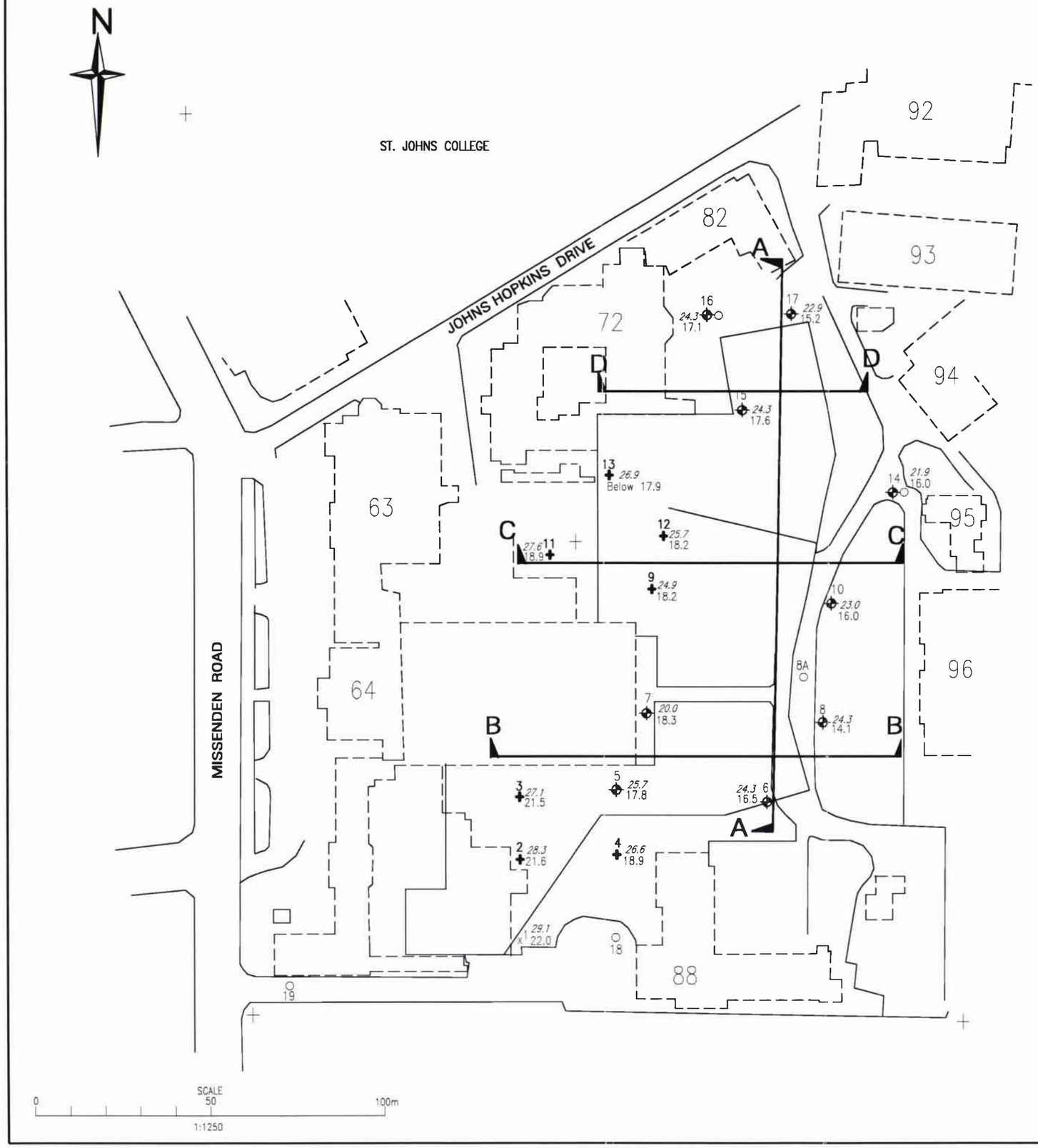
CLIENT	CENTRAL SYDNEY AREA HEALTH SERVICE	DATE	7-7-98
PROJECT	PROPOSED REDEVELOPMENT, EASTERN PRECINCT	PROJECT NO	27456
LOCATION	ROYAL PRINCE ALFRED HOSPITAL, MISSENDEN RD , CAMPERDOWN	PAGE NO	1 of 1

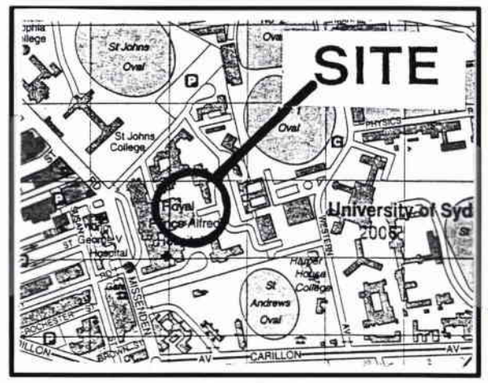
TEST LOCATIONS	1	18	19	8A						
RL OF TEST										
DEPTH m	PENETRATION RESISTANCE BLOWS/150mm									
0.00 - 0.15	4	concrete	concrete	asphalt						
0.15 - 0.30	7	2	1	-						
0.30 - 0.45	4	4	2	14						
0.45 - 0.60	4	4	4	5						
0.60 - 0.75	3	13	4	5						
0.75 - 0.90	4	11	4	10						
0.90 - 1.05	5	11	4	14						
1.05 - 1.20	10	13	4	11						
1.20 - 1.35										
1.35 - 1.50										
1.50 - 1.65										
1.65 - 1.80										
1.80 - 1.95										
1.95 - 2.10										
2.10 - 2.25										
2.25 - 2.40										
2.40 - 2.55										
2.55 - 2.70										
2.70 - 2.85										
2.85 - 3.00										

TEST METHOD AS 1289.6.3.2, CONE PENETROMETER ✓
AS 1289.6.3.3, FLAT END PENETROMETER O

TESTED BY: GAK
CHECKED BY: KJB

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LOCALITY PLAN

LEGEND

- ○ BULK SAMPLE LOCATION – 7.7.1998
- x PENGO TEST BORE LOCATION – 7.7.1998
- ⊕ TEST BORE LOCATION – 27.8.1998
- ✚ PENGO TEST BORE LOCATION – 30.9.1998
- *24.9* GROUND SURFACE LEVEL
- 18.2 UPPER SURFACE LEVEL OF 3.5MPa ALLOWABLE END BEARING STRATUM

Rev C – Surface levels added	9.11.98
Rev B – Sections B–B,C–C & D–D added	24.9.98
Rev A – Section A–A added	24.9.98

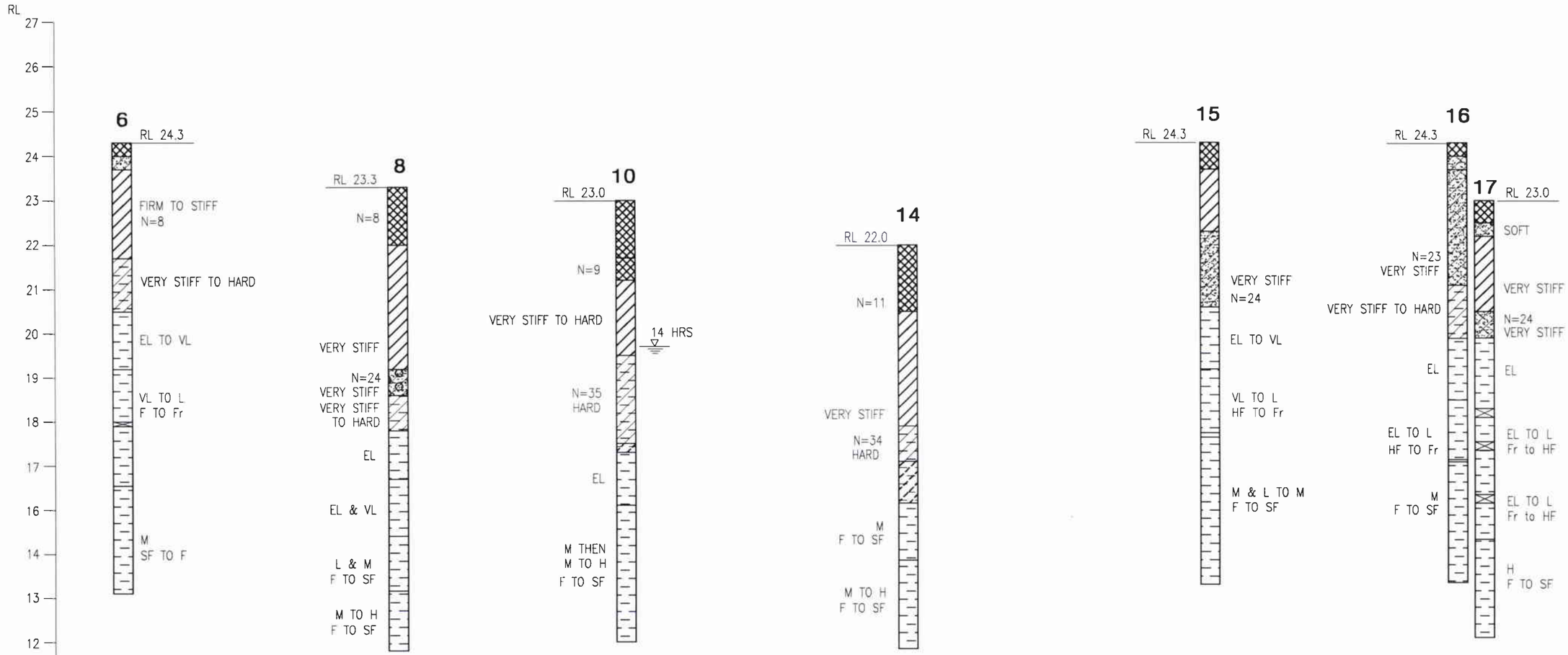
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Liability is limited by the Professional Engineers Scheme

TITLE: Test Bore Locations
Proposed Redevelopment
Royal Prince Alfred Hospital
Missenden Road
CAMPERDOWN

CLIENT: Central Sydney Area Health Service			
DRAWN BY: PSCH	SCALE: As shown	PROJECT No: 27456	OFFICE: SYDNEY
APPROVED BY: KJSB		DATE: 15.10.1998	DRAWING No: 1 Rev C



SECTION A-A

LEGEND

ROCK STRENGTH		FRACTURING	
EL	EXTREMELY LOW	SF	SLIGHTLY FRACTURED
VL	VERY LOW	F	FRACTURED
L	LOW	HF	HIGHLY FRACTURED
M	MEDIUM	Fr	FRAGMENTED
H	HIGH		

MATERIAL TYPE

- FILLING
- CLAY
- SILTY CLAY
- SILTY GRAVELLY CLAY
- CONCRETE
- CLAYEY SHALE
- SHALY CLAY
- SHALE
- CORE LOSS

SCALE
0 5 10 15 20 25m
1:500 (Horizontal)

NOTES

1. N=9 SPT BLOWS PER 300mm
2. 14 HRS ▽ WATER LEVEL AFTER 14 HOURS.
3. REFER DWG NO 1 (PROJECT NO 27456) FOR PLAN LOCATION OF BORE SECTION.
   ALL BORES PROJECTED ONTO THIS SECTION.

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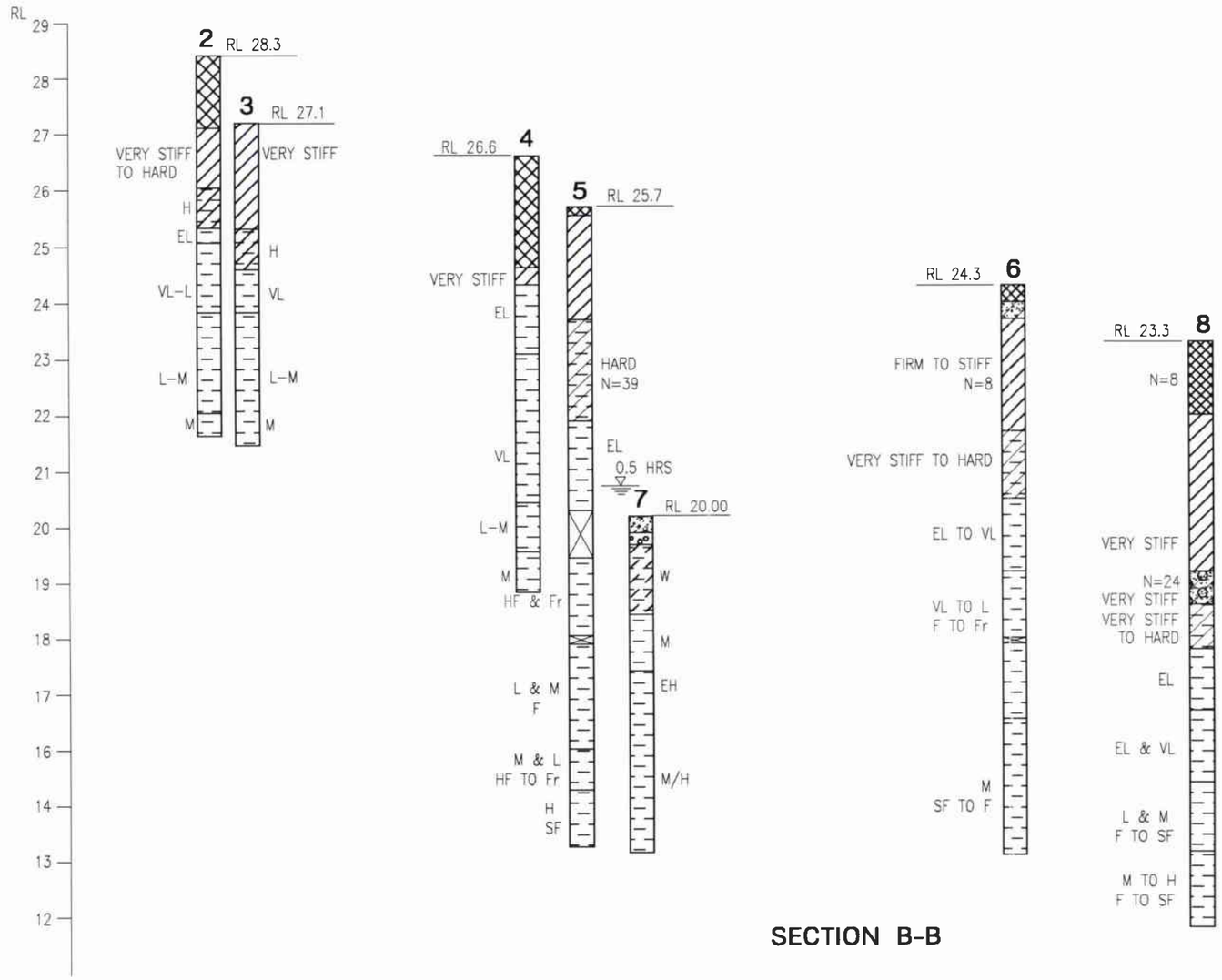
Sydney, Newcastle, Brisbane, Melbourne, Perth, Wyong, Singleton, Campbelltown, Townsville, Cairns, Wollongong

TITLE: Bore Section A-A
Proposed Redevelopment
Royal Prince Alfred Hospital
Missenden Road
CAMPERDOWN

PSC Liability is limited by the Professional Engineers Scheme

CLIENT: Central Sydney Area Health Service

DRAWN BY: PSCH	SCALE: As shown	PROJECT No: 27456	OFFICE: SYDNEY
APPROVED BY: KJB		DATE: 16.10.1998	DRAWING No: 2



SECTION B-B

LEGEND

ROCK STRENGTH		FRACTURING	
EL	EXTREMELY LOW	SF	SLIGHTLY FRACTURED
VL	VERY LOW	F	FRACTURED
L	LOW	HF	HIGHLY FRACTURED
M	MEDIUM	Fr	FRAGMENTED
H	HIGH		

MATERIAL TYPE

- FILLING
- CLAY
- SILTY CLAY
- SILTY GRAVELLY CLAY
- CONCRETE
- CLAYEY SHALE
- SHALY CLAY
- SHALE
- CORE LOSS

NOTES

1. N=9 SPT BLOWS PER 300mm
2. 14 HRS ▽ WATER LEVEL AFTER 14 HOURS.
3. REFER DWG NO 1 (PROJECT NO 27456) FOR PLAN LOCATION OF BORE SECTION. ALL BORES PROJECTED ONTO THIS SECTION.

SCALE
0 5 10 15 20 25m
1:500 (Horizontal)

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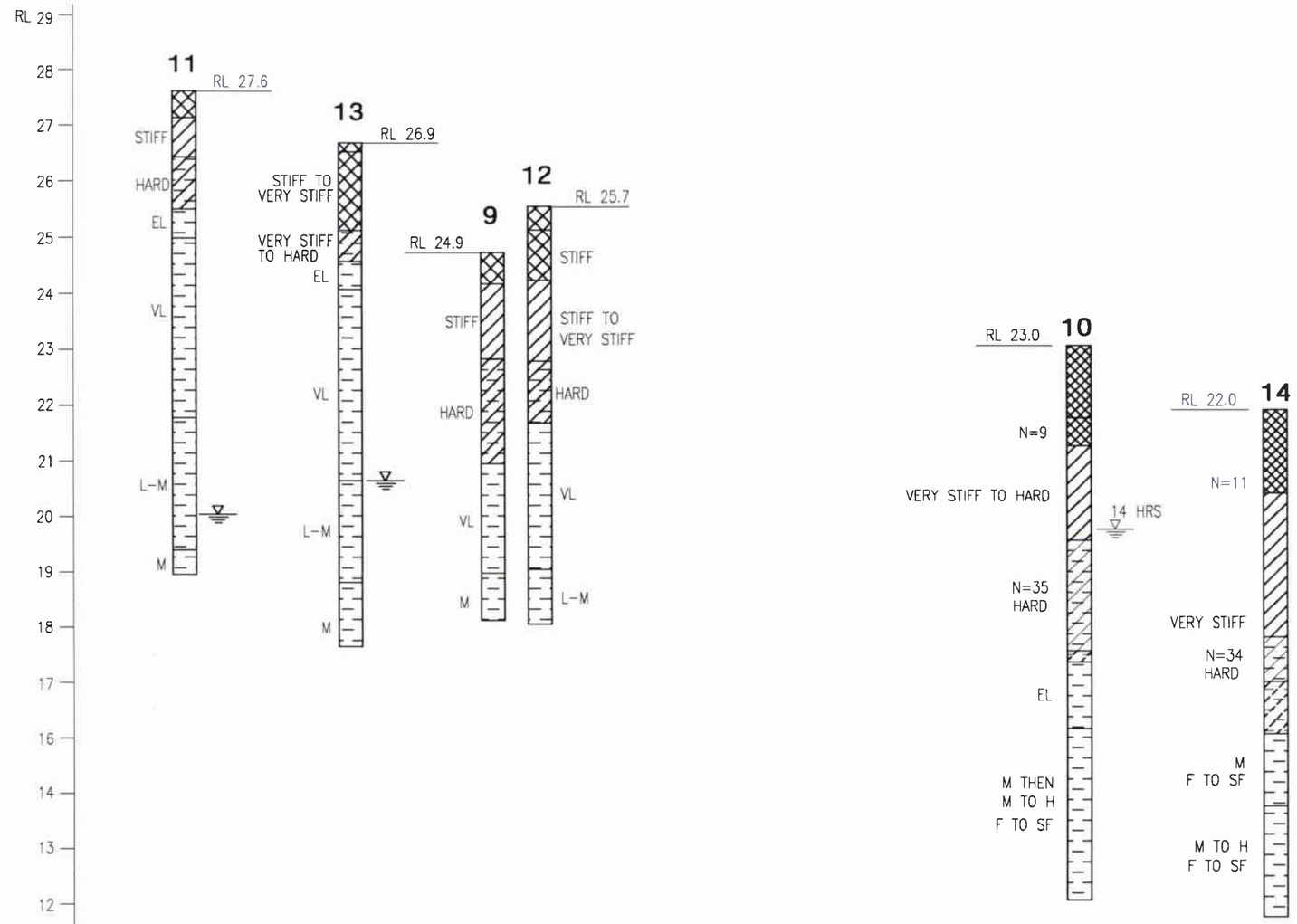
Sydney, Newcastle, Brisbane, Melbourne, Perth, Wyong, Singleton, Campbelltown, Townsville, Cairns, Wollongong

TITLE: Bore Section B-B
Proposed Redevelopment
Royal Prince Alfred Hospital
Missenden Road
CAMPERDOWN

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CLIENT: Central Sydney Area Health Service

DRAWN BY: PSCH	SCALE: As shown	PROJECT No: 27456	OFFICE: SYDNEY
APPROVED BY: KCJB		DATE: 16.10.1998	DRAWING No: 3



SECTION C-C

LEGEND

ROCK STRENGTH		FRACTURING	
EL	EXTREMELY LOW	SF	SLIGHTLY FRACTURED
VL	VERY LOW	F	FRACTURED
L	LOW	HF	HIGHLY FRACTURED
M	MEDIUM	Fr	FRAGMENTED
H	HIGH		

MATERIAL TYPE

- FILLING
- CLAY
- SILTY CLAY
- SILTY GRAVELLY CLAY
- CONCRETE
- CLAYEY SHALE
- SHALY CLAY
- SHALE
- CORE LOSS

SCALE
0 5 10 15 20 25m
1:500 (Horizontal)

NOTES

1. N=9 SPT BLOWS PER 300mm
2. 14 HRS ▽ WATER LEVEL AFTER 14 HOURS.
3. REFER DWG NO 1 (PROJECT NO 27456) FOR PLAN LOCATION OF BORE SECTION. ALL BORES PROJECTED ONTO THIS SECTION.

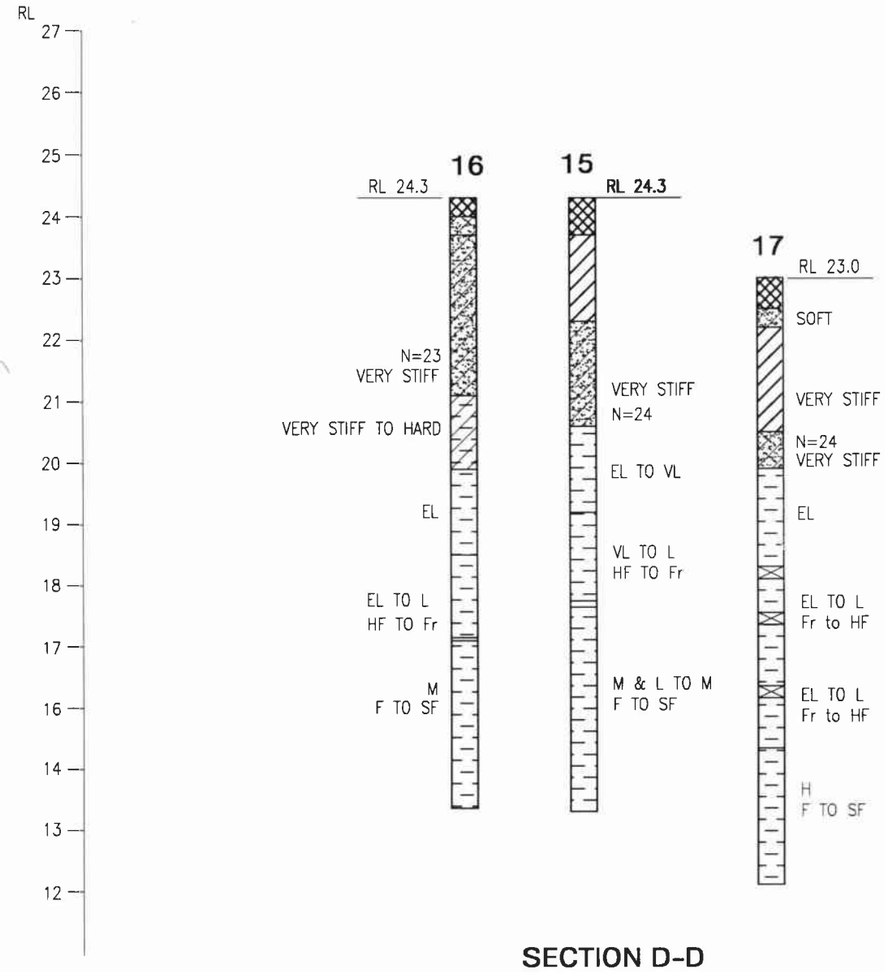
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Sydney, Newcastle, Brisbane, Melbourne, Perth, Wyong, Singleton, Campbelltown, Townsville, Cairns, Wollongong

TITLE: Bore Section C-C
Proposed Redevelopment
Royal Prince Alfred Hospital
Missenden Road
CAMPERDOWN

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CLIENT: Central Sydney Area Health Service			
DRAWN BY: PSCH	SCALE: As shown	PROJECT No: 27456	OFFICE: SYDNEY
APPROVED BY: KSB		DATE: 16.10.1998	DRAWING No: 4



SECTION D-D

LEGEND

ROCK STRENGTH		FRACTURING	
EL	EXTREMELY LOW	SF	SLIGHTLY FRACTURED
VL	VERY LOW	F	FRACTURED
L	LOW	HF	HIGHLY FRACTURED
M	MEDIUM	Fr	FRAGMENTED
H	HIGH		

MATERIAL TYPE

- FILLING
- CLAY
- SILTY CLAY
- SILTY GRAVELLY CLAY
- CONCRETE
- CLAYEY SHALE
- SHALY CLAY
- SHALE
- CORE LOSS

SCALE
0 5 10 15 20 25m
1:500 (Horizontal)

NOTES

1. N=9 SPT BLOWS PER 300mm
2. 14 HRS ▽ WATER LEVEL AFTER 14 HOURS.
3. REFER DWG NO 1 (PROJECT NO 27456) FOR PLAN LOCATION OF BORE SECTION.
   ALL BORES PROJECTED ONTO THIS SECTION.

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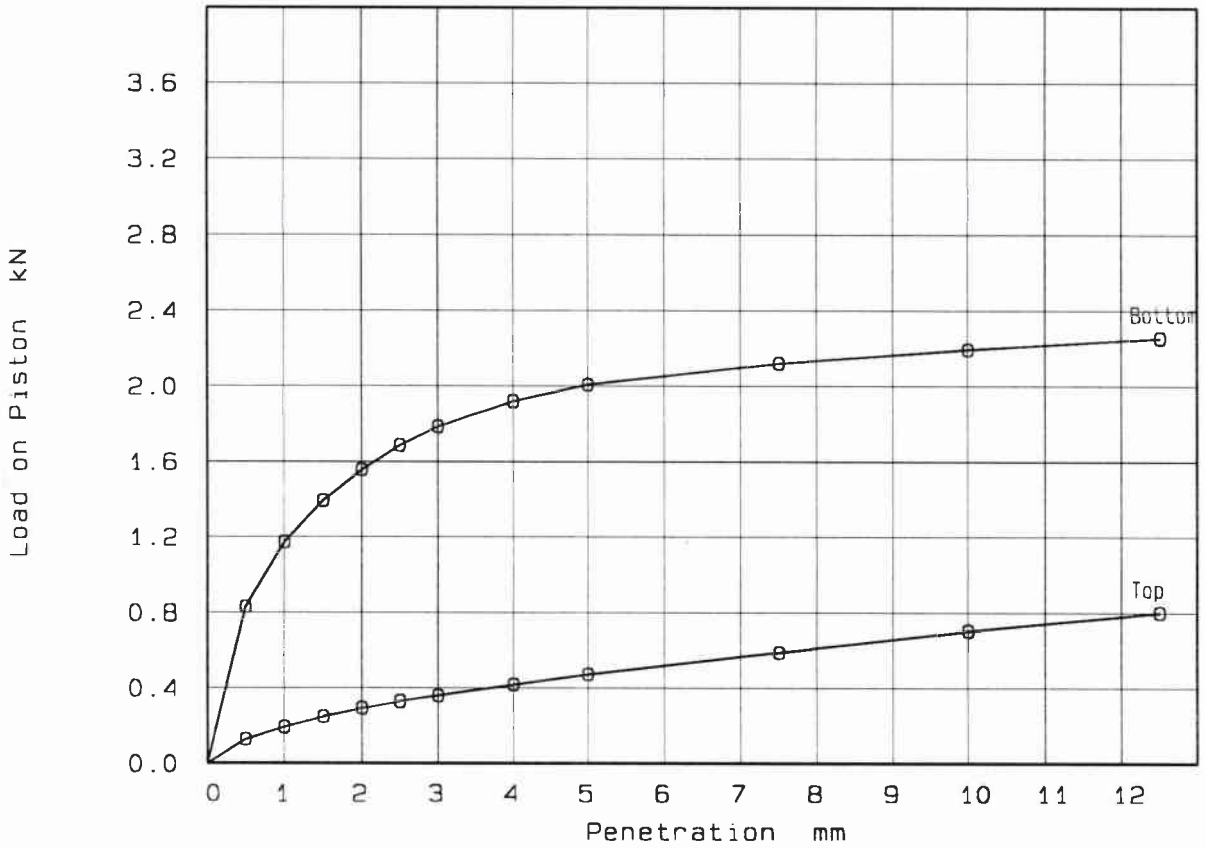
TITLE: Bore Section D-D
Proposed Redevelopment
Royal Prince Alfred Hospital
Missenden Road
CAMPERDOWN

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CLIENT: Central Sydney Area Health Service			
DRAWN BY: PSCH	SCALE: As shown	PROJECT No: 27456	OFFICE: SYDNEY
APPROVED BY: KJB		DATE: 16.10.1998	DRAWING No: 5

RESULTS OF CALIFORNIA BEARING RATIO TEST

CLIENT	CENTRAL SYDNEY AREA HEALTH SERVICE	DATE	17/07/1998
PROJECT	PROPOSED DEVELOPMENT, EASTERN PRECINCT	PROJECT No.	27456
LOCATION	ROYAL PRINCE ALBERT HOSPITAL, MISSENDEN ROAD, CAMPERDOWN	TEST LOC.	8A
		DEPTH	0.3 - 0.6



DESCRIPTION FILLING - GREY BROWN AND MOTTLED ORANGE SANDY CLAY FILLING

PREPARATION Remoulded to approximate 100% Maximum Dry Density & Optimum Moisture Content, then soaked for four days.

LEVEL OF COMPACTION 100 % Standard

SURCHARGE 9 kg SWELL 2.4 %

CONDITION	MOISTURE CONTENT %	DRY DENSITY t/m^3
At Compaction	18.8	1.70
After Soaking	23.2	1.66
After Test Top 30mm	25.1	-
- Remainder	22.1	-
Field Values	21.7	-
Standard Compaction	19.4	1.70

RESULTS Type	Penetration	CBR (%)
Top	- 2.5 mm	2.5
	- 5.0 mm	2.5
Bottom	- 2.5 mm	13
	- 5.0 mm	10

TEST METHOD AS 1289.F1.1

TESTED KG
CHECKED NW

LABORATORY SYDNEY 828 REPORT No S98-190 SIGNED

NORMAN WEIMANN

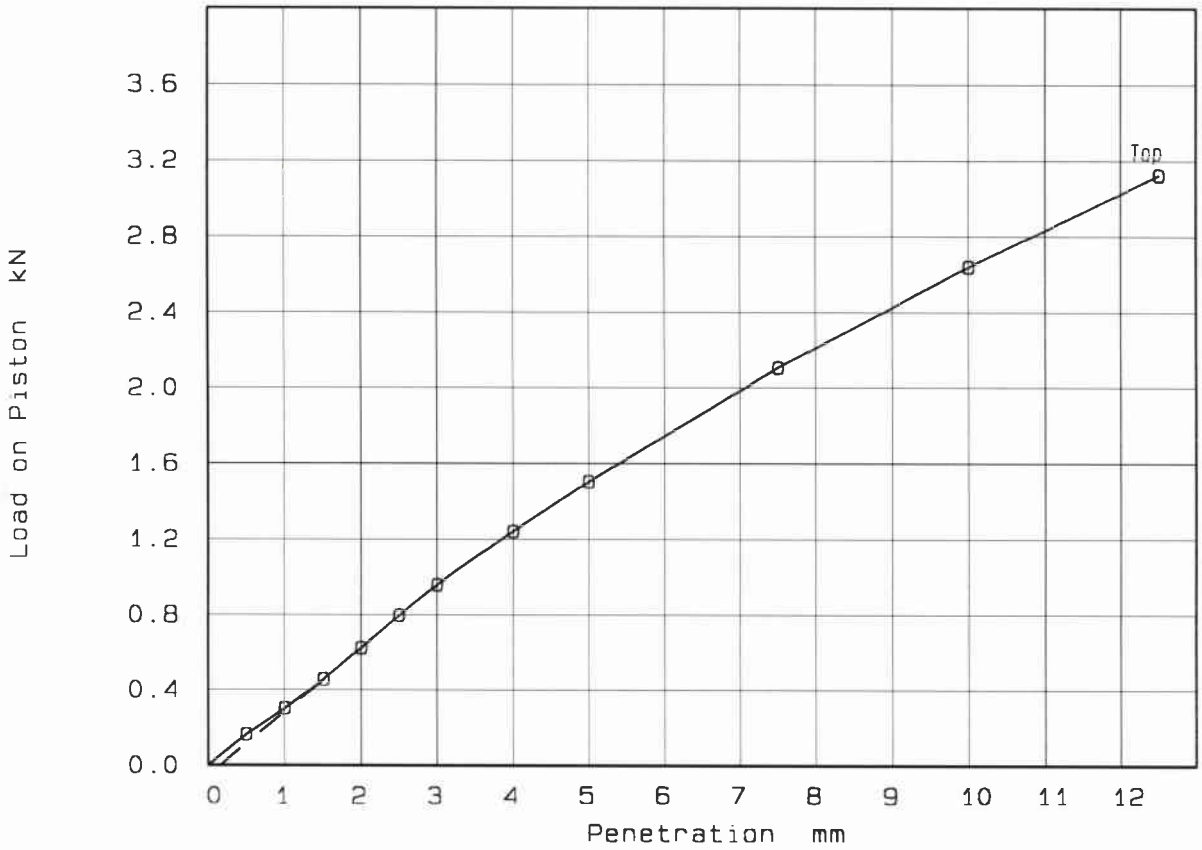
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RESULTS OF CALIFORNIA BEARING RATIO TEST

CLIENT	CENTRAL SYDNEY AREA HEALTH SERVICE	DATE	20/10/1998
PROJECT	PROPOSED REDEVELOPMENT	PROJECT No.	27456
LOCATION	ROYAL PRINCE ALFRED HOSPITAL, MISSENDEN ROAD, CAMPERDOWN	TEST LOC.	14
		DEPTH	0.1 - 0.5



DESCRIPTION BROWN CLAYEY SANDY SILT WITH SOME SANDSTONE

PREPARATION Remoulded to approximate 100% Maximum Dry Density & Optimum Moisture Content, then soaked for four days.

LEVEL OF COMPACTION 99 % Standard

SURCHARGE 4.5 kg SWELL 0.1 %

CONDITION	MOISTURE CONTENT %	DRY DENSITY t/m^3
At Compaction	13.2	1.85
After Soaking	15.0	1.85
After Test Top 30mm	15.1	-
- Remainder	13.9	-
Field Values	9.3	-
Standard Compaction	12.8	1.87

RESULTS		
Type	Penetration	CBR (%)
Top	- 2.5 mm	6
	- 5.0 mm	8

TEST METHOD AS 1289.F1.1

TESTED CT
CHECKED KG

LABORATORY SYDNEY - 828 REPORT No S98-299 SIGNED

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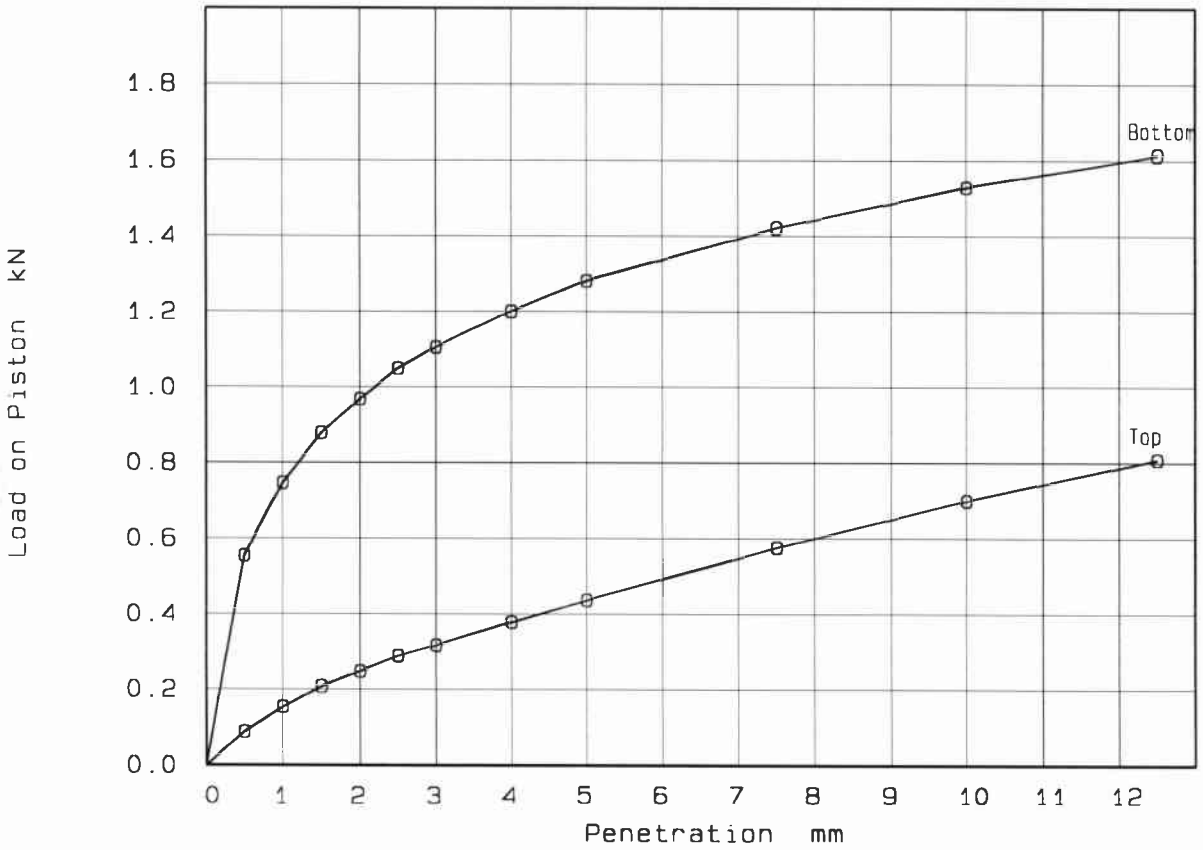
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RESULTS OF CALIFORNIA BEARING RATIO TEST

CLIENT	CENTRAL SYDNEY AREA HEALTH SERVICE	DATE	20/10/1998
PROJECT	PROPOSED REDEVELOPMENT	PROJECT No.	27456
LOCATION	ROYAL PRINCE ALFRED HOSPITAL, MISSENDEN ROAD, CAMPERDOWN	TEST LOC.	16
		DEPTH	0.1 - 0.5



DESCRIPTION BROWN MOTTLED SILTY CLAY

PREPARATION Remoulded to approximate 100% Maximum Dry Density & Optimum Moisture Content, then soaked for four days.

LEVEL OF COMPACTION 100 % Standard

SURCHARGE 4.5 kg SWELL 3.4 %

CONDITION	MOISTURE CONTENT %	DRY DENSITY t/m^3
At Compaction	27.1	1.49
After Soaking	31.9	1.44
After Test Top 30mm	35.2	-
- Remainder	31.0	-
Field Values	29.2	-
Standard Compaction	27.2	1.49

RESULTS Type	Penetration	CBR (%)
Top	- 2.5 mm	2.0
	- 5.0 mm	2.0
Bottom	- 2.5 mm	8
	- 5.0 mm	6

TEST METHOD AS 1289.F1.1

TESTED CT
CHECKED KG

LABORATORY SYDNEY - 828 REPORT No S98-299A SIGNED

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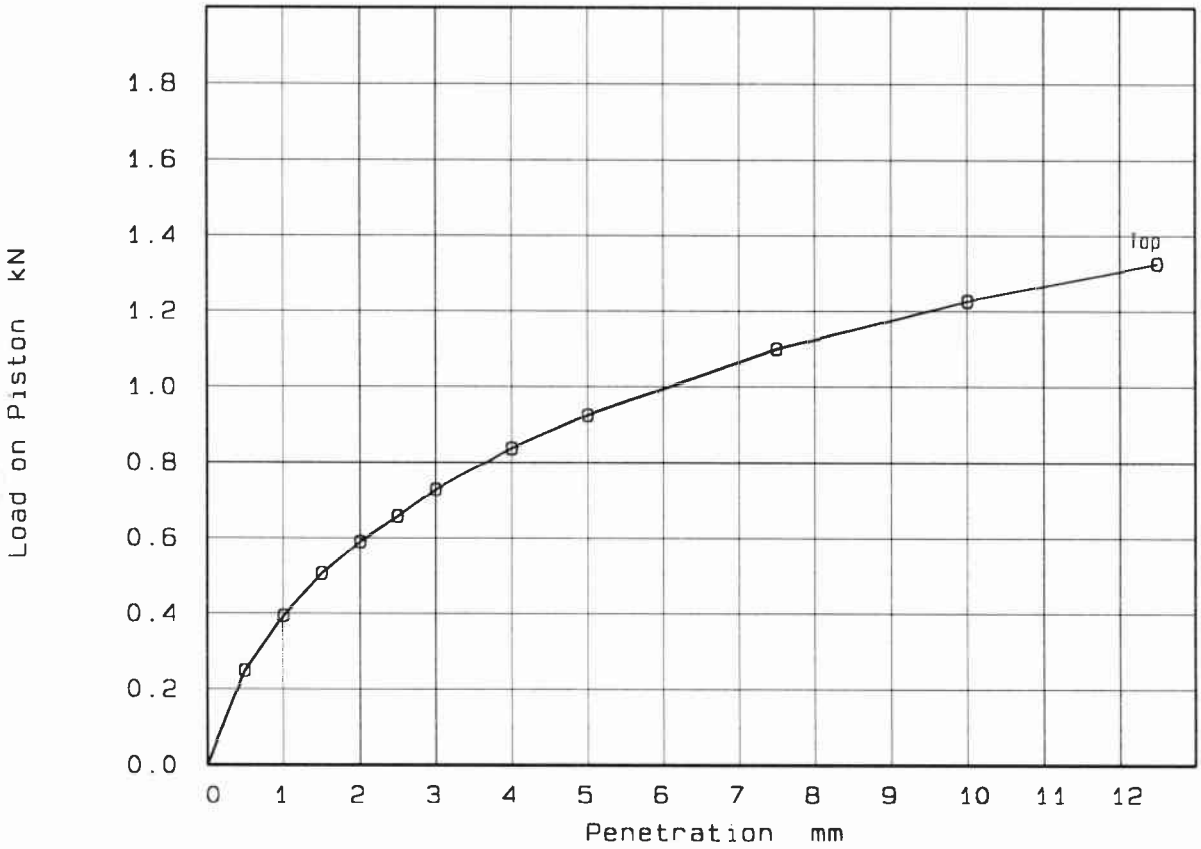
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RESULTS OF CALIFORNIA BEARING RATIO TEST

CLIENT	CENTRAL SYDNEY AREA HEALTH SERVICE	DATE	17/07/1998
PROJECT	PROPOSED DEVELOPMENT, EASTERN PRECINCT	PROJECT No.	27456
LOCATION	ROYAL PRINCE ALBERT HOSPITAL, MISSENDEN ROAD, CAMPERDOWN	TEST LOC.	18
		DEPTH	0.3 - 0.6



DESCRIPTION CLAY - STIFF BROWN GREY CLAY

PREPARATION Remoulded to approximate 100% Maximum Dry Density & Optimum Moisture Content, then soaked for four days.

LEVEL OF COMPACTION 100 % Standard

SURCHARGE 9 kg

SWELL -0.2 %

CONDITION	MOISTURE CONTENT %	DRY DENSITY t/m^3
At Compaction	26.6	1.53
After Soaking	28.5	1.53
After Test Top 30mm	27.7	-
- Remainder	27.2	-
Field Values	30.5	-
Standard Compaction	26.7	1.53

RESULTS		
Type	Penetration	CBR (%)
Top	- 2.5 mm	5
	- 5.0 mm	4.5

TEST METHOD AS 1289.F1.1

TESTED KG
CHECKED NW

LABORATORY SYDNEY 828 REPORT No S98-190A SIGNED

NORMAN WEIMANN

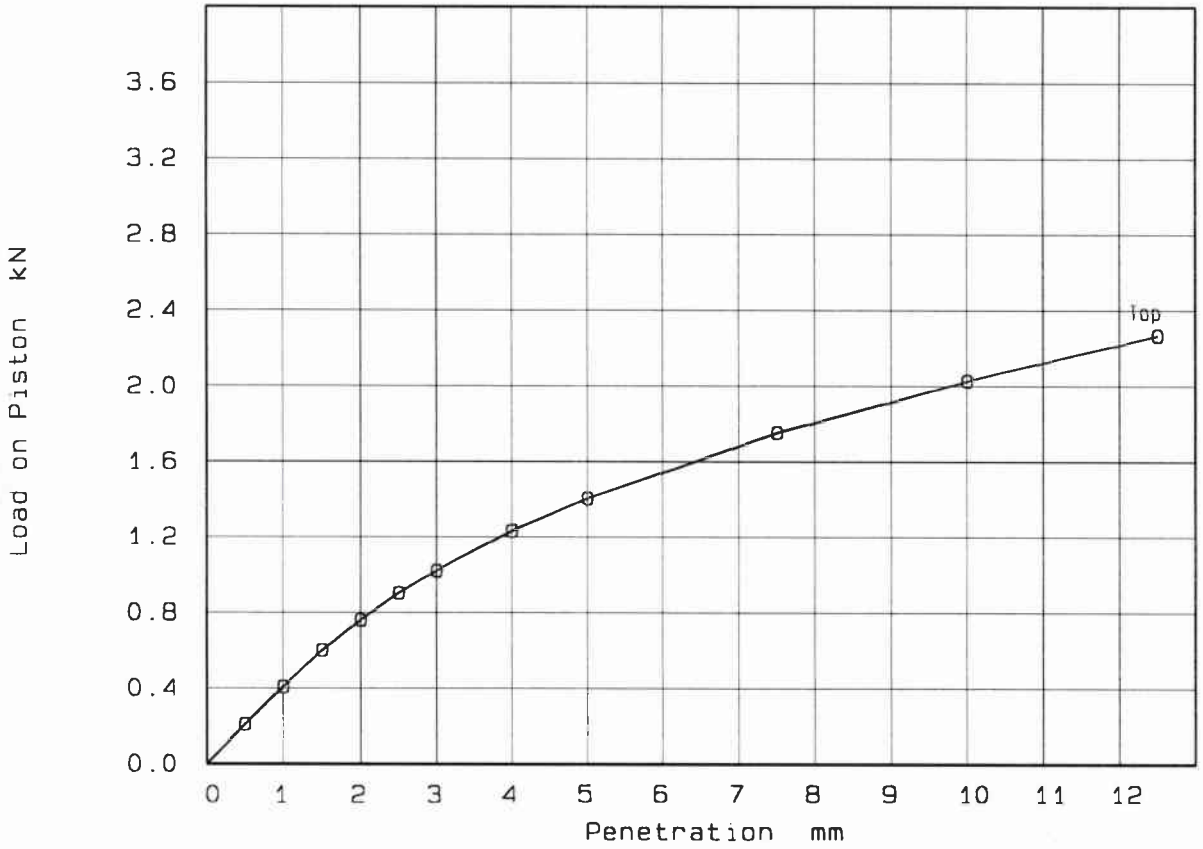
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RESULTS OF CALIFORNIA BEARING RATIO TEST

CLIENT	CENTRAL SYDNEY AREA HEALTH SERVICE	DATE	17/07/1998
PROJECT	PROPOSED DEVELOPMENT, EASTERN PRECINCT	PROJECT No.	27456
LOCATION	ROYAL PRINCE ALBERT HOSPITAL, MISSENDEN ROAD, CAMPERDOWN	TEST LOC.	19
		DEPTH	0.3 - 0.6



DESCRIPTION FILLING - BROWN GREY SANDY CLAY FILLING

PREPARATION Remoulded to approximate 100% Maximum Dry Density & Optimum Moisture Content, then soaked for four days.

LEVEL OF COMPACTION 99 % Standard

SURCHARGE 9 kg SWELL 1.3 %

CONDITION	MOISTURE CONTENT %	DRY DENSITY t/m^3
At Compaction	24.4	1.56
After Soaking	27.8	1.54
After Test Top 30mm	28.3	-
- Remainder	25.9	-
Field Values	27.1	-
Standard Compaction	24.0	1.57

RESULTS Type	Penetration	CBR (%)
Top	- 2.5 mm	7
	- 5.0 mm	7

TEST METHOD AS 1289.F1.1

TESTED KG
CHECKED NW

LABORATORY SYDNEY 828 REPORT No S98-1908 SIGNED

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RESULTS OF INSTABILITY INDEX DETERMINATION

CLIENT:	CENTRAL SYDNEY AREA HEALTH SERVICE	DATE:	21/10/1998
PROJECT:	PROPOSED REDEVELOPMENT	PROJECT No:	27456
LOCATION:	ROYAL PRINCE ALFRED HOS., CAMPERDOWN	LOC No:	6
		DEPTH:	2.6-2.9 m

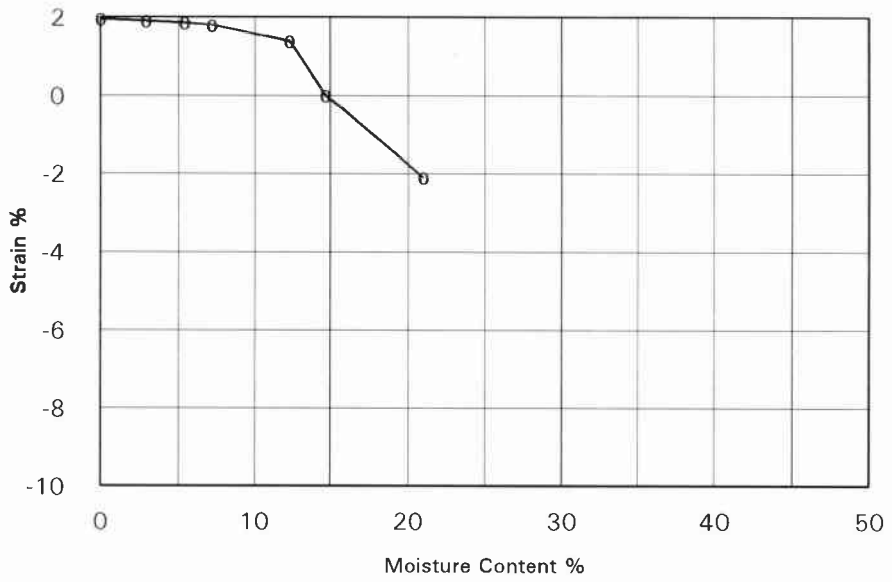
Description: CLAY - Mottled grey & red brown clay with some gravel

CORE SHRINKAGE TEST

Shrinkage - air dried	1.9 %
Shrinkage - oven dried	2.0 %
Significant inert inclusions	- %
Extent of cracking	- %
Extent of soil crumbling	- %
Moisture content of core	14.7 %

SWELL TEST

Pocket penetrometer reading at initial moisture content	>400 kPa
Pocket penetrometer reading at final moisture content	200 kPa
Initial Moisture Content	15.1 %
Final moisture content	21.0 %
Swell under 25kPa	2.1 %



SHRINK-SWELL INDEX I_{SS} 1.7 % per Δ pF

Remarks:

Test Method: AS1289 7.1.1-1998

TESTED BY: KG DATE: 16/10/98
CHECKED BY: NW DATE: 21/10/98

LABORATORY: SYDNEY - 828 REPORT NO: S98-301a

N.WEIMANN

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RESULTS OF INSTABILITY INDEX DETERMINATION

CLIENT:	CENTRAL SYDNEY AREA HEALTH SERVICE	DATE:	21/10/1998
PROJECT:	PROPOSED REDEVELOPMENT	PROJECT No:	27456
LOCATION:	ROYAL PRINCE ALFRED HOS., CAMPERDOWN	LOC No:	14
		DEPTH:	2.8-3.2 m

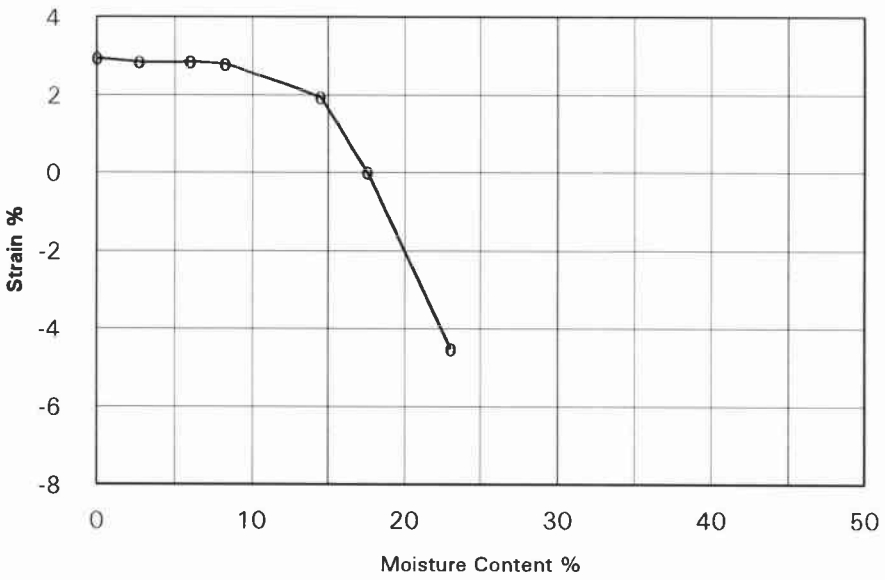
Description: CLAY - Mottled grey & red brown clay with some gravel

CORE SHRINKAGE TEST

Shrinkage - air dried	2.9 %
Shrinkage - oven dried	3.0 %
Significant inert inclusions	- %
Extent of cracking	- %
Extent of soil crumbling	- %
Moisture content of core	17.5 %

SWELL TEST

Pocket penetrometer reading at initial moisture content	>400 kPa
Pocket penetrometer reading at final moisture content	250 kPa
Initial Moisture Content	18.6 %
Final moisture content	23.0 %
Swell under 25kPa	4.5 %



SHRINK-SWELL INDEX I_{ss} 2.9% per Δ pF

Remarks:

Test Method: AS1289 7.1.1-1998

TESTED BY: KG DATE: 16/10/98
CHECKED BY: NW DATE: 21/10/98

LABORATORY: SYDNEY - 828 REPORT NO: S98-301b

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RESULTS OF INSTABILITY INDEX DETERMINATION

CLIENT:	CENTRAL SYDNEY AREA HEALTH SERVICE	DATE:	21/10/1998
PROJECT:	PROPOSED REDEVELOPMENT	PROJECT No:	27456
LOCATION:	ROYAL PRINCE ALFRED HOS., CAMPERDOWN	LOC No:	17
		DEPTH:	1.3-1.7 m

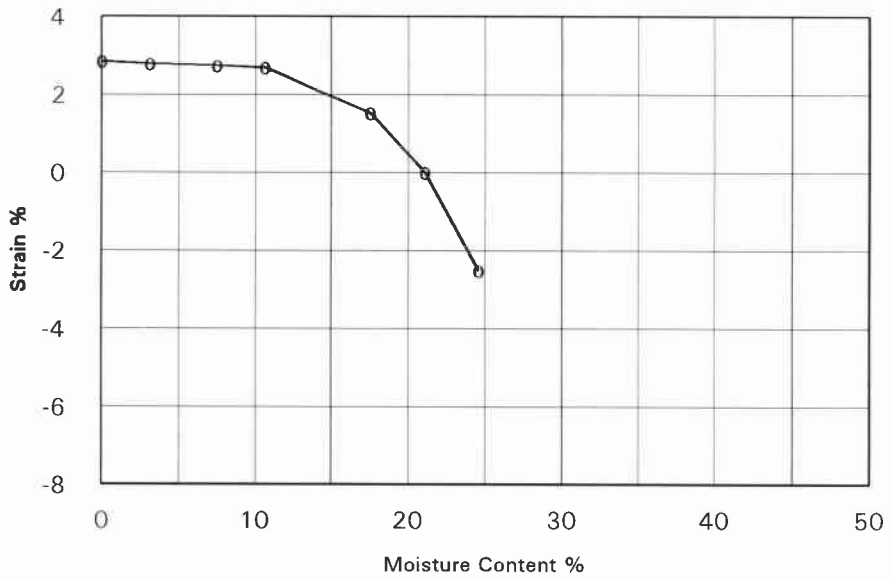
Description: CLAY - Mottled grey & red brown clay with some gravel

CORE SHRINKAGE TEST

Shrinkage - air dried	2.8 %
Shrinkage - oven dried	2.8 %
Significant inert inclusions	- %
Extent of cracking	1 %
Extent of soil crumbling	- %
Moisture content of core	21.1 %

SWELL TEST

Pocket penetrometer reading at initial moisture content	>400 kPa
Pocket penetrometer reading at final moisture content	200 kPa
Initial Moisture Content	20.8 %
Final moisture content	24.7 %
Swell under 25kPa	2.5 %



SHRINK-SWELL INDEX I_{SS} 2.3% per Δ pF

Remarks:

Test Method: AS1289 7.1.1-1998

TESTED BY: KG DATE: 16/10/98
CHECKED BY: NW DATE: 21/10/98

LABORATORY: SYDNEY - 828 REPORT NO: S98-301c

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BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Royal Prince Alfred Hospital Redevelopment
LOCATION: Missenden Road, Camperdown

SURFACE LEVEL: 23.2 AHD
EASTING: 332107.6
NORTHING: 6248578.5
DIP/AZIMUTH: 90°/--

BORE No: BH201
PROJECT No: 99709.00
DATE: 7/7/2020
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
23	0.1	ASPHALTIC CONCRETE										
		FILL/Clay: low to medium plasticity, brown and red-brown mottled grey, with fine to coarse sandstone gravel, trace silt and sand, w<PL							E/D			PID < 1 ppm
		between 0.4-0.5m: sandstone cobble										
22	1	between 0.9-1.0m: sandstone cobble							E/D			PID < 1 ppm
									E			PID < 1 ppm
	1.75	CLAY CI-CH: medium to high plasticity, red-brown mottled grey, with silt, w<PL, residual							E/D			PID < 1 ppm
21	2								E/D			PID < 1 ppm
	2.1	CLAY CI-CH: medium to high plasticity, red-brown and mottled grey, with ironstone gravel, fine to medium, angular to subangular, w<PL, very stiff, residual							S			6,9,10 N = 19
20	3											
19	4					15-07-20			S			5,8,15 N = 23
18	5											
		Below 5.7m: hard, trace ironstone gravel							S			14,24,17/70 refusal
	6.0	(extremely weathered rock)										
17	6							6m: CORE LOSS: 100mm	C	90	0	pp = 480
	6.1	CLAY CI-CH: medium to high plasticity, grey, trace ironstone gravel, fine to medium, angular to subangular, w<PL, hard, residual										pp = 520
	6.7	(extremely weathered rock)										
16	7	SILTSTONE: dark grey with brown, thinly laminated, with5-10% fine grained sandstone laminations, very low to low strength then medium strength with clay seams, highly weathered then moderately weathered, highly fractured, Ashfield Shale						6.78-6.92m: B(x4), 0-10°, pl-ir, fe, cly 10mm 6.92m: J50°, st, fe 6.97-6.99m: Cs, 20mm, fe 6.99-7.05m: B(0-10°), pl, fe 7.07-7.08m: Cs, 10mm 7.1-7.26m: B(x8), 0-10°, pl,fe 7.41m: B(0-10°), pl, fe 7.56m: B0°, pl, cly 9mm 8.31m: J45° and 90°, st, ti 8.37-8.50m: J(60-70°), ir, cly vn 8.66m: J60°, pl, cly vn 8.75-8.78m: Cs, 30mm				PL(A) = 0.35
	7.25											
15	8								C	100	72	PL(A) = 0.78
14	9	LAMINITE: dark grey, thinly laminated, with 30-40% fine grained sandstone laminations, medium strength then high strength with clay seams, fresh, fractured, Ashfield Shale										PL(A) = 0.95
	9.71							9.30-9.52m: B(x3), 0-10°, pl, fe, cly 5mm 9.55m: CORE LOSS: 160mm	C	94	52	

RIG: Bobcat **DRILLER:** Ground Test **LOGGED:** JJH/RB **CASING:** HW to 4.2m, HQ to 6.0m

TYPE OF BORING: Diacore to 0.1m, Non destructive digging to 2.1m, Solid flight auger (TC bit) to 4.0m, rotary to 6.0m. NMLC coring to 15.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Well installed: screened PVC 15.0m-2.5m, blank PVC 2.5m-0.1m, gravel pack 15.0m-2.0m, bentonite seal 2.0m-1.5m, backfill 1.5m-0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Royal Prince Alfred Hospital Redevelopment
LOCATION: Missenden Road, Camperdown

SURFACE LEVEL: 23.2 AHD
EASTING: 332107.6
NORTHING: 6248578.5
DIP/AZIMUTH: 90°/--

BORE No: BH201
PROJECT No: 99709.00
DATE: 7/7/2020
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
13		LAMINITE : as previous						9.74-10.57m: B(x9), 0-10°, pl, cly up to 7mm				PL(A) = 1.8
	10.57											
12		LAMINITE: dark grey, thinly laminated, with 20-25% fine grained sandstone laminations, high strength, fresh, slightly fractured, Ashfield Shale							C	94	52	PL(A) = 2
11								11.39-11.63m: B(x4), 0-5°, pl, cly 3mm				
12												PL(A) = 1.1
11								12.4m: J60°, ir				
								12.7m: J(70-80°), ir, ti				
13												PL(A) = 1.4
10								13.09m: J(45-55°), st, cln				
								13.15m: J60°, pl, ti	C	100	98	
14												PL(A) = 2.1
9								14.17m: J45°, pl, cln				
								14.75m: J60°, ir, ti				
15	15.0							14.93m: J45°, pl, cly vn				
8		Bore discontinued at 15.0m Target depth reached										
16												
7												
17												
6												
18												
5												
19												
4												

RIG: Bobcat **DRILLER:** Ground Test **LOGGED:** JJH/RB **CASING:** HW to 4.2m, HQ to 6.0m

TYPE OF BORING: Diacore to 0.1m, Non destructive digging to 2.1m, Solid flight auger (TC bit) to 4.0m, rotary to 6.0m. NMLC coring to 15.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Well installed: screened PVC 15.0m-2.5m, blank PVC 2.5m-0.1m, gravel pack 15.0m-2.0m, bentonite seal 2.0m-1.5m, backfill 1.5m-0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Royal Prince Alfred Hospital Redevelopment
LOCATION: Missenden Road, Camperdown

SURFACE LEVEL: 26.4 AHD
EASTING: 332074.2
NORTHING: 6248693.5
DIP/AZIMUTH: 90°/--

BORE No: BH202
PROJECT No: 99709.00
DATE: 9/7/2020
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
26	0.05	ASPHALTIC CONCRETE										
	0.25	FILL/SAND: fine to coarse, dark grey-brown, with silt, trace clay and fine to medium gravel, moist, apparently well compacted							E/D			PID < 1 ppm
	1	FILL/Silty CLAY: low to medium plasticity, brown-grey, with fine to coarse igneous sandstone gravel, trace sand and rootlets, w<PL							E/D			PID < 1 ppm
25	1.2	FILL/GRAVEL and COBBLES: pale yellow-grey sandstone cobbles and coarse sandstone gravel, moist										
	1.7	FILL/CLAY: low to medium plasticity, brown, with silt, trace fine gravel, coarse sandstone and ironstone gravel, w < PL							E/D			PID < 1 ppm
	2											
24	2.4	CLAY CI-CH: medium to high plasticity, grey mottled red-brown, with ironstone gravel, fine to medium, angular to subangular, w<PL, stiff to very stiff, residual							S/E			5,7,9 N = 16 PID < 1 ppm
	3											
23												
	4								S/E			5,9,15 N = 24 PID < 1 ppm
22												
	5											
21		Below 5.5m: grey, hard (extremely weathered rock)							S/E			22,25/70 refusal PID < 1 ppm
	6					15-07-20						PL(A) = 0.19
20	6.0	LAMINITE: dark grey, thinly laminated, with 20-30% fine grained sandstone laminations, low and medium strength with clay seams, slightly weathered then fresh, fractured, Ashfield Shale						6.01-6.56m: B(x8), 0-10°, pl, fe, cly up to 5mm 6.25-6.49m: Cs(x5), 10-30mm 6.86-6.87m: Cs, 10mm,fe 6.87m: B0°, pl, fe 6.99-7.09m:J, 60-80°, ir, fe 7.09m: B0°, pl, fe 7.2m: B(x4) 0°, pl, cly 3-5mm 7.52-7.59m: Cs, 70mm, fe 7.67-7.82m: B(x4), 0°, pl, cly 5mm, fe 7.84-8.29m: Cs(x5), 10-25mm 7.90-8.20m: J(x2) 70-90°, ir, fe, cly vn 8.35-8.48m: B(x3) 0°, pl, cly 5-9mm 8.77-8.78m: Cs, 10mm 9.03-9.30m: B(x10), 0-5°, cly 5-7mm 9.09m: B0°, pl, cly 7mm 9.37-9.38m: Cs, 10mm	C	100	55	PL(A) = 0.3 PL(A) = 0.5
	7											
19												
	8											
18	8.48	LAMINITE: dark grey, thinly laminated, with 20-30%, fine grained sandstone laminations, medium strength with clay seams, fresh, slightly fractured to fractured, Ashfield Shale							C	100	63	PL(A) = 0.74
	9											
17												

RIG: Scout 1 **DRILLER:** Ground Test **LOGGED:** JJH/RB **CASING:** HW to 4.2m, HQ to 6.0m

TYPE OF BORING: Diacore to 0.05m, Non destructive digging to 2.0m, Solid flight auger (TC bit) to 4.0m, rotary to 6.0m. NMLC coring to 16.15m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Approximately 40% water loss below 13.0m
Well installed: screen 16.15m-4.0m, blank 4.0m-0.1m, gravel pack 16.15m-3.5m, bentonite seal 3.5m-3.0m, backfill from 3.0m-0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Royal Prince Alfred Hospital Redevelopment
LOCATION: Missenden Road, Camperdown

SURFACE LEVEL: 26.4 AHD
EASTING: 332074.2
NORTHING: 6248693.5
DIP/AZIMUTH: 90°/--

BORE No: BH202
PROJECT No: 99709.00
DATE: 9/7/2020
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
			XW HW MW SW FS FR		Ex Low Very Low Low Medium High Very High Ex High		0.01 0.05 0.10 0.50 1.00	B - Bedding J - Joint S - Shear F - Fault				
		LAMINITE: dark grey, thinly laminated, with 20-30%, fine grained sandstone laminations, medium strength with clay seams, fresh, slightly fractured to fractured, Ashfield Shale *(continued)*						9.89-9.94m: B(x10), 0°, pl, cly 5-9mm 9.98-9.99m: Cs, 10mm				PL(A) = 0.47
								10.75-10.76m: Cs, 10mm 10.78m: J(60-70°), ir 10.81m: J60°, pl, cly vn 10.9m: J(45° & 5°), st, cly vn 10.99-11.05m: B(x3), 0°, pl, cly 5-7mm 11.43m: J(60-70°), ir, cly vn 11.73m: B0°, pl, cly 7mm 11.74m: J45°, pl, cly vn 12.54-12.57m: J(x2), 30-60°, ir, st 12.69m: B5°, pl, cly 3mm	C	100	63	PL(A) = 0.78
	12.9	SILTSTONE: dark grey, thinly laminated, with 5-10% fine grained sandstone laminations, high strength, fresh, slightly fractured to unbroken, Ashfield Shale										PL(A) = 0.26
									C	100	99	PL(A) = 1.1
								13.84-14.15m: J(70-80°),st, cly vn 14.20-14.47m: J60°, st, cly vn				PL(A) = 1.6
									C	100	100	PL(A) = 2.1
	16.15	Bore discontinued at 16.15m Target depth reached										PL(A) = 3.1

RIG: Scout 1 **DRILLER:** Ground Test **LOGGED:** JJH/RB **CASING:** HW to 4.2m, HQ to 6.0m

TYPE OF BORING: Diacore to 0.05m, Non destructive digging to 2.0m, Solid flight auger (TC bit) to 4.0m, rotary to 6.0m. NMLC coring to 16.15m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Approximately 40% water loss below 13.0m
Well installed: screen 16.15m-4.0m, blank 4.0m-0.1m, gravel pack 16.15m-3.5m, bentonite seal 3.5m-3.0m, backfill from 3.0m-0.1m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Royal Prince Alfred Hospital Redevelopment
LOCATION: Missenden Road, Camperdown

SURFACE LEVEL: 26.7 AHD
EASTING: 332070.2
NORTHING: 6248721.2
DIP/AZIMUTH: 90°/--

BORE No: BH203
PROJECT No: 99709.00
DATE: 8/7/2020
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
26	0.05	ASPHALTIC CONCRETE										
	0.14	CONCRETE										
	0.5	FILL/Silty SAND: brown, fine to coarse, with fine to medium igneous gravel, moist, apparently well compacted							E/D			PID < 1 ppm
1	0.9	Between 0.18m - 0.40m: sandstone cobbles, moist							E/D			PID < 1 ppm
	1.3	FILL/CLAY: medium to high plasticity, grey mottled red-brown, with silt, trace rootlets and fine to medium ironstone gravel, w<PL							E/D			PID < 1 ppm
25												
2		FILL/CLAY: low to medium plasticity, brown mottled grey, with silt, trace sand and fine to medium sandstone gravel, w<PL										
24		CLAY CI-CH: medium to high plasticity, grey mottled red-brown, with ironstone gravel, fine to medium, angular to subangular, w<PL, very stiff, residual							S/E			6,11,19 N = 30 PID < 1 ppm
3												
23												
4		Below 4.0m: hard							S/E			9,16,21 N = 37 PID < 1 ppm
22												
5												
21		Below 5.5m: grey, trace laminations of fine grained sandstone (extremely weathered rock)							S/E			9,14,24 N = 38 PID < 1 ppm
6	6.0											
	6.11	LAMINITE: dark grey, thinly laminated, with 30-40% fine grained sandstone laminations, low then low to medium strength with clay seams, slightly weathered, fractured, Ashfield Shale						6m: CORE LOSS: 100mm 6.18-6.24m: Cs, 60mm, fe 6.27-6.94m: B(x11), 0-10°, pl, cly, 0-8mm, fe 6.4-6.5m: J(80-90°), ir, fe	C	91	0	PL(A) = 0.1
20												
7								6.96-6.97m: Cs,10mm 7m: B5°, pl, fe 7.03-7.05m: Cs, 30mm 7.1-7.37m: B(x8), 0-10°, pl, fe 7.24-7.57m: J(x5), 45-90°, ir, pl and st, fe 7.74m: B0°, pl, cly 5mm 7.94m: B0°, pl, fe				PL(A) = 0.24
19												
8	8.19											
	8.23	LAMINITE: dark grey, thinly laminated, with 30-40% fine grained sandstone laminations, medium strength with clay seams, fresh, slightly fractured to fractured, Ashfield Shale						8.02m: CORE LOSS: 170mm 8.19-8.23m: B(0-10°), pl, fe 8.36-8.88m: B(0-5°), pl, cly 0-9mm	C	94	51	PL(A) = 0.32
18												
9												PL(A) = 0.92
17												

RIG: Bobcat **DRILLER:** Ground Test **LOGGED:** JJH/RB **CASING:** HW to 4.4m, HQ to 6.0m

TYPE OF BORING: Diacore to 0.14m, Non destructive digging to 2.4m, Solid flight auger (TC bit) to 4.0m, rotary to 6.0m. NMLC coring to 16.11m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Approximately 50% water loss below 8.5m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Royal Prince Alfred Hospital Redevelopment
LOCATION: Missenden Road, Camperdown

SURFACE LEVEL: 26.7 AHD
EASTING: 332070.2
NORTHING: 6248721.2
DIP/AZIMUTH: 90°/--

BORE No: BH203
PROJECT No: 99709.00
DATE: 8/7/2020
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
16		LAMINITE: dark grey, thinly laminated, with 30-40% fine grained sandstone laminations, medium strength with clay seams, fresh, slightly fractured to fractured, Ashfield Shale *(continued)*						9.90-10.10m:J(x5),45-85°, ir and pl 10.16-10.95m: J(x9), 40-80°, pl, ir, st, he 10.37-10.45m: B(x10), 10°, pl, cly 5mm				PL(A) = 0.11 PL(A) = 1.1
11	10.95	LAMINITE: dark grey, thinly laminated, with 20-30% fine grained sandstone laminations, medium then high strength, fresh, slightly fractured, Ashfield Shale										PL(A) = 0.63
15									C	100	63	
12								12.13m: B0°, pl, cly 3mm 12.28-12.92m: J(x5), 20-45°, pl, cly vn, ti 12.29-12.33m: Cs, 50mm				PL(A) = 1.4
13												PL(A) = 2.2
14	13.38	SILTSTONE: dark grey, thinly laminated, with 5-10% fine grained sandstone laminations, high strength, fresh, unbroken, Ashfield Shale						13.36m: J45°, pl, cln				PL(A) = 3.6
12									C	100	100	
15												PL(A) = 2
11												
16	16.11	Bore discontinued at 16.11m Target depth reached										PL(A) = 1.2
10												
17												
9												
18												
8												
19												
7												

RIG: Bobcat **DRILLER:** Ground Test **LOGGED:** JJH/RB **CASING:** HW to 4.4m, HQ to 6.0m

TYPE OF BORING: Diacore to 0.14m, Non destructive digging to 2.4m, Solid flight auger (TC bit) to 4.0m, rotary to 6.0m. NMLC coring to 16.11m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Approximately 50% water loss below 8.5m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Royal Prince Alfred Hospital Redevelopment
LOCATION: Missenden Road, Camperdown

SURFACE LEVEL: 24.7 AHD
EASTING: 331989.2
NORTHING: 6248757.4
DIP/AZIMUTH: 90°/--

BORE No: BH204
PROJECT No: 99709.00
DATE: 10/7/2020
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Type	Core Rec. %	RQD %	Test Results & Comments
24	0.35	FILL/Silty SAND: fine to medium, dark brown, with clay and rootlets, trace gravel, moist, poorly compacted		A/E			PID < 1 ppm
		Below 0.15m: trace silt		A/E*			PID < 1 ppm
	0.8			A/E			BD1-100720
23	1	FILL/Gravelly CLAY: low plasticity, brown, igneous gravel, with sand, trace brick fragments, w>PL, variably compacted					PID < 1 ppm
		FILL/CLAY: low to medium plasticity, brown and red-brown, with ironstone and sandstone gravel, w<PL, variably compacted		A/E			PID < 1 ppm
	2	At 2.00m: possible sandstone boulder		S/E			3,7,10 N = 17
22		At 2.7m: trace ceramics					PID < 1 ppm
	3	At 3.00m: metal wire		S/E			5,5,3/20 refusal
	3.5	CLAY CI-CH: medium to high plasticity, brown to red-brown, with medium to high strength ironstone bands and ironstone gravel, fine to medium, angular to subangular, w<PL, very stiff, residual					PID < 1 ppm
21	4			S/E			10,12,17 N = 29
	4.5						PID < 1 ppm
	4.63	CLAY CI-CH: medium to high plasticity, red brown and grey, with medium to high strength ironstone bands and ironstone gravel, fine to medium, angular to subangular, w<PL, very stiff to hard, residual		C	91	0	pp = 410
20	5	(extremely weathered rock)					pp = 420 pp = 460 pp = 380 pp = 650
	5.45	LAMINITE: brown and grey, laminated, with 20-30% fine grained sandstone laminations, very low strength with clay seams, highly weathered, fractured, Ashfield Shale					PL(A) = 0.08
19	6						
18	7			C	100	33	PL(A) = 0.05
	7.15	SILTSTONE: dark grey, thinly laminated, 5-10% fine grained sandstone laminations, medium strength, moderately weathered then fresh, fractured then slightly fractured, Ashfield Shale					
17	8						PL(A) = 0.46
	8.24	LAMINITE: dark grey, thinly laminated, with 0-10% fine grained sandstone, medium, fresh, slightly fractured, Ashfield Shale					
16	9			C	100	100	PL(A) = 0.58
15							PL(A) = 0.47

Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)

4.5m: CORE LOSS: 130mm

5.46-5.72: J(x4), 30-60°, pl & st, fe, cly 4mm

5.89m: Cs, 10mm, fe
5.95- 5.99m: Cs, 40mm, fe
6.02-6.06m: B(x4), 0-5°, fe
6.29m: J(x2), 45°, pl, fe, cly vn
6.42-6.47m: B(x6) 0-10°, cly vn, fe
6.59-6.73m: J(x4), 60-70°, pl & ir, fe, cly vn
7.04m: Cs, 10mm, fe
7.16-7.37m: J(x4), 60-70°, pl & ir, fe, cly vn
7.17-7.62m: B(x7), 0-10°, cly 5-8mm, fe
7.39-7.42m: Cs, 30mm, fe
7.75m: J45°, pl, cln
8.13-8.22m: J(x2) 60-70°, pl & ir

RIG: Bobcat **DRILLER:** Ground Test **LOGGED:** RB **CASING:** HW to 4.2m, HQ to 4.5m

TYPE OF BORING: Hand auger to 0.4m, Solid flight auger (TC bit) to 4.0m, rotary to 4.5m. NMLC coring to 14.51m.

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Duplicate sample: BD1-100720

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Royal Prince Alfred Hospital Redevelopment
LOCATION: Missenden Road, Camperdown

SURFACE LEVEL: 24.7 AHD
EASTING: 331989.2
NORTHING: 6248757.4
DIP/AZIMUTH: 90°/--

BORE No: BH204
PROJECT No: 99709.00
DATE: 10/7/2020
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	10.4	LAMINITE: dark grey, thinly laminated, with up to 50% fine grained sandstone, high then very high strength, fresh, slightly fractured to unbroken, Ashfield Shale						10.21m: J 45°& 5°, st, cly vn 10.39m: B0°, pl, cly 3-5mm	C	100	100	PL(A) = 2.4
								11.93-11.97m: Cs, 40mm				PL(A) = 2.2
									C	100	100	PL(A) = 4
												PL(A) = 3.2
	14.51	Bore discontinued at 14.51m Target depth reached										PL(A) = 4.8

RIG: Bobcat **DRILLER:** Ground Test **LOGGED:** RB **CASING:** HW to 4.2m, HQ to 4.5m

TYPE OF BORING: Hand auger to 0.4m, Solid flight auger (TC bit) to 4.0m, rotary to 4.5m. NMLC coring to 14.51m.

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Duplicate sample: BD1-100720

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Royal Prince Alfred Hospital Redevelopment
LOCATION: Missenden Road, Camperdown

SURFACE LEVEL: 33.6 AHD
EASTING: 331807.1
NORTHING: 6248607.6
DIP/AZIMUTH: 90°/--

BORE No: BH205
PROJECT No: 99709.00
DATE: 13/7/2020
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
			XW HW MW SW FS FR		Ex Low Very Low Low Medium High Very High Ex High		0.01 0.05 0.10 0.50 1.00	B - Bedding J - Joint S - Shear F - Fault				
33	0	FILL/Sandy GRAVEL: fine to medium gravel, dark brown, igneous, fine to medium sand, angular to subangular, trace clay, moist, apparently well compacted (road base)							A/D			PID < 1 ppm
	0.4								A/E*			PID < 1 ppm BD2-130720
32	1	CLAY CI-CH: medium to high plasticity, brown mottled red-brown, trace ironstone gravel, stiff to very stiff, residual (first 300mm possibly disturbed)							A/E			PID < 1 ppm
									S/E			4,7,9 N = 16 PID < 1 ppm
	2											
31	2.5	CLAY CI-CH: medium to high plasticity, grey and red brown, with bands of medium to high strength ironstone, hard, residual (extremely weathered rock)							S/E			7,14,20 N = 34 PID < 1 ppm
	3											pp = 580
30	3.0	CLAY CI-CH: medium to high plasticity, grey and red brown, with bands of medium to high strength ironstone, hard, residual (extremely weathered rock)							C	100	0	pp = 530 pp = 560
	4											pp = 450
29						15-07-20			C	100	0	pp = 510
	5											pp = 650
28									C	100	0	pp = 520 pp = 580
	6											pp = 450
27	7								C	100	0	pp = 570
	7.2	SILTSTONE: brown with grey, laminated, with 5-10% fine grained sandstone laminations, very low strength with low to medium strength ironstone bands and clay seams, highly weathered, fractured, Ashfield shale						7.2-7.83m: B(x7) 0-10°, pl & ir, fe, cly up to 7mm 7.27-7.75m: Cs(x4), 10-80mm, fe 7.3-7.67m: J(x6), 45-85°, cly up to 5mm, fe				PL(A) = 0.2
26	8								C	100	0	
	8.22	SILTSTONE: brown with grey, thinly laminated, with 5-10% fine grained sandstone laminations, low to very low strength, moderately weathered, fractured, Ashfield shale						7.83-8.47m: Cs(x7), 10-80mm, fe 8.00-8.90m: J(x7), 45-90°, pl, cu & ir, fe, cly vn 8.12-8.36m: Ds(x2), 50 &120mm 8.9m: CORE LOSS: 150mm 9.05-9.22m: J(x4), 60-90°, fe, cly vn 9.2-9.39m: B(x5), 0-10°, fe, cly vn				PL(A) = 0.3
25	9								C	95	55	
	9.05											
24												

RIG: Bobcat **DRILLER:** Ground Test **LOGGED:** RB **CASING:** HW to 2.5m, HQ to 3.0m

TYPE OF BORING: Solid flight auger (TC bit) to 2.5m, rotary to 3.0m. NMLC coring to 15.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Well installed: screen 15.0m-4.0m, blank 4.0m-0.1m, gravel pack 15.0m-3.5m, bentonite seal 3.5m-3.0m, backfill 3.0m-0.1m. Duplicate Sample: BD2-130720

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Royal Prince Alfred Hospital Redevelopment
LOCATION: Missenden Road, Camperdown

SURFACE LEVEL: 33.6 AHD
EASTING: 331807.1
NORTHING: 6248607.6
DIP/AZIMUTH: 90°/--

BORE No: BH205
PROJECT No: 99709.00
DATE: 13/7/2020
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
23	10.1	SILTSTONE: dark grey, laminated, with 5% fine grained sandstone laminations, medium strength with low to very low strength crushed seams and a sheared zone, fresh, fractured to slightly fractured, Ashfield Shale						9.54-9.66m: Ds, 120mm, fe 9.62-9.70m: Cs, 20mm, fe 9.73-9.88m: B(x3), 0-10°, pl & cu, cly vn, fe 9.91m: Cs, 10mm, fe 9.94-9.97m: J(x2) 45°, pl, fe 10.06-11.63m: J(x5) 60°, pl 11.57-11.6m: Cz, cly, 40mm 11.95m: J(x3) 60-80°, pl & ir 12.33-12.53m: Sz, cly 50mm 12.37m: J(x2), 60°, pl, cly 2mm 12.57m: CORE LOSS: 180mm 12.84-13.13m: J(x3), 35-60°, pl 13.41m: J45°, pl, cln 13.79-13.93m: J(x4), 45°, pl, cly vn 14.01-14.21m: J(x3), 45° & 90°, pl & un 14.26-14.27m: Cs, 10mm	C	95	55	PL(A) = 0.3 PL(A) = 0.5
22	11											
21	12								C	84	62	PL(A) = 0.7
20	12.75								C	100	68	PL(A) = 0.8
19	13											
18	14								C	100	100	PL(A) = 0.8
17	15 15.0	Bore discontinued at 15.0m Target depth reached										
16	16											
15	17											
14	18											
	19											

RIG: Bobcat **DRILLER:** Ground Test **LOGGED:** RB **CASING:** HW to 2.5m, HQ to 3.0m

TYPE OF BORING: Solid flight auger (TC bit) to 2.5m, rotary to 3.0m. NMLC coring to 15.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Well installed: screen 15.0m-4.0m, blank 4.0m-0.1m, gravel pack 15.0m-3.5m, bentonite seal 3.5m-3.0m, backfill 3.0m-0.1m. Duplicate Sample: BD2-130720

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Royal Prince Alfred Hospital Redevelopment
LOCATION: Missenden Road, Camperdown

SURFACE LEVEL: 33.4 AHD
EASTING: 331768.5
NORTHING: 6248588.4
DIP/AZIMUTH: 90°/--

BORE No: BH206
PROJECT No: 99709.00
DATE: 14 - 15/7/2020
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
33	0.12	CONCRETE: 120mm thick, up to 20mm aggregate, 10mm reinforcement at 70mm depth							A/E			PID < 1 ppm
		CLAY CI-CH: medium to high plasticity, brown-dark brown, trace ironstone gravel, stiff then hard, w<PL, residual							A/E*			PID < 1 ppm BD3-140720
32	1	(possibly disturbed to 0.6m) Below 0.6m: red-brown Below 1.0m: grey mottled red-brown, stiff							S/E			3,5,9 N = 14 PID < 1 ppm
31	2											
	2.5	CLAY CI-CH: medium to high plasticity, grey and red brown, with bands of medium to high strength ironstone, hard, residual							S/E			9,19,33 N = 52 PID < 1 ppm
30	3	(extremely weathered rock)						3m: CORE LOSS: 110mm	C	91	0	
	3.11	CLAY CI-CH: medium to high plasticity, grey and red brown, with bands of medium to high strength ironstone, hard, residual (extremely weathered rock)										
29	4							4.23m: CORE LOSS: 150mm	C	80	0	
28	4.38							4.95m: CORE LOSS: 480mm	C	78	0	
27	5											
	5.43											
26	6											
	7											
	7.1	SILTSTONE: brown and pale brown, thinly laminated, with 5-10% fine grained sandstone laminations, very low then low to very low strength, highly weathered, fractured, Ashfield shale						7.15-8.38m: J(x7), 60-80°, ir, pl & vt, fe, cly vn 7.25-7.64m: Ds, 390mm 7.35-7.43m: B(x8), 0-10°, pl, cly 2mm, fe	C	100	0	
25	8											
	8.4	SILTSTONE: grey, laminated, with 5-10% fine grained sandstone laminations, very low to low strength, moderately weathered, slightly fractured to fractured, Ashfield shale						8.49-8.61: B(x3), 0-5°, pl, cly vn, fe				PL(A) = 0.2
	9							8.93-9.02m: B(x4), 0-10°, pl, fe, cly vn	C	100	67	
24	9.02	SILTSTONE: dark grey, laminated, with 5-10% fine grained sandstone laminations, medium strength, fresh, slightly fractured, Ashfield Shale						9.5m: B0°, pl, cly 6mm 9.72m: B0°, pl, cly 5mm 9.74m: J35°, pl, cly				PL(A) = 0.5

RIG: Bobcat **DRILLER:** Ground Test **LOGGED:** RB **CASING:** HW to 2.6m, HQ to 3.0m

TYPE OF BORING: Diacore to 0.12m, Solid flight auger (TC bit) to 2.5m, rotary to 3.0m. NMLC coring to 15.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Duplicate sample: BD3-140720

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Health Infrastructure
PROJECT: Royal Prince Alfred Hospital Redevelopment
LOCATION: Missenden Road, Camperdown

SURFACE LEVEL: 33.4 AHD
EASTING: 331768.5
NORTHING: 6248588.4
DIP/AZIMUTH: 90°/--

BORE No: BH206
PROJECT No: 99709.00
DATE: 14 - 15/7/2020
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
23		SILTSTONE: dark grey, laminated, with 5-10% fine grained sandstone laminations, medium strength, fresh, slightly fractured, Ashfield Shale *(continued)*						2mm	C	100	67	PL(A) = 0.5
22	11 11.05							11m: CORE LOSS: 50mm 11.05-11.29m: J (70-80°), ir				
21	12								C	100	100	PL(A) = 0.5
20	13							13.1m: J45°, pl, cln				PL(A) = 0.5
19	14	Between 13.83m-15.21m: fractured						13.83m: J45°, pl, cln 14.02-14.61m: J(x5), 45-70°, pl & ir	C	100	87	PL(A) = 0.6
18	15							14.72-15.21m: J(x7), 45-60°, pl, ti				PL(A) = 0.4
17	16	Between 15.84m-15.95m: sandstone bands (x2), 20mm thick						15.81m: J60°, pl, ti	C	100	78	PL(A) = 0.6
16	17 17.0	At 16.92m: sandstone band 80mm thick Bore discontinued at 17.0m Target depth reached						16.81m: J20°, pl, cln				
15	18											
14	19											

RIG: Bobcat **DRILLER:** Ground Test **LOGGED:** RB **CASING:** HW to 2.6m, HQ to 3.0m

TYPE OF BORING: Diacore to 0.12m, Solid flight auger (TC bit) to 2.5m, rotary to 3.0m. NMLC coring to 15.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Duplicate sample: BD3-140720

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BORE: 201 PROJECT: RPA HOSPITAL JULY 2020



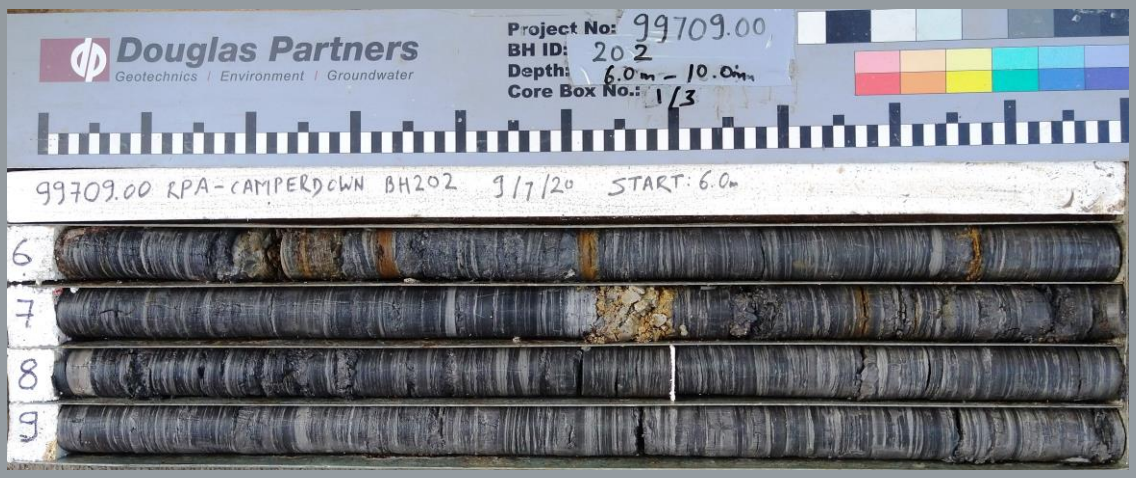
6.00 – 10.00m

BORE: 201 PROJECT: RPA HOSPITAL JULY 2020



10.00 – 15.00m

BORE: 202 PROJECT: RPA HOSPITAL JULY 2020



6.00 – 10.00m

BORE: 202 PROJECT: RPA HOSPITAL JULY 2020



10.00 – 15.00m

BORE: 202 **PROJECT: RPA HOSPITAL** **JULY 2020**



15.00 – 16.15m

BORE: 203 PROJECT: RPA HOSPITAL JULY 2020



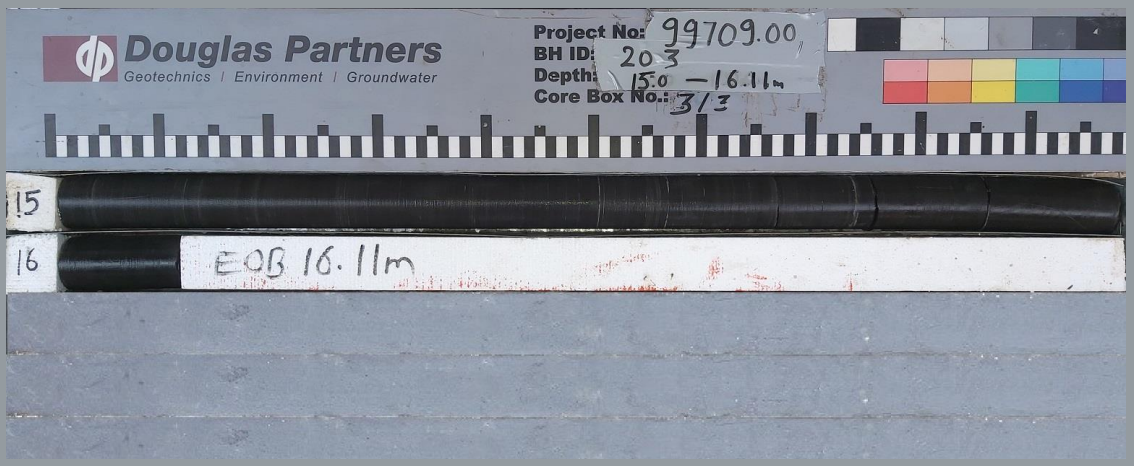
6.00 – 10.00m

BORE: 203 PROJECT: RPA HOSPITAL JULY 2020



10.00 – 15.00m

BORE: 203 **PROJECT: RPA HOSPITAL** **JULY 2020**



15.00 – 16.11m

BORE: 204 PROJECT: RPA HOSPITAL JULY 2020



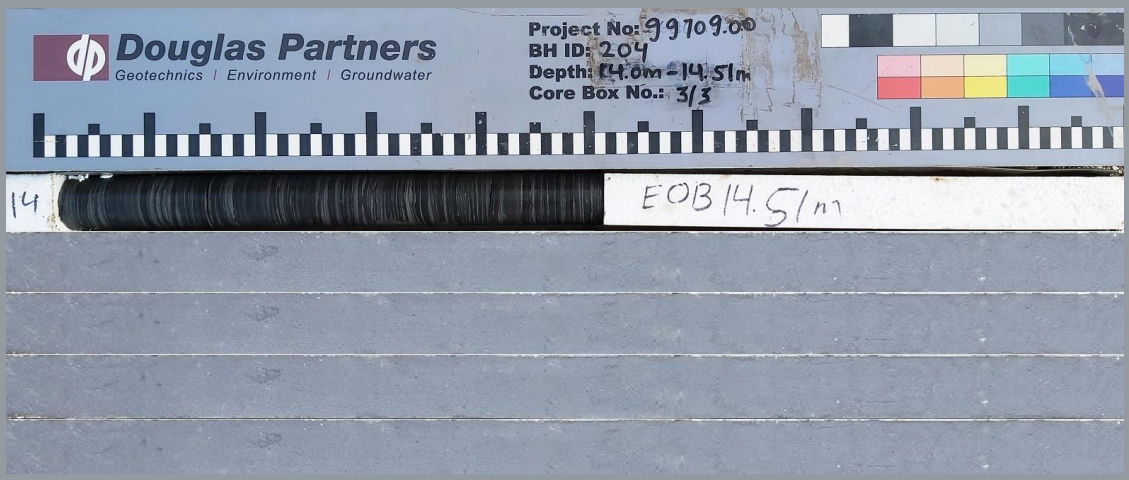
4.50 – 9.00m

BORE: 204 PROJECT: RPA HOSPITAL JULY 2020



9.00 – 14.00m

BORE: 204 **PROJECT: RPA HOSPITAL** **JULY 2020**



14.00 – 14.51m

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 247251

Client Details

Client	Douglas Partners Pty Ltd
Attention	Peter Valenti
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**99709.00, RPA Hospital Redevelopment**
Number of Samples	2 Soil
Date samples received	17/07/2020
Date completed instructions received	17/07/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

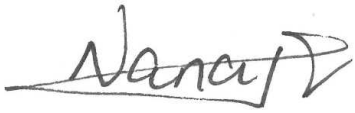
Date results requested by	24/07/2020
Date of Issue	24/07/2020

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Priya Samarawickrama, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

Misc Inorg - Soil			
Our Reference		247251-1	247251-2
Your Reference	UNITS	BH201	BH205
Depth		4.0-4.45	1.0-1.45
Date Sampled		07/07/2020	13/07/2020
Type of sample		Soil	Soil
Date prepared	-	20/07/2020	20/07/2020
Date analysed	-	20/07/2020	20/07/2020
pH 1:5 soil:water	pH Units	4.6	4.2
Electrical Conductivity 1:5 soil:water	µS/cm	63	97
Chloride, Cl 1:5 soil:water	mg/kg	<10	32
Sulphate, SO4 1:5 soil:water	mg/kg	82	43

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			20/07/2020	[NT]	[NT]	[NT]	[NT]	20/07/2020	[NT]
Date analysed	-			20/07/2020	[NT]	[NT]	[NT]	[NT]	20/07/2020	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	88	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	114	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

pH/EC
Sample #1 was out of the recommended holding time for this analysis.

Douglas Partners
Geotechnics · Environment · Groundwater

CHAIN OF CUSTODY

Project Name: RPA Hospital Redevelopment .....
Project No: 99709.00..... Sampler: ...Roshan B.....
Project Mgr: PAV.....Mob. Phone: 0422 000 438.....
Email: peter.valenti@douglaspartners.com.au .....
Date Required: ...Standard TAT ..... Lab Quote No. .....

To: Envirolab Services
12 Ashley Street, Chatswood NSW 2068
Attn: Tania Notaras
Phone: 02 9910 6200 Fax: 02 9910 6201
Email: tnotaras@envirolabservices.com.au

Sample ID	Sample Depth (m)	Lab ID	Sampling Date	Sample Type S - soil W – water	Container type	Analytes									Notes
						pH	sulphate	Chloride	Electrical Conductivity						
BH201	4.0-4.45	1	7.7	S	Plastic	x	x	x	x						
BH205	1.0-1.45	2	13.7	S	Plastic	x	x	x	x						

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 247251
Date Received: 17/7/2020
Time Received: 1620
Received By:
Temp: Cool/Ambient 8.1
Cooling: Ice/Icepack
Security: Intact/Broken/None

Lab Report No. .....
Send Results to: Douglas Partners Address: 96 Hermitage Road, West Ryde 2114
Phone: (02) 9809 0666
Fax: (02) 9809 4095

Relinquished by: PAV Signed: Peter Valenti Date & Time: 17.7.20 Received By: Date & Time:

Relinquished by: JSN Signed: Date & Time: Received By: Ray Date & Time: 1620 17/7/20

Royal Prince Alfred Hospital – Eastern Campus

APPENDIX F

IMPORTANT INFORMATION

Cardno

now

Stantec

Important Information about this Geotechnical Report

Scope of Work

The purpose of this report and any associated documentation is expressly stated in the document. This document does not form a complete assessment of the site, and no implicit determinations about Cardno's scope can be taken if not specifically referenced. Whilst this report is intended to reduce geotechnical risk, no level of detail or scope of work can entirely eliminate risk.

The nature of geotechnical data typically precludes auxiliary environmental assessment without undertaking specific methods in the investigation. Therefore, unless it is explicitly stated in the scope of work, this report does not provide any contamination or environmental assessment of the site or adjacent sites, nor can it be inferred or implied from any component of the document.

The scope of work, geotechnical information, and assessments made by Cardno may be summarised in the report; however, all aspects of the document, including associated data and limitations should be reviewed in its entirety.

Standard of care

Cardno have undertaken investigations, performed consulting services, and prepared this report based on the Client's specific requirements, data that was available or was collected, and previous experience.

Cardno's findings and assessment represent its reasonable judgment, diligence, skill, with sound professional standards, within the time and budget constraints of its commission. No warranty, expressed or implied, is made as to the professional advice included in this report.

Data sources

In preparing this document, or providing any consulting services during the commission, Cardno may have relied on information from third parties including, but not limited to; sub-consultants, published data, and the Client including its employees or representatives. This data may not be verified and Cardno assumes no responsibility for the adequacy, incompleteness, inaccuracies, or reliability of this information.

Cardno does not assume any responsibility for assessments made partly, or entirely based on information provided by third parties.

Variability in conditions and limitations of data

Subsurface conditions are complex and can be highly variable; they cannot be accurately defined by discrete investigations. Geotechnical data is based on investigation locations which are explicitly representative of the specific sample or test points. Interpretation of conditions between such points cannot be assumed to represent actual subsurface information and there are unknowns or variations in ground conditions between test locations that cannot be inferred or predicted.

The precision and reliability of interpretive assessment between discrete points is dependent on the uniformity of the subsurface strata, as well as the frequency, detail, and method of sampling or testing.

Subsurface conditions are formed by various natural and anthropogenic processes and therefore are subject to change over time. This is particularly relevant with changes to the site ownership or usage, site boundary or layout, and design or planning modifications. Aspects of the site may also not be able to be determined due to physical or project related constraints and any information provided by Cardno cannot apply following modification to the site, regulations, standards, or the development itself.

It is important to appreciate that no level of detail in investigation, or diligence in assessment, can eliminate uncertainty related to subsurface conditions and thus, geotechnical risk. Cardno cannot and does not provide unqualified warranties nor does it assume any liability for site conditions not observed or accessible during the investigations.

Verification of opinions and recommendations

Geotechnical information, by nature, represents an opinion and is based extensively on judgment of both data and interpretive assessments or observation. This report and its associated documentation are provided explicitly based on Cardno's opinion of the site at the time of inspection, and cannot be extended beyond this.

Any recommendations or design are provided as preliminary until verified on site during project implementation or construction. Inspection and verification on site shall be conducted by a suitably qualified geotechnical consultant or engineer, and where subsurface conditions or interpretations differ from those provided in this document or otherwise anticipated, Cardno must be notified and be provided with an opportunity to review the recommendations.

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Warren Smith
Consulting Engineers

15th June 2022

REF 2 UTILITY SERVICES REPORT

RPA HOSPITAL REDEVELOPMENT



REF 2 UTILITY SERVICES REPORT

RPA HOSPITAL REDEVELOPMENT

A	4th March 2022	Draft issue for coordination and discussion
B	26th May 2022	Final Issue incorporating review comments
C	26th May 2022	Final Issue incorporating TSA comments
D	30th May 2022	Final Issue incorporating TSA comments
E	15th June 2022	Incorporating Architectus comments
Rev #	**Date**	**Description of Change**

APPROVALS

A	**J. Skubevski**	**Superseded**	**S. Sullivan**	**D. Power**
B	**J. Skubevski**	**Superseded**	**S. Sullivan**	**D. Power**
C	**J. Skubevski**	**Superseded**	**S. Sullivan**	**D. Power**
D	**J. Skubevski**	**Superseded**	**S. Sullivan**	**D. Power**
E	**J. Skubevski**	**Current**	**T. Wise**	**D. Bolt**
Rev #	**Author**	**Status**	**Reviewer**	**Approver**

PREPARED BY:

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Contents

HYDRAULIC SERVICES 1

1. GENERAL 1

1.1 PURPOSE OF THE REPORT 2
1.2 UTILITY SERVICES 2
1.3 REF 2 IMPACTS 2

2. DEMAND CALCULATIONS 3

2.1 WATER SUPPLY DEMAND CALCULATIONS 3
2.2 SEWER DISCHARGE CALCULATIONS 3
2.3 NATURAL GAS DEMAND CALCULATIONS 4

3. CONNECTIONS 5

3.1 WATER 5
3.2 SEWER 6
3.3 NATURAL GAS 7

4. APPENDICES 9

4.1 APPENDIX A – SYDNEY WATER AVERAGE DAILY WATER USE TABLE I

HYDRAULIC SERVICES

1. GENERAL

Warren Smith Consulting Engineers (WSCE) have been engaged by Health Infrastructure (HI) NSW to prepare a Utility Services Report for the proposed redevelopment works at the Royal Prince Alfred Hospital (RPA redevelopment) relating to the hydraulic services.

The RPA redevelopment ("the site") is located at 12 Missenden Road, Camperdown NSW 2050 and is shown in Figure 1 (approximate site location identified in blue).

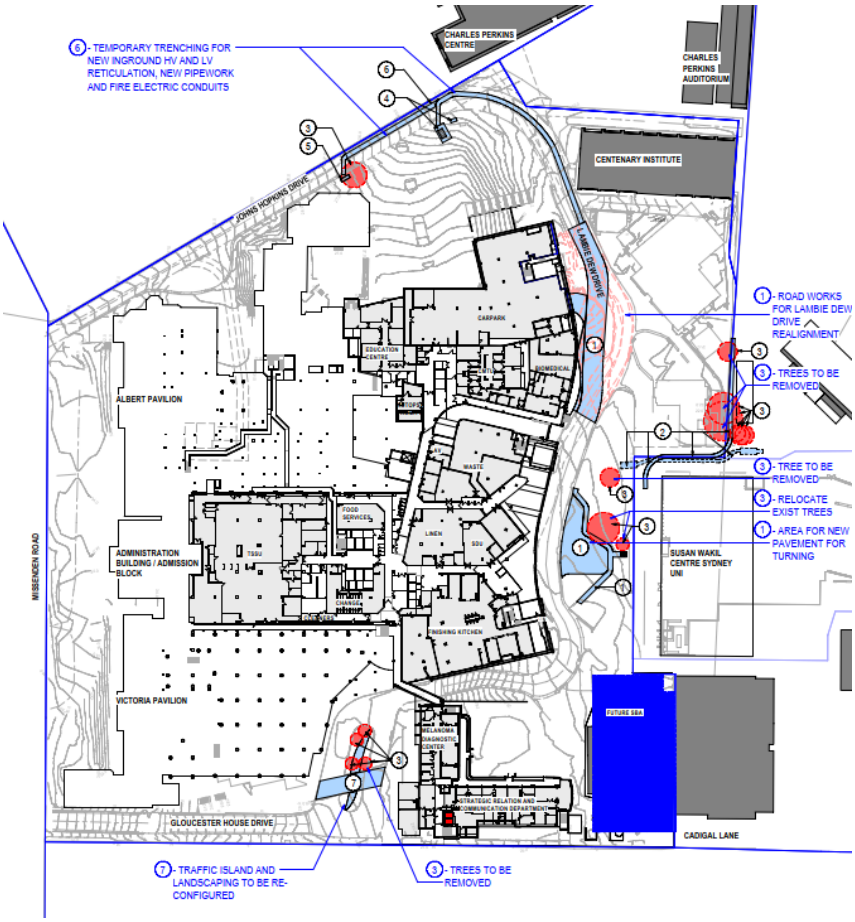


Figure 1: Aerial View of Property Boundary (Source: Google Maps)

The associated works forming part of this REF package are to include:

- Reconfiguration of the traffic island and road surface at the main patient entrance at Gloucester House Drive.
- Provision of a traffic management system to control access of delivery vehicles to the loading dock.
- Adjustments to humps, footpaths and kerb lines in Gloucester House Drive.
- Installation of a turning bay adjacent to the loading dock to facilitate access for delivery vehicles approaching from Gloucester House Drive.
- Pruning of one (1) Ficus macrocarpa var. Hilli (Hills Fig) growing on the St Andrews College campus at the University of Sydney.
- Removal of four palm trees for the facilitation of the traffic signal within the Gloucester House Plaza.

1.1 PURPOSE OF THE REPORT

This report has been prepared to describe the local hydraulic utility services and any associated implications created by the proposed RPA redevelopment works under this Review of Environmental Factors (REF) submission. The REF strategy for the early works stage of the project has been split into four packages including:

- REF No. 1 which deals with the upgrade works for mortuary access
- REF No. 2 which deals with the Lambie Dew Drive realignment, Gloucester House bridge adjustment and Gloucester Road civil and services
- REF No. 3 which deals with Molecular Imaging expansion in Building 89 and vertical transport relocation of Building 63
- REF No. 4 which deals with Anatomical Pathology in Building 12

The REF 1,3 and 4 utility requirements cannot be individually addressed given the scope of works are internal to the building and so the report aims to address the sitewide utility infrastructure plan, subsequently supplementing the individual REF packages as required.

This report will only follow the general utility planning condition; “Utilities; Prepare an Infrastructure Management Plan in consultation with relevant agencies, detailing information on the existing capacity and any augmentation requirements of the development for the provision of utilities including staging infrastructure”.

1.2 UTILITY SERVICES

The utility infrastructure services described within this report (water, sewer and natural gas) are all owned by the following Network Utility Operators (NUO):

- Sydney Water – water and sewer;
- Jemena – natural gas.

The hydraulic services that extend from these utility mains such as water, sewer and natural gas are all privately owned services.

Based on the above, any proposed modification to the utility mains or private services is either dealt with through the relevant NUO or the property owner and therefore there will be no impact on any council owned assets from the proposed early works for the REF 2 package which includes the Lambie Dew Drive realignment, Gloucester House bridge and Gloucester Road adjustment works.

1.3 REF 2 IMPACTS

This section of the report has been included to confirm the following for the REF 2 works:

- The works will not result in a loss or permanent disruption of an existing land use.
- The works will not involve the installation of structures or services that may be perceived as objectionable or a nuisance.
- The works will be within the vicinity of other existing-private and utility services within the realigned roadway and will be subject to coordination with available survey information and other disciplines.

2. DEMAND CALCULATIONS

2.1 WATER SUPPLY DEMAND CALCULATIONS

There are a total of 171 proposed additional beds in the new hospital expansion. The average daily water demand has been calculated using the Sydney Water Average Daily Water Use Guide (APPENDIX A – SYDNEY WATER AVERAGE DAILY WATER USE TABLE), as presented in the Tables below.

Where possible, potable water usage will be reduced by using low flow taps and sanitary fixtures, typically using the following flow rates:

- Basin 7.7L/m
- Sink 7.7L/m

It is expected that Sydney Water will have historical data of the existing site of which they can use to assess the effect of the load on existing infrastructure and ultimately provide advice on the proposed connection location and if any required amplifications or upgrades are required.

Average Daily Water Demand

Classification	Metric Unit	Average Demand (L/Metric Unit/Day)
Special Use – Hospital	Each Bed	271.00

Average Daily Water Demand Calculation

Total Number of Beds	Average Demand (L/Metric Unit/Day)	Total Average Daily Water Demand (kL)
171	271.00	46.34

The following flows for the entire site have also been calculated:

- Probable simultaneous demand – TBC as the design develops (estimated to be 6 L/sec).
- Cooling tower flow increases (this is excluded from the 271 L/bed/day metric above) – TBC as the design develops.
- Fire flow for hydrants, sprinklers, drenchers – TBC as the design develops (estimated to be 60 L/sec).

2.2 SEWER DISCHARGE CALCULATIONS

To determine the average daily sewer discharge for the proposed development, an estimate of the daily sewer discharge in terms of Litres/Day has been made by adopting information derived by the NSW Water Directorate. Where the standard equivalent tenement figures suggest that a 60% water to sewer discharge factor is appropriate. Refer to table below for this calculation.

Sewer Discharge Calculation

Classification	Unit	Average Demand (60% of Water Average Demand) L/Metric Unit/Day)
Special Use – Hospital	Each bed	162.60

Average Daily Sewer Discharge

Total Number of Beds	Average Demand (60% of Water Average Demand) (L/Metric Unit/Day)	Total Average Daily Sewer Discharge (kL)
171	162.60	27.81

2.3 NATURAL GAS DEMAND CALCULATIONS

Within the proposed redevelopment zones, there are several existing buildings that currently utilise natural gas services as described in the table below. The new natural gas services that will be provided as part of the hydraulic services design will cater for both the existing loads and any additional loads required by the redevelopment works.

The estimated demands tabled below have been based on information available at the time of writing this report. It is expected that as the design develops, so too will the demands below.

Existing and proposed Natural Gas Usages

East Campus Building	Connection Point	Demand (MJ/hr)	Items
Redevelopment Works	TBC – Independent or consolidation of existing	20,000	This is estimated and be determined as the design develops

3. CONNECTIONS

3.1 WATER

The eastern campus currently has two (2) existing connections to Sydney Water utility mains that surround the site including:

- 250mm diameter service in Missenden Road; and
- 450mm diameter service in Western Avenue.

These are illustrated in Figure 2 below.

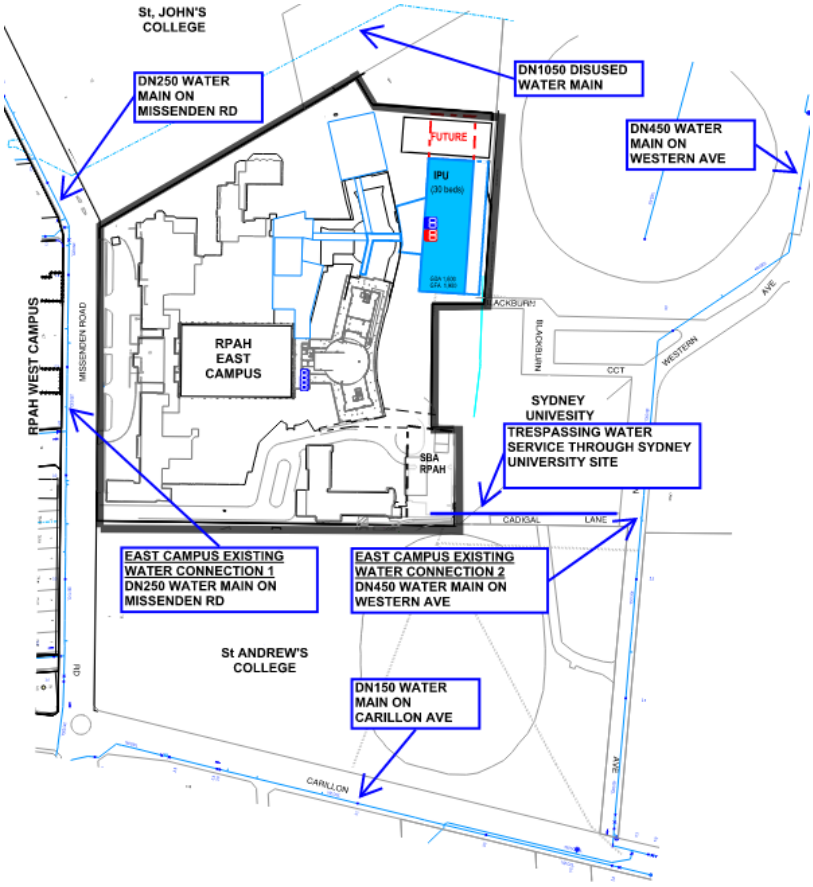


Figure 2: Location of the Sydney Water utility mains surrounding the East Campus

It is the project's intention to utilise the existing water connections for the proposed redevelopment works.

There are a number of other existing water mains that surround and traverse the western campus, although have not been identified/discussed given the scope of works under this REF (east campus) i.e. that they are not within close proximity of the works.

3.2 SEWER

There are currently two Sydney Water authority sewer mains that reticulate within the proposed redevelopment zones including a large 660mm x 990mm concrete oviform and a 300mm diameter service that extends from the oviform. These are located near the eastern boundary of the East Campus and have been identified in Figure 3 below.

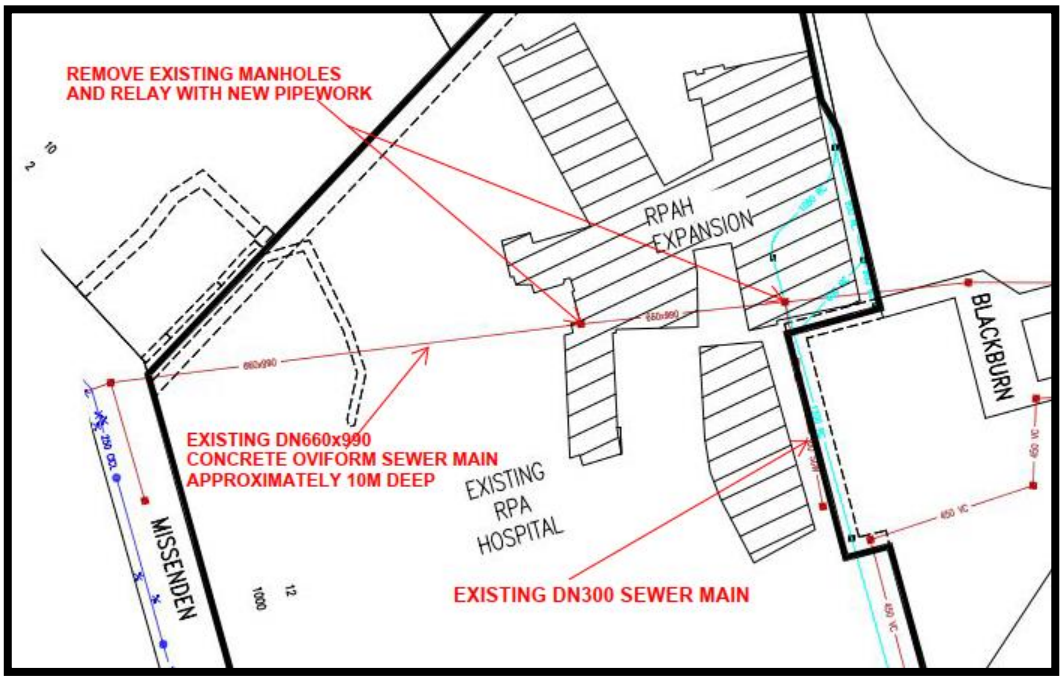


Figure 3: location of sewer infrastructure and proposed adjustments

The existing oviform sewer main that traverses underneath the existing hospital building is considered a critical asset to the Sydney Water network as it services a large catchment. This sewer main is approximately 10 metres deep and WSCE are seeking advice from Sydney Water on the relocation of the manhole(s) which reside within the construction zone. The relocated manhole (into Lambie Dew Drive) will then be utilised to drain any existing and new private sewer infrastructure as required.

Recent CCTV footage of the 300mm diameter sewer line revealed no apparent connections from neighbouring properties and so WSCE will seek the privatisation of this main to assist with Sydney Water' planning team and reduce the complexity of the Sydney Water liaison process.

- The existing oviform sewer main is to remain in place with the proposed building being constructed with an under croft and acceptable vertical clearances.

There are a number of other sewer mains that surround and traverse the western campus, although have not been identified/discussed given the scope of works under this REF (east campus) i.e. that they are not within close proximity of the works.

3.3 NATURAL GAS

The site has access to multiple Jemena natural gas mains including:

- 150mm diameter 1050kPa in John Hopkins Road;
- 100mm diameter 1050kPa in Missenden Road;
- 100mm diameter 1050Kpa in Susan Street;
- 50mm diameter 210kPa in Missenden Road (east side);
- 50mm diameter 210kPa in Missenden Road (west side); and
- 32mm diameter 210kPa in Rochester Street.

There are a number of existing connections to these natural gas mains across the site, however the East Campus is currently supplied from the existing connection in Susan Street.

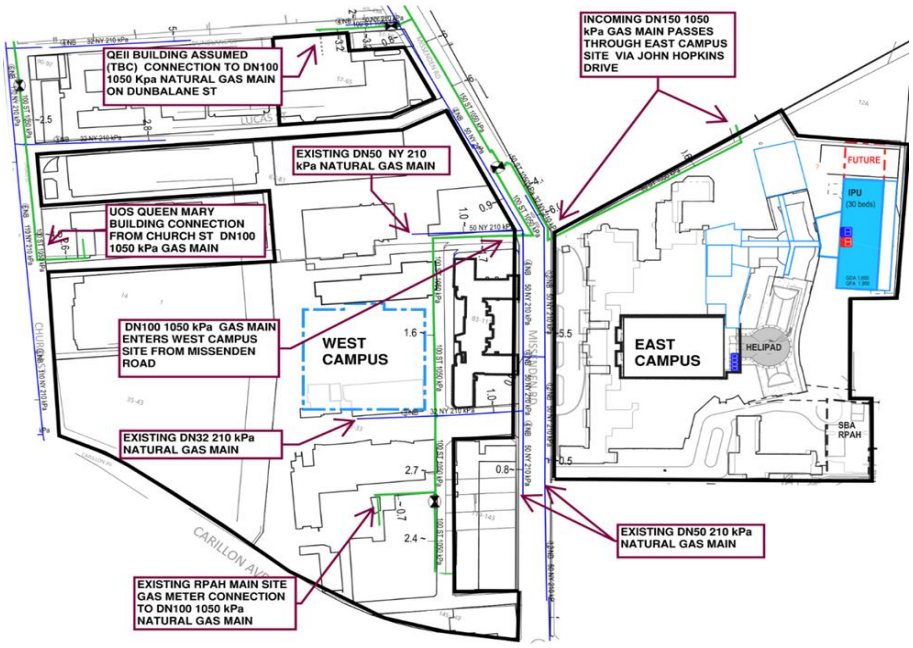


Figure 4: Location of Jemena authority natural gas mains

Figure 5 below illustrates the approximate location of the existing Jemena authority meter sets and private natural gas infrastructure services reticulation pathways. The connections to the natural gas mains and are assumed to be located adjacent to the meter sets as required by the Jemena network operator guidelines.

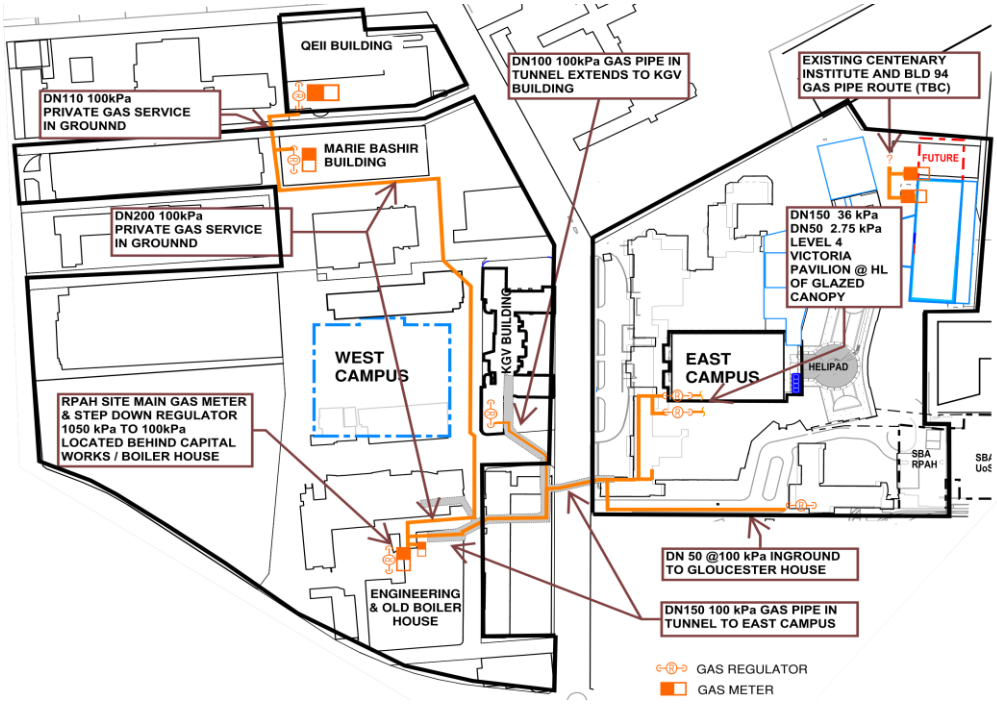


Figure 5: Location of Jemena authority meter sets private natural gas services infrastructure

Existing data shows a private 100kPa natural gas service traversing from the west campus to the east campus via an underground services tunnel. This existing supply will be utilised for the expansion works under this REF.

4. APPENDICES

4.1 APPENDIX A – SYDNEY WATER AVERAGE DAILY WATER USE TABLE

Development Type	Development Sub-Type	Key Metric	Metric Unit	Average Demand (L/Metric Unit / Day)
Residential	Single Lot Torrens	Dwelling	Each dwelling	623.00
	Flats Torrens	Net Floor Area	Square Meter	2.36
	High Rise Units	Net Floor Area	Square Meter	3.34
	Single Lot Community	Dwelling	Each dwelling	623.00
Mixed	Residential / Commercial	Combined Floor Area	Each dwelling / Square Meter	Use separate rates for each component
	Commercial / Industrial	Combined Floor Area	Square Meter	Use separate rates for each component
Commercial	Aged Accom - Self Care	Net Floor Area	Square Meter	2.50
	Aged Accom - Hostel	Bed	Each bed	271.00
	Aged Accom - Full Care	Bed	Each bed	271.00
	Childcare	Net Floor Area	Square Meter	3.60
	Hotel / motel / serviced apartments	Room	Each room	359.94
	Office	Net Floor Area	Square Meter	2.27
	Shopping Centre	Net Floor Area	Square Meter	3.00
	Laundry / Dry Cleaner	Net Floor Area	Square Meter	10.50
	Café / Fast Food / Butcher / Deli	Net Floor Area	Square Meter	2.48
	Retail Units	Net Floor Area	Square Meter	2.48
	Medical / Veterinary	Net Floor Area	Square Meter	2.48
	Mechanical Repair	Net Floor Areas	Square Meter	2.48
	Car / Boat Sales	Net Floor Area	Square Meter	2.48
	Car Wash	Net Floor Area	Square Meter	9.40
	Club	Net Floor Area	Square Meter	3.77
Industrial	Heavy Process		As required	
	Chemical Manufacturing		As required	
	Printing Manufacturing		As required	
	Beverage Manufacturing		As required	
	Light Factory Unit	Developed floor area	Square Meter	2.82
	Warehousing	Developed floor area	Square Meter	2.82
	Transport / Bus Depot	Site area	Square Meter	0.91
Special Uses	University	Student	Each student	20.00
	School	Student	Each student	20.00
	Hospital	Bed	Each bed	271.00
	Religious assembles	Developed floor area	Square Meter	1.30
	Government Depot	Site area	Square Meter	0.91
	Community Centre / Library	Floor area	Square Meter	1.84
	Sport Fields with Amenities		As required	
	Park & Reserves		As required	
	Services - Police / Ambulance etc.	Floor area	Square Meter	1.40

Health Infrastructure NSW

Royal Prince Alfred Hospital Redevelopment

Review of Environmental Factors (REF) Electrical, ICT and Mechanical Utilities Report

RPA-ELE-ARP-RPT-REF2-000.docx

Rev B | 20 May 2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 280318

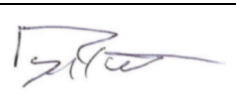
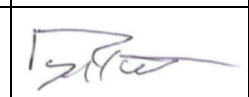
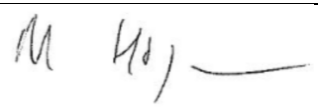
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		Name	Ryan Fisher	Ed Caine	Mairead Hogan
		Signature			
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Contents

Page

1 Executive summary 1

2 Introduction 1

2.1 Purpose of Report 1
2.2 Scope 1

3 Electrical Services 2

3.1 Existing Utility Services 2
3.2 Required Utility Alterations 3

4 ICT 4

4.1 Existing Utility Services 4
4.2 Required Utility Alterations 4

5 Mechanical 5

5.1 Existing Utility Services 5
5.2 Required Utility Alterations 5

6 Conclusion 6

No table of contents entries found.

1 Executive summary

This report has been produced on behalf of Health Infrastructure NSW to address issues particular to a Review of Environmental Factors application with reference to Power, Communication and Mechanical services.

2 Introduction

2.1 Purpose of Report

The purpose of this report is to outline the existing electrical and ICT utility services and identify the requirement for alterations to serve the proposed works included under this REF submission.

Details of the existing services have been obtained from the 'dial before you dig' (DBYD) service, site investigations and initial discussions with the utility companies, which include:

- Electricity Services – Ausgrid
- Communications Services – NBN Co, Telstra, AARNet, Optus, NextGen

2.2 Scope

The proposed works included under this package includes:

1. New Pavement for vehicle turning and pedestrian pavement
2. New external lighting
3. Stop line and traffic signals
4. Removal of existing trees
5. Traffic island and landscaping to be reconfigured

2.2.1 Utility Scope

There are no proposed utility works included under this package.

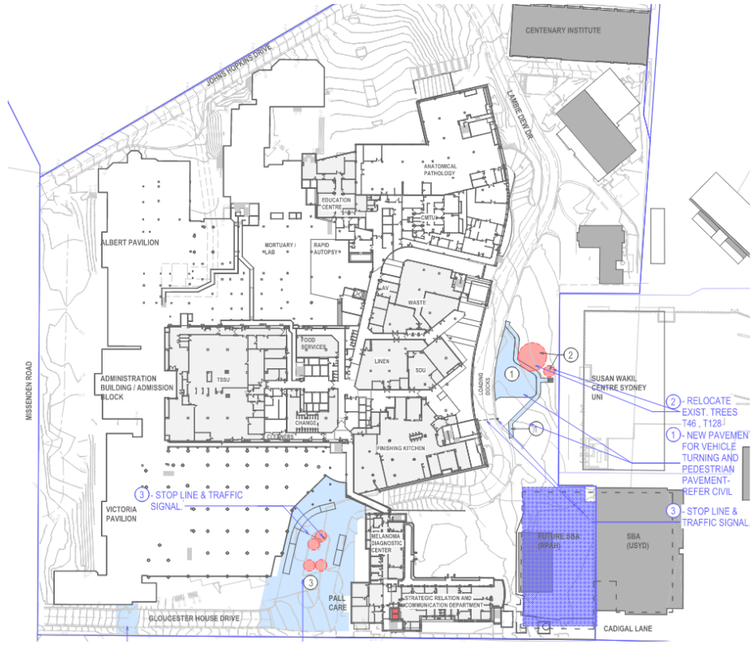


Figure 1 - Overview of REF No.2 Scope

No mechanical utilities work is required as part of this scope.

3 Electrical Services

3.1 Existing Utility Services

The RPAH campus l is served by two Ausgrid 11kV high voltage (HV) rings running underground via an easement from the St. Peters Substation, around the campus. The HV feeders supplies the following substations with relevance to this projects;

Substation	Area of Service	Capacity (A)*	Demand (A)*	Comment
S7653 (Chamber)	RPAH (MSB 1)	4260	2300	Level 1 Chamber substation with man and equipment access via hatches to outside. Ventilation is ducted. Significant spare capacity.
S7654 (Chamber)	RPAH (MSB 2)	5329	5000	Level 1 Chamber substation with man and equipment access via hatches to outside. Secondary access to BOH service area. Ventilation is ducted. Supports Mechanical Chillers.
S7906 (Chamber)	RPAH (MSB 3 & 4)	4514	4200	Level 1 Chamber substation with man, equipment access and ventilation via BOH service area.
S7327 (Ground)	Centenary Institute & Pathology	1586	1200	External Redbrick substation. Likely situated within 1:100 flood level.
S63081 (Kiosk)	KGV	1523	1200	External kiosk type
S7757 (Kiosk)	KGV & B28	924	750	External kiosk type
S584 (Ground)	None	-	-	Decommissioned substation

Table 1: Substation Summary Survey

**Capacities and Demands as advised by Ausgrid 11/09/19*

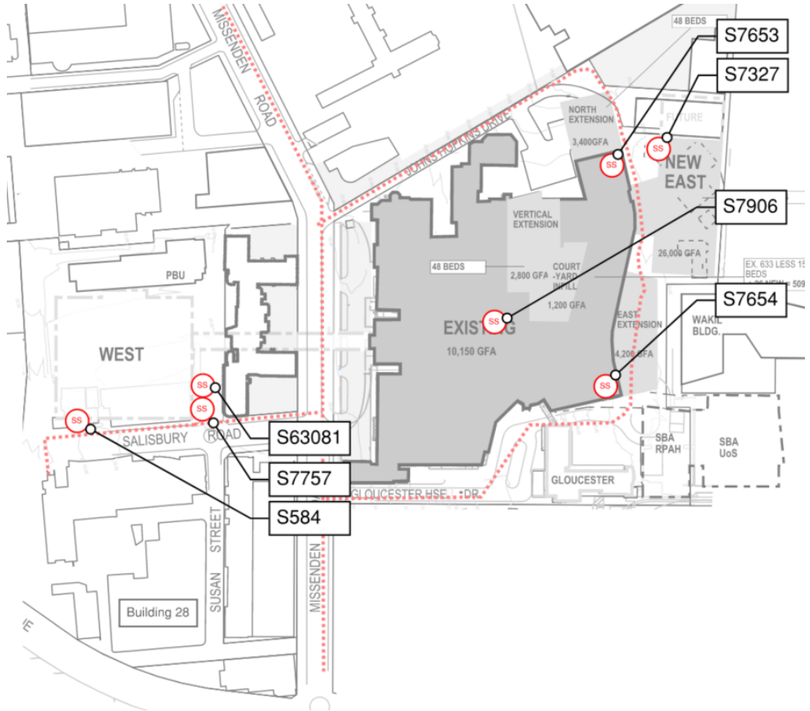


Figure 2: RPAH Substations

The Ausgrid substations supporting the RPAH hospital are:

- Substation S7653
  - Basement Chamber Type
  - Containing 3No. 1500kVA Transformers
  - 2No. incoming 3000A connections via busbars reticulate to adjacent LV Switchroom (MSB 1)
  - Full load dedicated to RPAH
- Substation S7654
  - Basement Chamber Type
  - Containing 3No. 1500kVA Transformers
  - 2No. incoming 3000A connections via busbars reticulate to adjacent LV Switchroom (MSB 2)
  - Full load dedicated to RPAH

- Substation S7906
    - Ground floor Chamber Type (located with entry / exit into back of house area at basement level)
    - Containing 3No. 1500kVA Transformers
    - 2No. incoming 3000A connections via busbars reticulate to adjacent LV Switchroom (MSB 3 & MSB 4)
    - Full load dedicated to RPAH
- Substation S7327
    - External Red brick Ground Type
    - Containing 2No. 1000kVA Transformers
    - 1No. connection via inground cables to Centenary Institute Main Switchroom
    - 1No. connection via inground cables to Anatomical Pathology Building

The substations are supplied via Ausgrid HV cables running along John Hopkins Drive, Lambie Dew Drive, and Gloucester House Drive.

The existing cables attract Ausgrid cable easements.

3.2 Required Utility Alterations

No new Electrical utility services are required across RPAH as part of these proposed works under this REF submission.

No public or privately held Electrical utility infrastructure will be impacted by the proposed Electrical works.

4 ICT

4.1 Existing Utility Services

The existing RPAH internal ICT services comprises:

- 3No. Datacentres located between KGV and B89 Level 5
- 2No. Campus Distributors with associated lead-ins located at B75 L1, and B89 L5
  - Supporting multiple Building Distributors across the campus
- 4No. Building Distributions, 2No. within B89 L5, 1No. within B75 L1, 1No. within B65
- Multiple Floor Distributions per level generally with diverse links to 2No. Building Distributors
- 1No. DAS room located at B75 L1 (within Campus Distributor)

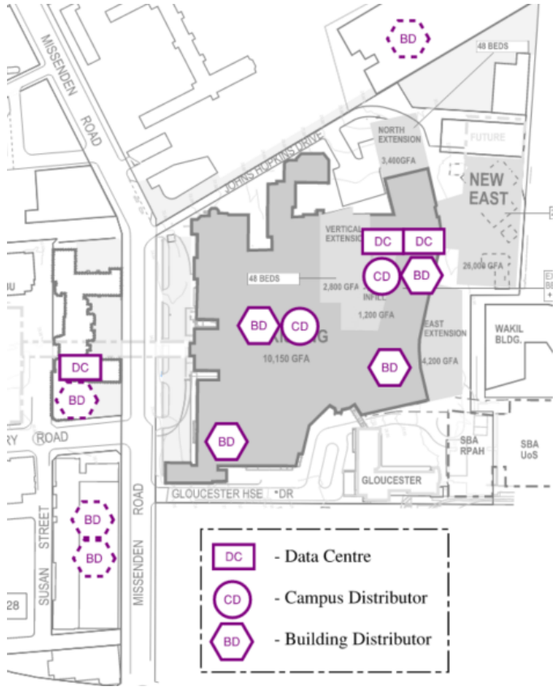


Figure 3 Existing ICT Services

Multiple lead-in cables originate from the Missenden Road, run underground in conduits to two Campus Distributors, 1No. in KGV building, and 1No at L1 of B75. The existing hospital campus is on the NBN, and a network is existing for the hospital campus.

There is an existing DAS room with three carriers, locations within the Campus Distributor located at L1 of B75.

4.2 Required Utility Alterations

No new ICT utility services are required across RPAH as part of these proposed works under this REF submission.

No public or privately held ICT utility infrastructure will be impacted by the proposed ICT works.

5 Mechanical

5.1 Existing Utility Services

There are no Mechanical utility services present across RPAH.

5.2 Required Utility Alterations

No new Mechanical utility services are required across RPAH as part of these proposed works under this REF submission.

No public or privately held Mechanical utility infrastructure will be impacted by the proposed Mechanical works.

6 Conclusion

There are no adjustments to the electrical utility infrastructure required as part of the work under this REF.

There are no adjustments to the ICT utility infrastructure required as part of the work under this REF.

There are no adjustments to the Mechanical utility infrastructure required as part of the work under this REF.

Structural
Civil
Traffic
Façade

REF2 Civil Report

RPAH Redevelopment Stage 1

Prepared for Health Infrastructure / 31 May 2022 – Revision 2

201957

Taylor Thomson Whitting (NSW) Pty Ltd (ACN 113 578 377)
as trustee for the Taylor Thomson Whitting NSW Trust
(ABN 59 514 956 558) I Consulting Engineers
Level 6, 73 Miller Street, North Sydney NSW 2060

Your Partner in Engineering

Contents

1. Introduction 3
2. Gloucester House Plaza 4
3. Loading Dock Turning Area 5
4. Stormwater 5
5. Conclusion 6
Appendix A – Civil REF2 drawings 7

DOCUMENT REGISTER

PREPARED BY	STATUS	ISSUE	DATE
Tim Moore	REF2	2	31.05.22
Tim Moore	REF2	1	24.05.22

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1. Introduction

TTW has been engaged by Health Infrastructure to prepare the civil and stormwater works to be constructed as part of the proposed REF2 package of works on the East Campus at the Royal Prince Alfred Hospital (RPAH).

The civil scope of works includes the following:

- Remodelled Gloucester House plaza to allow loading dock access from Gloucester House Drive;
- Increasing headroom clearance to Gloucester House Bridge to 4.5m to allow loading dock and fire truck access;
- Remodelled loading dock turnaround to allow for access from the south into all bays; and
- Amendments to the existing raised crossing on Gloucester House Drive to prevent scrapping of vehicles. for maintenance.

The civil scope of works is documented on the 200 civil drawing series below:

- RPA-CIV-TTW-DRG-EW-XX-0201 – REF2 – Notes and Legends Sheet
- RPA-CIV-TTW-DRG-EW-XX-0202 – REF2 – Erosion and Sediment Control Plan
- RPA-CIV-TTW-DRG-EW-XX-0211 – REF2 – Existing Survey and Services
- RPA-CIV-TTW-DRG-EW-XX-0231 – REF2 – Siteworks Plan
- RPA-CIV-TTW-DRG-EW-XX-0232 – REF2 – Proposed Change in Levels
- RPA-CIV-TTW-DRG-EW-XX-0240 – REF2 – Turning Path Plan
- RPA-CIV-TTW-DRG-EW-XX-0250 – REF2 – Detail Sheet 1
- RPA-CIV-TTW-DRG-EW-XX-0251 – REF2 – Detail Sheet 2
- RPA-CIV-TTW-DRG-EW-XX-0260 – REF2 – Scrapping Check Sheet 1
- RPA-CIV-TTW-DRG-EW-XX-0261 – REF2 – Scrapping Check Sheet 2

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2. Gloucester House Plaza

Figure 1 shows the proposed Gloucester House Plaza works. This includes remodelling the central island to allow for the swept paths of larger vehicles accessing the loading dock. Traffic lights are also included to manage traffic flows on the narrow stretch of carriageway beneath the Gloucester House Bridge. The existing paving which is loose and damaged in parts will be replaced with rigidly bound paver on a concrete slab to cater for heavy vehicle turning movements.

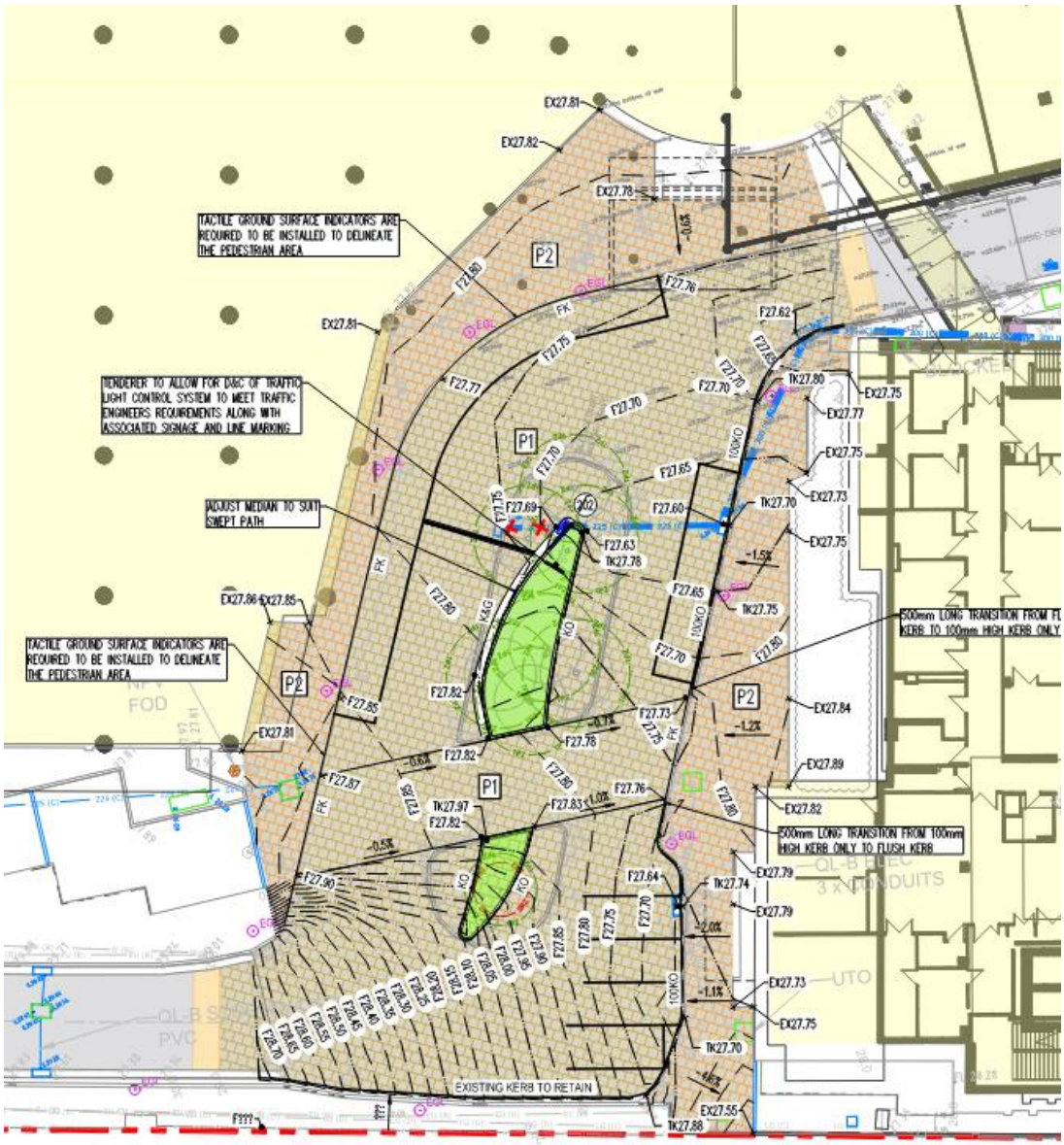


Figure 1 – Proposed Gloucester House Plaza works

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3. Loading Dock Turning Area

Figure 2 shows the proposed loading dock turning area works. The turning area is being increased to allow HRV access to the loading docks from the south. The existing footpath route will be maintained to the rear of the turning area with stepped access to the Susan Wakil Building.

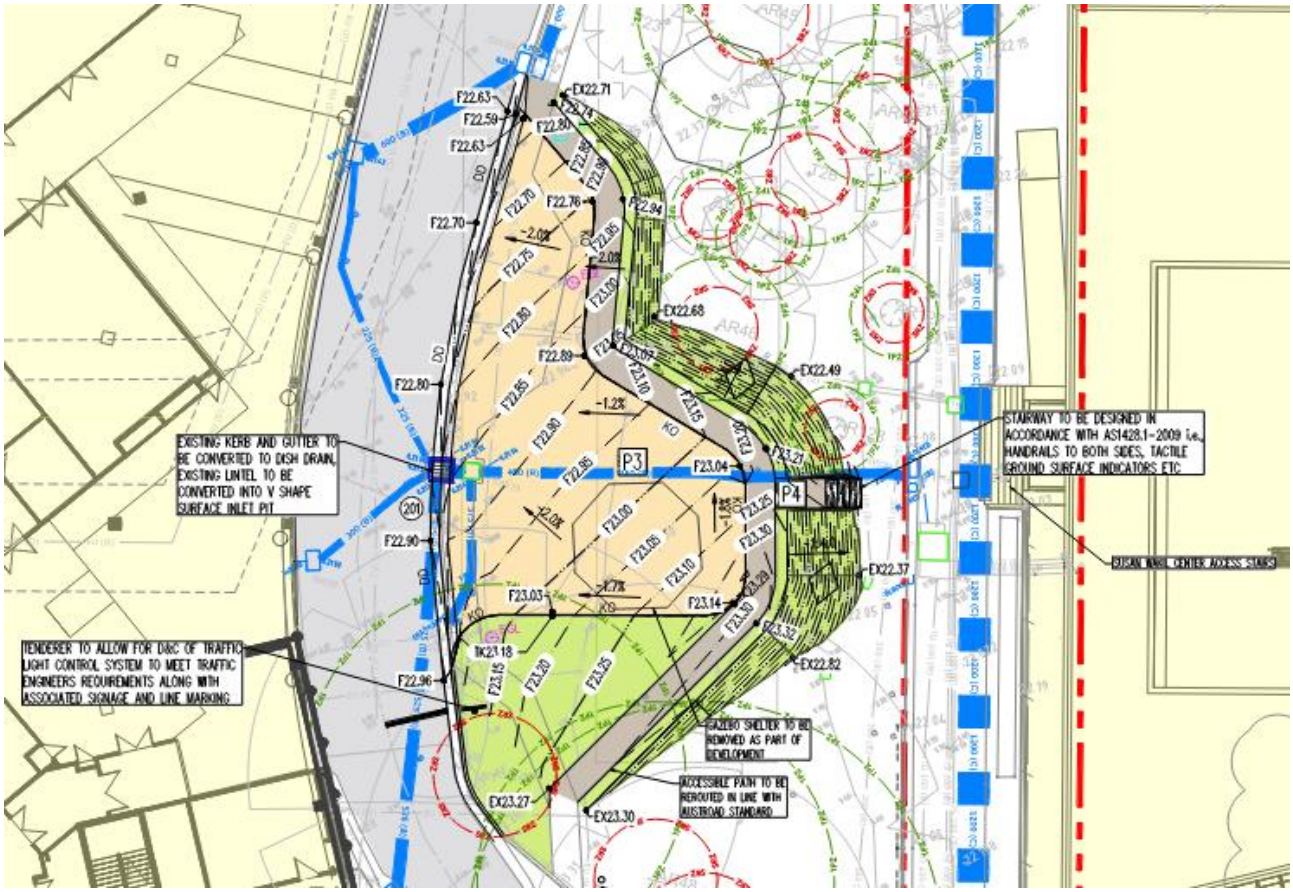


Figure 2 – Loading dock turning area

4. Stormwater

Minor stormwater drainage amendments will occur in Gloucester House Plaza and the loading dock turning area to suit the proposed levels. This involves the relocation of existing stormwater pits as shown in Figure 1 and Figure 2 and will not adversely impact the existing flow conveyance. No Council stormwater assets will be affected by the proposed works. Erosion and sediment control will be installed during the works to protect downstream waterways.

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5. Conclusion

The proposed REF2 works are to facilitate loading dock access from Gloucester House Drive and improve fire truck access around the perimeter of the site. The civil works are minor in nature and will maintain the existing stormwater flow conveyance. No Council stormwater assets will be affected by the proposed works Construction methodology and phasing will be critical to ensuring the operation of the hospital is not adversely impacted during the works.

Prepared by
TAYLOR THOMSON WHITTING (NSW) PTY LTD
in its capacity as trustee for the
TAYLOR THOMSON WHITTING NSW TRUST



TIM MOORE
Associate Director

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Appendix A – Civil REF2 drawings

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ROYAL PRINCE ALFRED HOSPITAL

CIVIL EARLY WORKS - REF2 PACKAGE

GENERAL NOTES

1. Contractor must verify all dimensions and existing levels on site prior to commencement of works. Any discrepancies to be reported to the Engineer
2. Strip all topsoil from the construction area. All stripped topsoil shall be disposed of off-site unless directed otherwise.
3. Make smooth connection with all existing works.
4. Compact subgrade under buildings and pavements to minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1. Compaction under buildings to extend 2m minimum beyond building footprint.
5. All work on public property, property which is to become public property, or any work which is to come under the control of the Statutory Authority; the Contractor is to ensure that the drawings used for construction have been approved by all relevant authorities prior to commencement site.
6. All work on public property, property which is to become public property, or any work which is to come under the control of the Statutory Authority is to be carried out in accordance with the requirements of the relevant Authority. The Contractor shall obtain these requirements from the Authority. Where the requirements of the Authority are different to the drawings and specifications, the requirements of the Authority shall be applicable.
7. For all temporary batters refer to geotechnical recommendations.

REFERENCE DRAWINGS

1. These drawings have been based from, and to be read in conjunction with the following Consultants drawings. Any conflict to the drawings must be notified immediately to the Engineer.

CONSULTANT	DWG TITLE	DWG No.	REV	DATE
SITE IMAGE	SS20-4582_EW TENDER			04.04.22
RPS	CONTOUR & DETAIL SURVEY	PR142110-DS-005	E	21.02.22
RPS	ULITIES UNIVERSTICATION	PR142110-UTIL-001	F	09.05.22
Jacobs	ARBORIST REPORT DIAGRAM	MW-AR-SK-0013-DWG		16.09.21

STORMWATER DRAINAGE NOTES

1 Stormwater Design Criteria :
- (A) Average exceedance probability –
  1% AEP for roof drainage to first external pit
  5% AEP for paved and landscaped areas
- (B) Rainfall intensities –
  Time of concentration: 5 minutes
  1% AEP = 250 mm/hr
  5% AEP = 193 mm/hr
- (C) Rainfall losses –
  Impervious areas: IL = 1.5 mm , CL = 0 mm/hr
  Pervious areas: IL =23.10mm , CL = 0.72mm/hr

2. Pipes 300 dia and larger to be reinforced concrete Class "2" approved spigot and socket with rubber ring joints U.N.O.
3. Pipes up to 300 dia may be sewer grade uPVC with solvent welded joints, subject to approval by the engineer
4. Equivalent strength VCP or FRP pipes may be used subject to approval.
5. Precast pits may be used external to the building subject to approval by
6. Enlargers, connections and junctions to be manufactured fittings where pipes are less than 300 dia.
7. Where subsoil drains pass under floor slabs and vehicular pavements, unslotted uPVC sewer grade pipe is to be used.
8. Grates and covers shall conform with AS 3996–2006, and AS 1428.1 for access requirements.
9. Pipes are to be installed in accordance with AS 3725. All bedding to be type H2 U.N.O.
10. Care is to be taken with invert levels of stormwater lines. Grades shown are not to be reduced without approval.
11. All stormwater pipes to be 150 dia at 1.0% min fall U.N.O.
12. Subsoil drains to be slotted flexible uPVC U.N.O.
13. Adopt invert levels for pipe installation (grades shown are only nominal).

KERBING NOTES

Includes all kerbs, gutters, dish drains, crossings and edges.

1. All kerbs, gutters, dish drains and crossings to be constructed on minimum 75mm granular basecourse compacted to minimum 98% modified maximum dry density in accordance with AS 1289 5.2.1.
2. Expansion joints (EJ) to be formed from 10mm compressible cork filler board for the full depth of the section and cut to profile. Expansion joints to be located at drainage pits, on tangent points of curves and elsewhere at 12m centres except for integral kerbs where the expansion joints are to match the joint locations in slabs.
3. Weakened plane joints to be min 3mm wide and located at 3m centres except for integral kerbs where weakened plane joints are to match the joint locations in slabs.
4. Broomed finished to all ramped and vehicular crossings, all other kerbing or dish drains to be steel float finished.
5. In the replacement of kerbs –
   Existing road pavement is to be sawcut 900mm from lip of gutter. Upon completion of new kerbs, new basecourse and surface is to be laid 900mm wide to match existing materials and thicknesses.
   Existing allotment drainage pipes are to be built into the new kerb with a 100mm dia hole.
   Existing kerbs are to be completely removed where new kerbs are shown.

SURVEY AND SERVICES INFORMATION

SURVEY

Origin of levels : PM 53458
Datum of levels : AHD, AUSTRALIAN HEIGHT DATUM
Coordinate system : MGA GDA2020
Survey prepared by : RPS SURVEYORS
Setout Points : CONTACT THE SURVEYOR

Taylor Thomson Whitting does not guarantee that the survey information shown on these drawings is accurate and will accept no liability for any inaccuracies in the survey information provided to us from any cause whatsoever.

UNDERGROUND SERVICES - WARNING

The locations of underground services shown on Taylor Thomson Whittings drawings have been plotted from diagrams provided by service authorities. This information has been prepared solely for the authorities own use and may not necessarily be updated or accurate.

The position of services as recorded by the authority at the time of installation may not reflect changes in the physical environment subsequent to installation.

Taylor Thomson Whitting does not guarantee that the services information shown on these drawings shows more than the presence or absence of services, and will accept no liability for inaccuracies in the services information shown from any cause whatsoever.

The Contractor must confirm the exact location and extent of services prior to construction and notify any conflict with the drawings immediately to the Engineer/Superintendent.

The contractor is to get approval from the relevant state survey department, to remove/adjust any survey mark. This includes but is not limited to; State Survey Marks (SSM), Permanent Marks (PM), cadastral reference marks or any other survey mark which is to be removed or adjusted in any way.
Taylor Thomson Whitting plans do not indicate the presence of any survey mark. The contractor is to undertake their own search.

BOUNDARY AND EASEMENT NOTE

The property boundary and easement locations shown on Taylor Thomson Whitting drawing's have been based from information received from : RPS Surveyors

Taylor Thomson Whitting makes no guarantees that the boundary or easement information shown is correct.
Taylor Thomson Whitting will accept no liabilities for boundary inaccuracies. The contractor/builder is advised to check/confirm all boundaries in relation to all proposed work prior to the commencement of construction. Boundary inaccuracies found are to be reported to the superintendent prior to construction starting.

SITEWORKS NOTES

1. All basecourse material to comply with RMS specification No 3051 and compacted to minimum 98% modified standard dry density in accordance with AS 1289 5.2.1.
2. All trench backfill material shall be compacted to the same density as the adjacent material.
3. All service trenches under vehicular pavements shall be backfilled with an approved select material and compacted to a minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1

CONCRETE FINISHING NOTES

1. All exposed concrete pavements are to be broomed finished.
2. All edges of the concrete pavement including keyed and dowelled joints are to be finished with an edging tool.
3. Concrete pavements with grades greater than 10 % shall be heavily broomed finished.
4. Carborundum to be added to all stair treads and ramped crossings U.N.O.

CONCRETE NOTES

EXPOSURE CLASSIFICATION : External : B2

CONCRETE

Place concrete of the following characteristic compressive strength f'c as defined in AS 1379.

Location	AS 1379 f'c MPa at 28 days	Specified Slump	Nominal Agg. Size
Kerbs	S20	80	20
Retaining wall footing	S40	80	20

1. Use Type 'GP' cement, unless otherwise specified.
2. All concrete shall be subject to project assessment and testing to AS 1379.
3. Consolidate by mechanical vibration. Cure all concrete surfaces as directed in the Specification.
4. For all falls in slab, drip grooves, regrets, chamfers etc. refer to Architects drawings and specifications.
5. Unless shown on the drawings, the location of all construction joints shall be submitted to Engineer for review.
6. No holes or chases shall be made in the slab without the approval of the Engineer.
7. Conduits and pipes are to be fixed to the underside of the top reinforcement layer.
8. Slurry used to lubricate concrete pump lines is not to be used in any structural members.
9. All slabs cast on ground require sand blinding with a Concrete Underlay

FORMWORK

1. The design, certification, construction and performance of the formwork, falsework and backpropping shall be the responsibility of the contractor. Proposed method of installation and removal of formwork is to be submitted to the superintendent for comment prior to work being carried out.

EROSION AND SEDIMENT CONTROL NOTES

1. All work shall be generally carried out in accordance with
   (A) Local authority requirements,
   (B) EPA – Pollution control manual for urban stormwater,
   (C) LANDCOM NSW – Managing Urban Stormwater: Soils and Construction ("Blue Book").
2. Erosion and sediment control drawings and notes are provided for the whole of the works. Should the Contractor stage these works then the design may be required to be modified. Variation to these details may require approval by the relevant authorities.
   The erosion and sediment control plan shall be implemented and adopted to meet the varying situations as work on site progresses.
3. Maintain all erosion and sediment control devices to the satisfaction of the superintendent and the local authority.
4. When stormwater pits are constructed prevent site runoff entering the pits unless silt fences are erected around pits.
5. Minimise the area of site being disturbed at any one time.
6. Protect all stockpiles of materials from scour and erosion. Do not stockpile loose material in roadways, near drainage pits or in watercourses.
7. All soil and water control measures are to be put back in place at the end of each working day, and modified to best suit site conditions.
8. Control water from upstream of the site such that it does not enter the disturbed site.
9. All construction vehicles shall enter and exit the site via the temporary construction entry/exit.
10. All vehicles leaving the site shall be cleaned and inspected before leaving.
11. Maintain all stormwater pipes and pits clear of debris and sediment. Inspect stormwater system and clean out after each storm event.
12. Clean out all erosion and sediment control devices after each storm event.

Sequence Of Works

1. Prior to commencement of excavation the following soil management devices must be installed.
1.1. Construct silt fences below the site and across all potential runoff sites.
1.2. Construct temporary construction entry/exit and divert runoff to suitable control systems.
1.3. Construct measures to divert upstream flows into existing stormwater system.
1.4. Construct sedimentation traps/basin including outlet control and overflow.
1.5. Construct turf lined swales.
1.6. Provide sandbag sediment traps upstream of existing pits.
2. Construct geotextile filter pit surround around all proposed pits as they are constructed.
3. On completion of pavement provide sand bag kerb inlet sediment traps around pits.
4. Provide and maintain a strip of turf on both sides of all roads after the construction of kerbs.

PIT SCHEDULE

Note: Grate size does not necessarily reflect pit size, refer pit type details, shown on detail sheets – **0251**
Final internal pit dimensions are to comply with AS3500

Type	Description	Cover (Clear Opening)	Number
A	Kerb inlet pit 1800 lintel	450 x 900 Class D galvanised mild steel grate hinged to frame	202
B	Surface inlet pit	900 x 900 Class D galvanised mild steel grate hinged to frame	
C	Junction pit	900 x 900 Class D cast iron cover with concrete infill	
D	Dish drain pit	900 x 900 Class D galvanised mild steel grate hinged to frame	201
E	GPT		

BULK EARTHWORKS NOTES

1. All bulk earthworks setout from grid lines U.N.O.
2. All batters at a slope of 2 (H) : 1 (V) U.N.O.
3. Excavated material may be used as structural fill provided,
   (i) it complies with the specification requirements for fill material,
   (ii) the placement moisture content complies with the Geotechnical Consultants requirements, and allows filling to be placed and proofrolled in accordance with the specification. Where necessary the Contractor must moisture condition the excavated material to meet these requirements.
4. Compact fill areas and subgrade to not less than:

Location	Standard dry density (AS 1289 5.1.1.)	Moisture (OMC)
Under building slabs on ground:	98%	±2%
Under roads and carparks:	98%	±2%
Landscaped areas:	95%	±2%

5. Before placing fill, proof roll exposed subgrade with a 10 tonne minimum roller to test subgrade and then remove soft spots (areas with more than 3mm movement under roller). Soft spots to be replaced with select fill U.N.O.
6. Contractor shall place safety barriers around excavations in accordance with relevant safety regulations.
7. For interpretation of bulk earthworks foot print line shown on the bulk earthworks drawings refer to the bulk earthworks construction legend.
8. Bulk earthwork drawings are not to be used for detailed excavation.
9. Refer to Geotechnical Report prepared by –
   Douglas Partners
   Project 99709.00 dated 08.2020

SAFETY IN DESIGN

Contractor to refer to Appendix B of the Civil Specification for the Civil Risk and Solutions Register.

EXISTING SERVICES

Contractor to be aware existing services are located within the site. Location of all services to be verified by the Contractor prior to commencing works. Contractor to confirm with relevant authority regarding measures to be taken to ensure services are protected or procedures are in place to demolish and/or relocate.

EXISTING STRUCTURES

Contractor to be aware existing structures may exist within the site. To prevent damage to existing structure(s) and/or personnel, site works to be carried out as far as practicably possible from existing structure(s).

EXISTING TREES

Contractor to be aware existing trees exist within the site which need to be protected. To prevent damage to trees and/or personnel, site works to be carried out as far as practicably possible from existing trees. Advice needs to be sought from Arborist and/or Landscape Architect on measures required to protect trees.

GROUNDWATER

Contractor to be aware ground water levels are close to existing surface level. Temporary de-watering may be required during construction works.

EXCAVATIONS

Deep excavations due to stormwater drainage works is required. Contractor to ensure safe working procedures are in place for works. All excavations to be fenced off and batters adequately supported to approval of Geotechnical Engineer.

GROUND CONDITIONS

Contractor to be aware of the site geotechnical conditions.
Refer to geotechnical report for details.

HAZARDOUS MATERIALS

Existing asbestos products & contaminated material may be present on site. Contractor to ensure all hazardous materials are identified prior to commencing works. Safe working practices as per relevant authority to be adopted and appropriate PPE to be used when handling all hazardous materials. Refer to geotechnical/environmental report for details.

CONFINED SPACES

Contractor to be aware of potential hazards due to working in confined spaces such as stormwater pits, trenches and/or tanks. Contractor to provide safe working methods and use appropriate PPE when entering confined spaces.

MANUAL HANDLING

Contractor to be aware manual handling may be required during construction. Contractor to take appropriate measures to ensure manual handling procedures and assessments are in place prior to commencing works.

WATER POLLUTION

Contractor to ensure appropriate measures are taken to prevent pollutants from construction works contaminating the surrounding environment.

SITE ACCESS/EGRESS

Contractor to be aware site works occur in close proximity to footpaths and roadways. Contractor to erect appropriate barriers and signage to protect site personnel and public.

VEHICLE MOVEMENT

Contractor to supply and comply with traffic management plan and provide adequate site traffic control including a certified traffic marshal to supervise vehicle movements where necessary.

TENDER NOTES

1. These drawings are preliminary drawings issued for tender as an indication of the extent of works only. They are not a complete construction set of drawings.
2. To determine the full extent of work, these drawings shall be read in conjunction with the architectural drawings and other contract documents.
   Allow for all items shown on architectural and other drawings as not all items are shown on the structural/civil works drawings.
3. Should any ambiguity, error, omissions, discrepancy, inconsistency or other fault exist or seem to exist in the documents, immediately notify in writing to the Superintendendent.
4. Rates shown on the drawings are for the final structure/civil works in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements. etc.

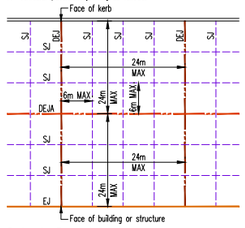
JOINTING NOTES

Vehicular Pavement Jointing

1. All vehicular pavements to be jointed as shown on drawings.
2. Doweled expansion joints (DEJ) should generally be located at a maximum of 24.0m centres. Dowel bars to be plain round steel bars of Grade 250N, 450mm long and placed at 300mm spacing. Dowel diameter as specified below U.N.O

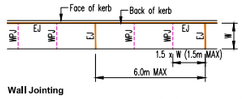
Design base thickness, D (mm)	Dowel diameter (mm)
150 < D ≤ 175	24
175 < D ≤ 200	28
200 < D ≤ 260	32
D > 260	36

3. Doweled expansion joint type A (DEJA) should generally be located longitudinally and at a maximum of 24.0m centres. Refer to DEJA detail provided on detail sheets.
4. Sawn joints should generally be located at a maximum of 6.0m centres or 1.5 x the spacing of perpendicular sawn joints
5. Provide 10mm wide full depth expansion joints (EJ) between buildings/structures and all concrete or unit pavers.
6. The timing of the saw cut is to be confirmed by the contractor on site. Site conditions will determine how many hours after the concrete pour before the saw cuts are commenced. Refer to the specification for weather conditions and temperatures required.
7. Vehicular pavement jointing as follows.



Pedestrian Footpath Jointing

1. Expansion joints (EJ) are to be located where possible at tangent points of curves and elsewhere at max 6.0m centres.
2. Weakened plane joints (WPJ) are to be located at a max 1.5 x width of the pavement.
3. Where possible joints should be located to match kerbing and / or adjacent pavement joints.
4. All pedestrian footpath jointings as follows U.N.O.



Wall Jointing

1. For concrete walls, weakened plane joints (WPJ) or control joints (CJ) to be located at a maximum of 8.0m centres. Expansion joints (EJ) to be located at a maximum of 30.0m centres U.N.O.
2. For blockwork walls, dowelled control joints (CJ) to be located at maximum of 8.0m spacing U.N.O.

DRAWING SHEET LIST

DRAWING NO.	DRAWING TITLE
RPA-CIV-TTW-DRG-EW-XX-0201	REF2 – NOTES AND LEGENDS SHEET
RPA-CIV-TTW-DRG-EW-XX-0202	REF2 – EROSION AND SEDIMENT CONTROL PLAN
RPA-CIV-TTW-DRG-EW-XX-0211	REF2 – EXISTING SURVEY AND SERVICES
RPA-CIV-TTW-DRG-EW-XX-0231	REF2 – SITEWORKS PLAN
RPA-CIV-TTW-DRG-EW-XX-0232	REF2 – PROPOSED CHANGE IN LEVELS
RPA-CIV-TTW-DRG-EW-XX-0240	REF2 – TURNING PATH PLAN
RPA-CIV-TTW-DRG-EW-XX-0250	REF2 – DETAIL SHEEH 1
RPA-CIV-TTW-DRG-EW-XX-0251	REF2 – DETAIL SHEET 2
RPA-CIV-TTW-DRG-EW-XX-0260	REF2 – SCRAPPING CHECK SHEET 1
RPA-CIV-TTW-DRG-EW-XX-0261	REF2 – SCRAPPING CHECK SHEET 2
RPA-CIV-TTW-DRG-EW-XX-0262	REF2 – HEADROOM CHECK SHEET 1

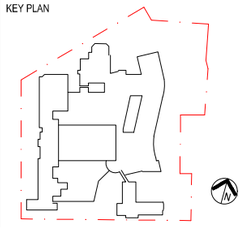
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REV	DATE	AMENDMENT
B	30.05.22	ISSUE FOR TENDER
A	13.05.22	DRAFT TENDER

KEY PLAN



PROJECT MANAGER

TSA

CLIENT

NSW GOVERNMENT Health Sydney Local Health District
NSW GOVERNMENT Health Infrastructure

ARCHITECT

Jacobs

TTW Structural Civil Traffic Façade
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

TTW JOB NO.
201957

DRAWING TITLE
REF2 - NOTES AND LEGENDS SHEET

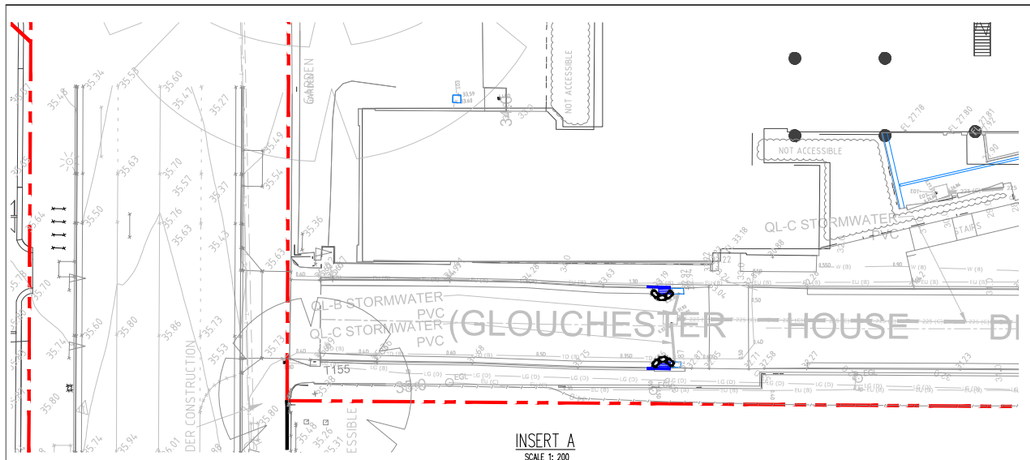
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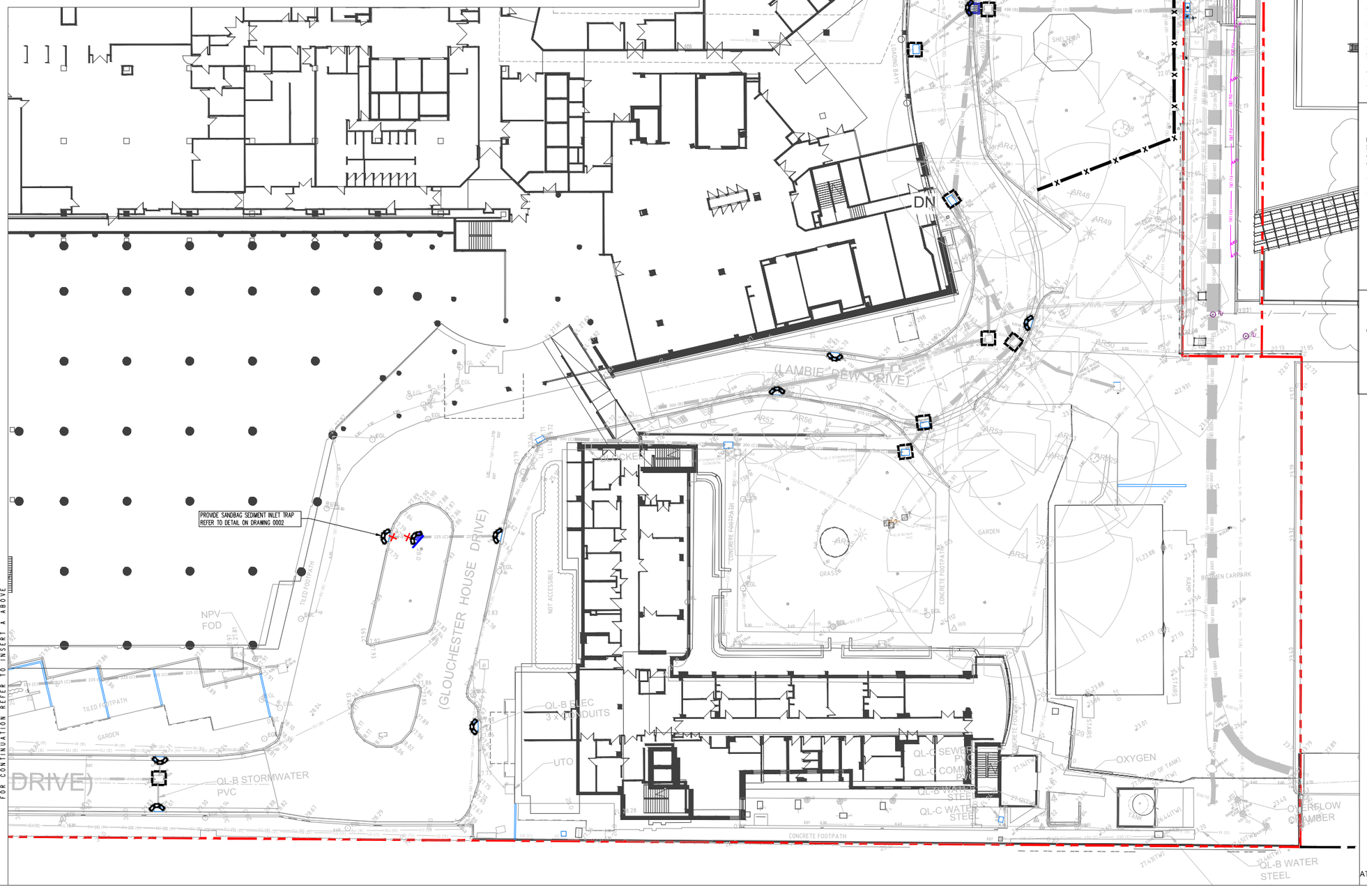
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WW	**DM**
CHECKED	APPROVED
TM	TM

SCALE @ B1
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DRAWING NO. RPA-CIV-TTW-DRG-EW-XX-0201
REVISION B

FileName: RPA-CIV-TTW-DRG-EW-XX-0201 REF2 - NOTES AND LEGENDS SHEET.dwg - USER: wwdye - Plot File Created: May 30, 2022 - 6:32pm





EROSION AND SEDIMENT CONTROL NOTES

1. All work shall be generally carried out in accordance with
   (A) Local authority requirements,
   (B) EPA – Pollution control manual for urban stormwater,
   (C) LANDCOM NSW – Managing Urban Stormwater: Soils and Construction ("Blue Book").
2. Erosion and sediment control drawings and notes are provided for the whole of the works. Should the Contractor stage these works then the design may be required to be modified. Variation to these details may require approval by the relevant authorities.
   The erosion and sediment control plan shall be implemented and adapted to meet the varying situations as work on site progresses.
3. Maintain all erosion and sediment control devices to the satisfaction of the superintendent and the local authority.
4. When stormwater pits are constructed prevent site runoff entering the pits unless silt fences are erected around pits.
5. Minimise the area of site being disturbed at any one time.
6. Protect all stockpiles of materials from scour and erosion. Do not stockpile loose material in roadways, near drainage pits or in watercourses.
7. All soil and water control measures are to be put back in place at the end of each working day, and modified to best suit site conditions.
8. Control water from upstream of the site such that it does not enter the disturbed site.
9. All construction vehicles shall enter and exit the site via the temporary construction entry/exit.
10. All vehicles leaving the site shall be cleaned and inspected before leaving.
11. Maintain all stormwater pipes and pits clear of debris and sediment. Inspect stormwater system and clean out after each storm event.
12. Clean out all erosion and sediment control devices after each storm event.

Sequence Of Works

1. Prior to commencement of excavation the following soil management devices must be installed.
1.1. Construct silt fences below the site and across all potential runoff sites.
1.2. Construct temporary construction entry/exit and divert runoff to suitable control systems.
1.3. Construct measures to divert upstream flows into existing stormwater system.
1.4. Construct sedimentation traps/basin including outlet control and overflow.
1.5. Construct turf lined swales.
1.6. Provide sandbag sediment traps upstream of existing pits.
2. Construct geotextile filter pit surround around all proposed pits as they are constructed.
3. On completion of pavement provide sand bag kerb inlet sediment traps around pits.
4. Provide and maintain a strip of turf on both sides of all roads after the construction of kerbs.

WATER QUALITY TESTING REQUIREMENTS

Prior to discharge of site stormwater, groundwater and seepage water into council's stormwater system, contractors must undertake water quality tests in conjunction with a suitably qualified environment consultant outlining the following:

- Compliance with the criteria of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)
- If required subject to the environmental consultants advice, provide remedial measures to improve the quality of water that is to be discharged into Councils storm water drainage system.This should include comments from a suitably qualified environmental consultant confirming the suitability of these remedial measures to manage the water discharged from the site into Councils storm water drainage system. Outlining the proposed, ongoing monitoring, contingency plans and validation program that will be in place to continually monitor the quality of water discharged from this site. This should outline the frequency of water quality testing that will be undertaken by a suitably qualified environmental consultant.

EROSION AND SEDIMENT CONTROL LEGEND

- Siltation fence
- Stormwater pit with Geotextile filter surround
- Sandbag sediment trap

SCALE 1:200 0 2 4 6 8 10 m
AT ORIGINAL SIZE

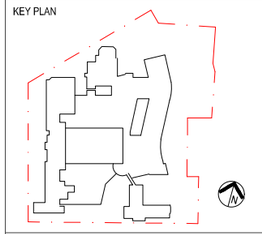
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B	30.05.22	ISSUE FOR TENDER
A	13.05.22	DRAFT TENDER

KEY PLAN



PROJECT MANAGER

TSA

CLIENT

Health NSW GOVERNMENT Sydney Local Health District

Health NSW GOVERNMENT Infrastructure

ARCHITECT

Jacobs

TTW Structural Civil Traffic Façade
61 2 9439 7288 | 48 Chandos Street St Leonards NSW 2065

PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

TTW JOB NO.
201957

DRAWING TITLE
REF2 - EROSION AND SEDIMENT CONTROL PLAN

STATUS
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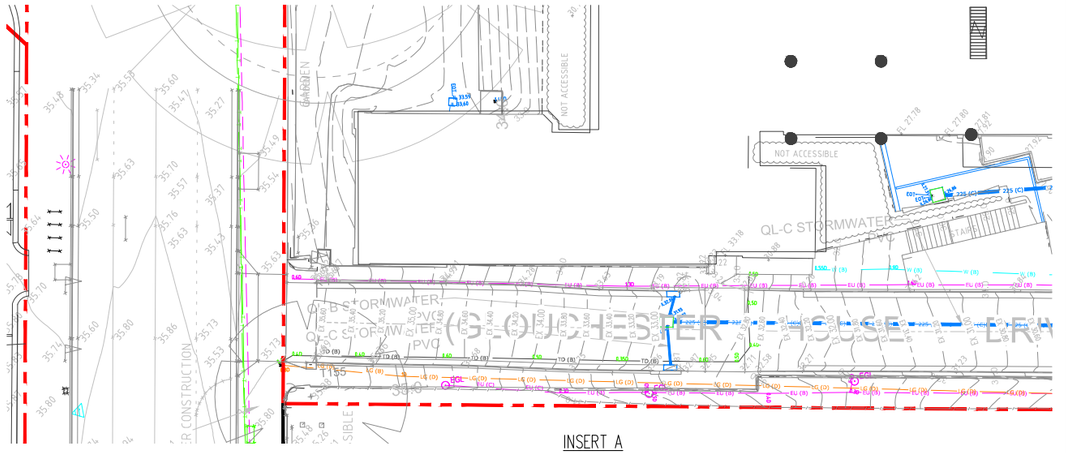
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WW	**DM**
CHECKED	APPROVED
TM	TM

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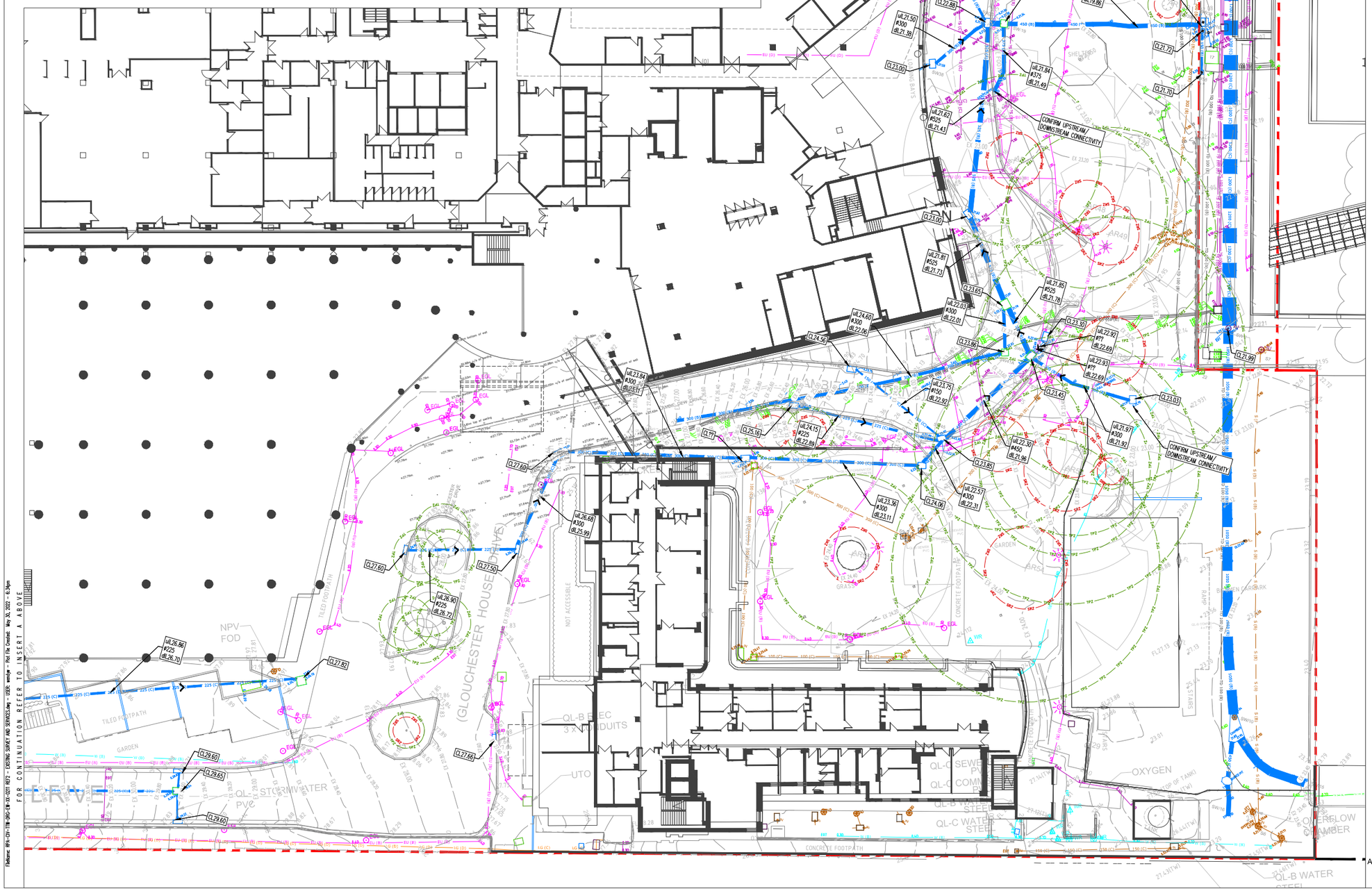
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REVISION B

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File Name: RPA-CIV-TTW-DRG-EW-XX-0202 REF2 - EROSION AND SEDIMENT CONTROL PLAN.dwg - 1:02:25 am/pm - Plot File Created: May 30, 2022 - 6:32pm



INSERT A
SCALE 1: 200



EXISTING UTILITIES LEGEND:

- HOUSE CONNECTION (EY) (DIA UNK)
- HOUSE CONNECTION (EY) (DIA)
- CONDUIT (ED) (DIA UNK)
- CONDUIT (ED) (DIA)
- LINE–UNDERGROUND (EU) (DIA UNK)
- LINE–UNDERGROUND (EU) (DIA)
- LINE–MINOR TRANSMISSION (UC) (DIA UNK)
- LINE–MINOR TRANSMISSION (UE) (DIA)
- OPTICAL FIBRE–UNDERGROUND (OU) (DIA UNK)
- OPTICAL FIBRE–UNDERGROUND (OU) (DIA)
- TELEPHONE LINE (TN) (DIA UNK)
- TELEPHONE LINE (TN) (DIA)
- TELEPHONE CONDUIT (TD) (DIA UNK)
- TELEPHONE CONDUIT (TD) (DIA)
- TELEPHONE SUMP (TS)
- ETHANE PIPELINE (HA) (DIA UNK)
- ETHANE PIPELINE (HA) (DIA)
- HOUSE CONNECTION (DC) (DIA UNK)
- HOUSE CONNECTION (DC) (DIA)
- MAIN–HIGH PRESSURE PIPELINE (HG) (DIA UNK)
- MAIN–HIGH PRESSURE PIPELINE (HG) (DIA)
- MAIN–LOW PRESSURE (LG) (DIA UNK)
- MAIN–LOW PRESSURE (LG) (DIA)
- HOUSE CONNECTION (WY) (DIA UNK)
- HOUSE CONNECTION (WY) (DIA)
- MAIN (WM) (DIA UNK)
- MAIN (WM) (DIA)
- MAIN (SM) (DIA UNK)
- MAIN (SM) (DIA)
- HOUSE CONNECTION (SY)
- HOUSE CONNECTION (SY) (DIA)
- DRAINAGE PIT (DP)
- DRAINAGE BOX (DX)
- DRAINAGE PIPE (DU) (DIA UNK)
- DRAINAGE PIPE (DU) (DIA)
- UNIDENTIFIED SERVICE (UP)

LEGEND:

- RPA BOUNDARY

SCALE 1:200 AT ORIGINAL SIZE 0 2 4 6 8 10 m

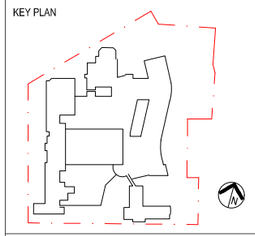
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REV	DATE	AMENDMENT
B	30.05.22	ISSUE FOR TENDER
A	13.05.22	DRAFT TENDER

KEY PLAN



PROJECT MANAGER

TSA

CLIENT

Health NSW Government Sydney Local Health District

Health NSW Government Infrastructure

ARCHITECT

Jacobs

TTW Structural Civil Traffic Façade

612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

TTW JOB NO.
201957

DRAWING TITLE
REF2 - EXISTING SURVEY AND SERVICES

STATUS
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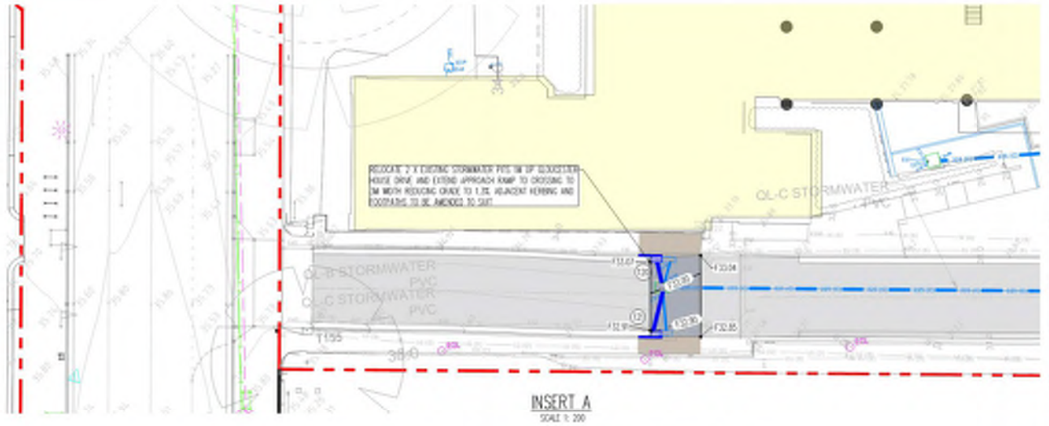
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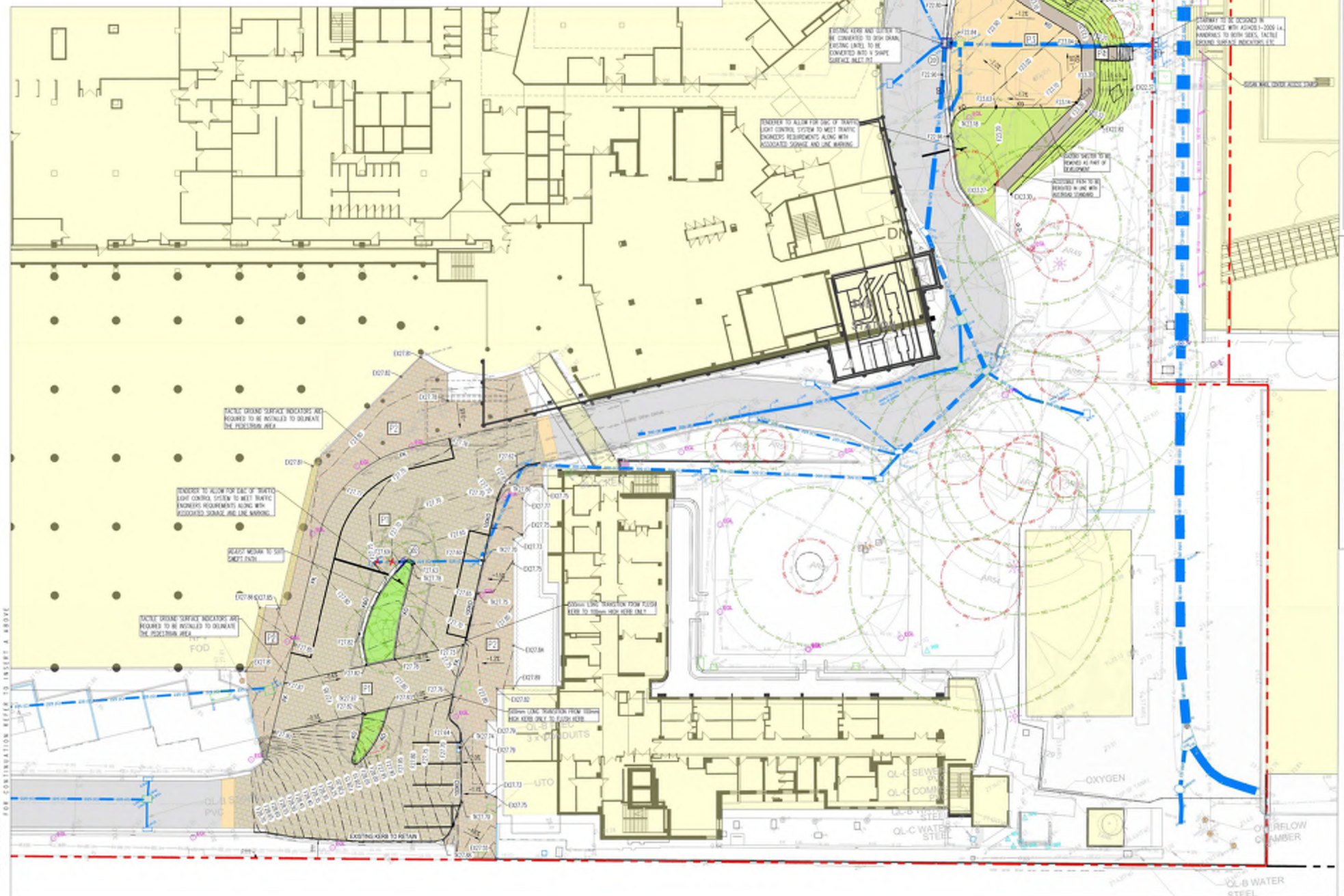
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REVISION B

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EXISTING UTILITIES LEGEND:

HOUSE CONNECTION E(C) [DA (RW)]
HOUSE CONNECTION E(P) [DA]
TELSTRA (T) [DA]
OPTUS (O) [DA]
PIPE UNDERGROUND E(C) [DA (RW)]
PIPE UNDERGROUND E(P) [DA]
PIPE MIRROR SUBMERSION (C) [DA (RW)]
PIPE MIRROR SUBMERSION (C) [DA]
OPTICAL FIBRE UNDERGROUND [OU] [DA (RW)]
OPTICAL FIBRE UNDERGROUND [OU] [DA]
TELEPHONE LINE [TL] [DA (RW)]
TELEPHONE LINE [TL] [DA]
TELEPHONE CONDUIT [T] [DA (RW)]
TELEPHONE CONDUIT [T] [DA]
TELEPHONE SUMP [TS]
STORM WATER PIPE [SW] [DA (RW)]
STORM WATER PIPE [SW] [DA]
HOUSE CONNECTION [SW] [DA (RW)]
HOUSE CONNECTION [SW] [DA]
MAIN-HIGH PRESSURE PIPELINE [HC] [DA (RW)]
MAIN-HIGH PRESSURE PIPELINE [HC] [DA]
MAIN-LOW PRESSURE [LC] [DA (RW)]
MAIN-LOW PRESSURE [LC] [DA]
HOUSE CONNECTION [WP] [DA (RW)]
HOUSE CONNECTION [WP] [DA]
MAIN [WP] [DA (RW)]
MAIN [WP] [DA]
MAIN [GW] [DA (RW)]
MAIN [GW] [DA]
HOUSE CONNECTION [CC]
HOUSE CONNECTION [CC] [DA]
DRAINAGE PIT [DP]
DRAINAGE BOX [CC]
DRAINAGE PIPE [DP] [DA (RW)]
DRAINAGE PIPE [DP] [DA]
UNIDENTIFIED SERVICE [UP]

LEGEND:

- RPA BOUNDARY
- Finished surface level
- Finished contour
- Kerb and gutter
- Kerb only
- Flush kerb
- Slot drain
- Stormwater pit, flow direction and line with: Insert level upstream; Pipe size and class; Pipe grade; Flow (Litres per second); Insert level downstream
- Grated drain
- Subsoil drainage line (100 dia) – refer detail sheets
- IR Intermediate riser with subsoil drainage line (100 dia)
- FP Flushing point with subsoil drainage line (100 dia)

REF2 PAVEMENT LEGEND:

CONCRETE ROAD

- P1: 80mm Bipave III on 30mm cut/shrink mortar bedding on 200mm Thickness concrete (f'c= + 32MPa with SL82 fabric (40 top cover) on 150mm Compacted thickness fine crushed rock (DG20)
- P1.1: 200mm Thickness concrete (f'c= + 32MPa with SL82 fabric (40 top cover) on 150mm Compacted thickness fine crushed rock (DG20)

CONCRETE FOOTPATH

- P2: 80mm Bipave III on 30mm Mortar bedding on 125mm Thickness concrete (f'c= + 32MPa with SL72 fabric (40 top cover) on 100mm Compacted thickness fine crushed rock (DG20)
- P4: 125mm Thickness concrete (f'c= + 32MPa with SL72 fabric (40 top cover) on 100mm Compacted thickness fine crushed rock (DG20)
- Landscape
- Existing road
- Existing building

SCALE 1:200 0 2 4 6 8 10 m
AT ORIGINAL SIZE

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A	31.05.22	DRAFT ISSUE

KEY PLAN

PROJECT MANAGER

TSA

CLIENT

NSW GOVERNMENT Health Sydney Local Health District

NSW GOVERNMENT Health Infrastructure

ARCHITECT

Jacobs

TTW Structural Civil Traffic Façade

612 9439 7288 | 46 Chandos Street St Leonards NSW 2065

PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

TTW JOB NO.
201957

DRAWING TITLE
REF2 - SITEWORKS PLAN

STATUS
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WW	DM
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TM	TM

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1:200

DRAWING NO. RPA-CIV-TTW-DRG-EW-XX-0231 REVISION B

INSERT A
SCALE 1: 200



CUT AND FILL DEPTH

Number	Minimum Elevation	Maximum Elevation	Color
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2	-0.100	0.000	
3	0.000	0.100	
4	0.100	0.200	
5	0.200	0.300	
6	0.300	0.400	
7	0.400	0.500	
8	0.500	0.600	
9	0.600	0.700	

SCALE 1:200 AT ORIGINAL SIZE 0 2 4 6 8 10 m

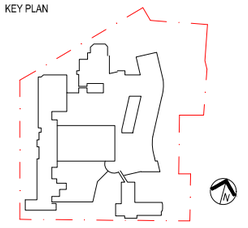
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KEY PLAN



PROJECT MANAGER

TSA

CLIENT

Health Sydney Local Health District
Health Infrastructure

ARCHITECT

Jacobs

TTW Structural Civil Traffic Façade

612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

TTW JOB NO.
201957

DRAWING TITLE
REF2 - PROPOSED CHANGE IN LEVELS

STATUS
FOR TENDER
NOT TO BE USED FOR CONSTRUCTION

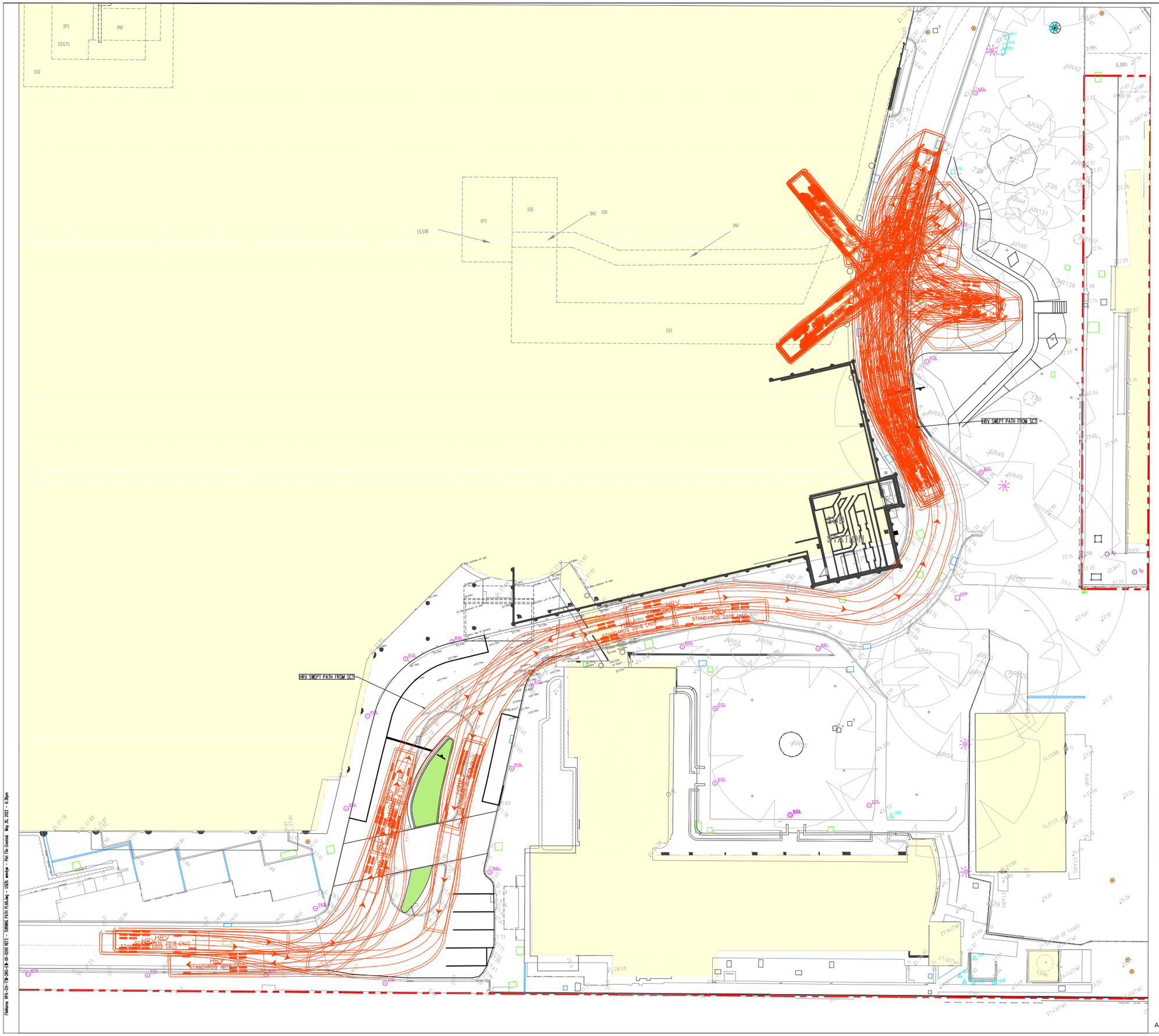
DRAWN	DESIGNED
WW	**DM**
CHECKED	APPROVED
TM	TM

SCALE @ B1
1:200

DRAWING NO. RPA-CIV-TTW-DRG-EW-XX-0232 REVISION B

FOR CONTINUATION REFER TO INSERT A ABOVE

File Name: RPA-CIV-TTW-DRG-EW-XX-0232 REF2 - PROPOSED CHANGE IN LEVELS.dwg - 1:500 - wwtyle - Plot By Created: May 30, 2022 - 6:36pm



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AT ORIGINAL SIZE

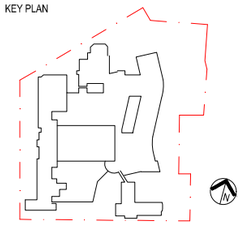
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REV	DATE	AMENDMENT
B	30.05.22	ISSUE FOR TENDER
A	13.05.22	DRAFT TENDER

KEY PLAN



PROJECT MANAGER

TSA

CLIENT

NSW GOVERNMENT Health
Sydney Local Health District

NSW GOVERNMENT Health
Infrastructure

ARCHITECT

Jacobs

TTW Structural Civil Traffic Façade

(02) 9439 7288 | 48 Chandos Street St Leonards NSW 2065

PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

TTW JOB NO.
201957

DRAWING TITLE
REF2 - TURNING PATH PLAN

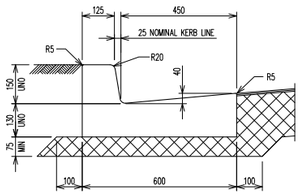
STATUS
FOR TENDER
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED
WW	**DM**
CHECKED	APPROVED
TM	TM

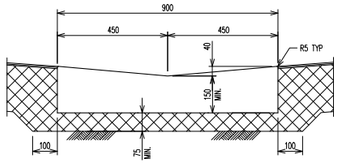
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DRAWING NO. RPA-CIV-TTW-DRG-EW-XX-0240
REVISION B

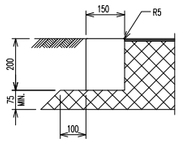
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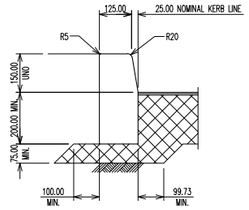
KERB AND GUTTER (K&G)
SCALE 1:10



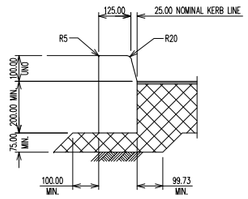
DISH DRAIN (DD)
SCALE 1:10



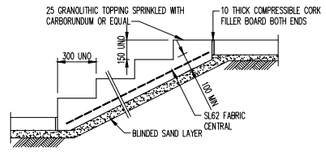
FLUSH KERB (FK)
SCALE 1:10



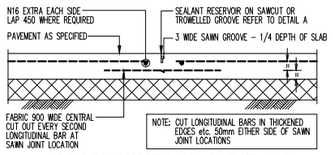
KERB ONLY (KO)
SCALE 1:10



100mm HIGH KERB ONLY (100KO)
SCALE 1:10

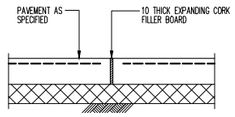


CONCRETE STAIRS
SCALE 1: 20

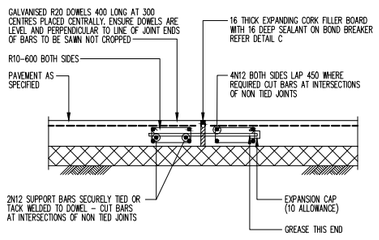


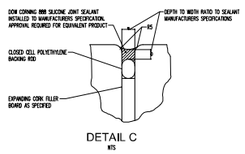
SAWN CONTROL JOINT (SJ)
SCALE 1: 20

NOTE:REFER TO JOINTING NOTES, POINT 5 FOR TIMING OF SAW CUTS.



EXPANSION JOINT (EJ)
SCALE 1: 20





DETAIL C
NTS

DOWELLED EXPANSION JOINT (DEJ)
SCALE 1: NTS

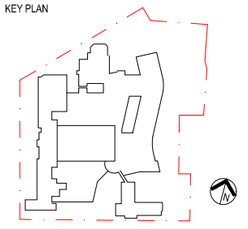
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REV	DATE	AMENDMENT
B	30.05.22	ISSUE FOR TENDER
A	13.05.22	DRAFT TENDER

KEY PLAN



PROJECT MANAGER

TSA

CLIENT

NSW GOVERNMENT Health Sydney Local Health District

NSW GOVERNMENT Health Infrastructure

ARCHITECT

Jacobs

TTW Structural Civil Traffic Façade

61 2 9439 7288 | 48 Chandos Street St Leonards NSW 2065

PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

TTW JOB NO.
201957

DRAWING TITLE
REF2 - DETAIL SHEEH 1

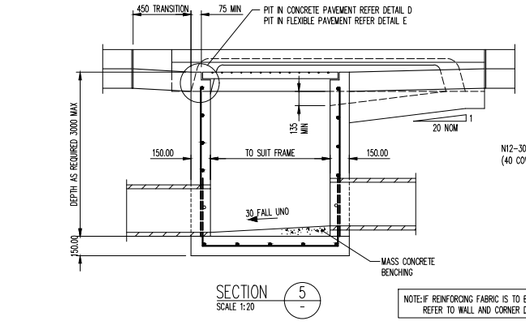
STATUS
FOR TENDER
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED
WW	**DM**
CHECKED	APPROVED
TM	TM

SCALE @ B1
AS SHOWN

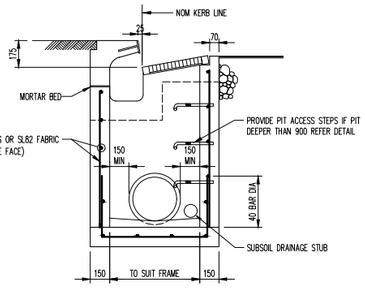
DRAWING NO. RPA-CIV-TTW-DRG-EW-XX-0250 REVISION B

Filename: RPA-CIV-TTW-DRG-EW-XX-0250 REF2 - DETAIL SHEEH 1.dwg - USER: wendyw - Plot Tm Created: May 30, 2022 - 8:30pm

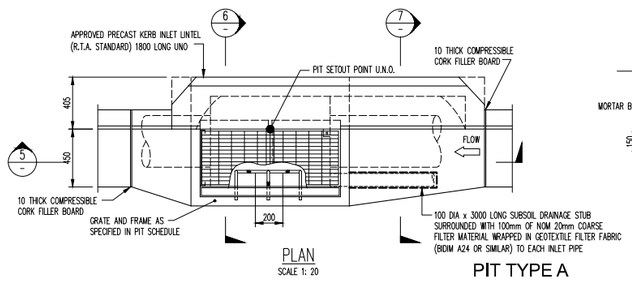


SECTION 5
SCALE 1:20

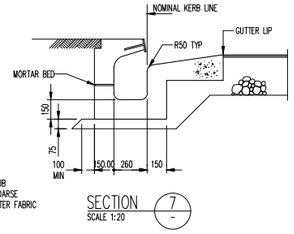
NOTE:IF REINFORCING FABRIC IS TO BE USED REFER TO WALL AND CORNER DETAILS



SECTION 6
SCALE 1:20

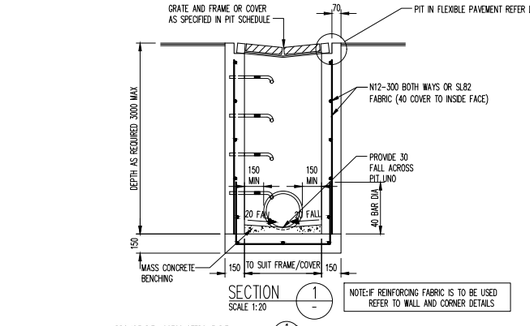


PLAN
SCALE 1: 20



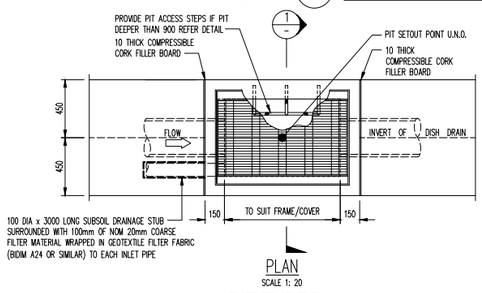
SECTION 7
SCALE 1:20

PIT TYPE A



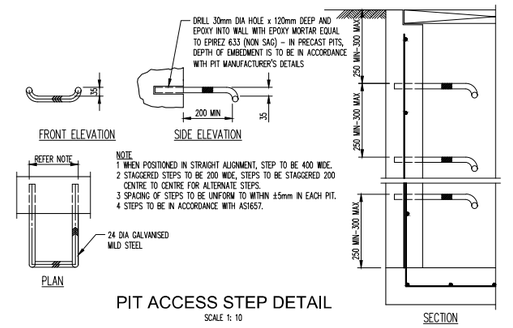
SECTION 1
SCALE 1:20

NOTE:IF REINFORCING FABRIC IS TO BE USED REFER TO WALL AND CORNER DETAILS



PLAN
SCALE 1: 20

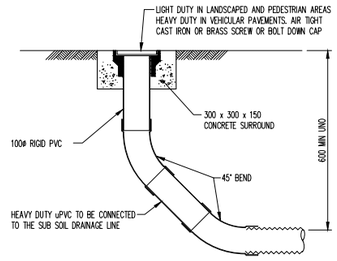
PIT TYPE D



NOTE
1 WHEN POSITIONED IN STRAIGHT ALIGNMENT, STEP TO BE 400 WIDE.
2 STAGGERED STEPS TO BE 200 WIDE, STEPS TO BE STAGGERED 200 CENTRE TO CENTRE FOR ALTERNATE STEPS.
3 SPACING OF STEPS TO BE UNIFORM TO WITHIN ±5mm IN EACH PIT.
4 STEPS TO BE IN ACCORDANCE WITH AS1657.

PIT ACCESS STEP DETAIL

SCALE 1: 10



FLUSHING POINT (FP)

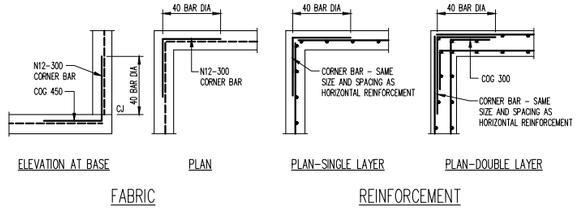
SCALE 1: 10
NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED

SUBSOIL IN PAVED AREAS

SCALE 1: 10

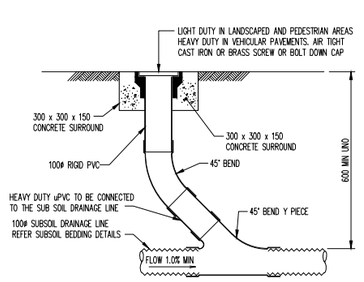
SUBSOIL IN LANDSCAPED AREAS

SCALE 1: 10



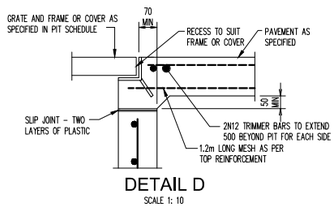
PIT CORNER DETAILS

SCALE 1: 20



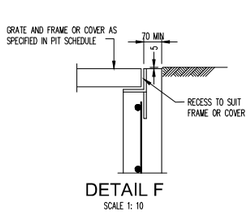
INTERMEDIATE RISER (IR)

SCALE 1: 10
NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



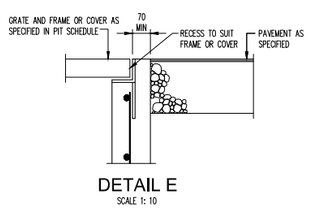
DETAIL D

SCALE 1: 10



DETAIL F

SCALE 1: 10



DETAIL E

SCALE 1: 10

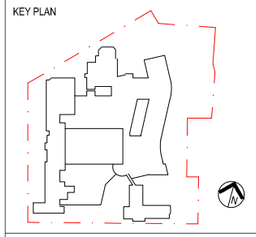
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REV	DATE	AMENDMENT
B	30.05.22	ISSUE FOR TENDER
A	13.05.22	DRAFT TENDER

KEY PLAN



PROJECT MANAGER

TSA

CLIENT

Health NSW Government Sydney Local Health District

Health NSW Government Infrastructure

ARCHITECT

Jacobs

TTW Structural Civil Traffic Façade

612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

TTW JOB NO.
201957

DRAWING TITLE
REF2 - DETAIL SHEET 2

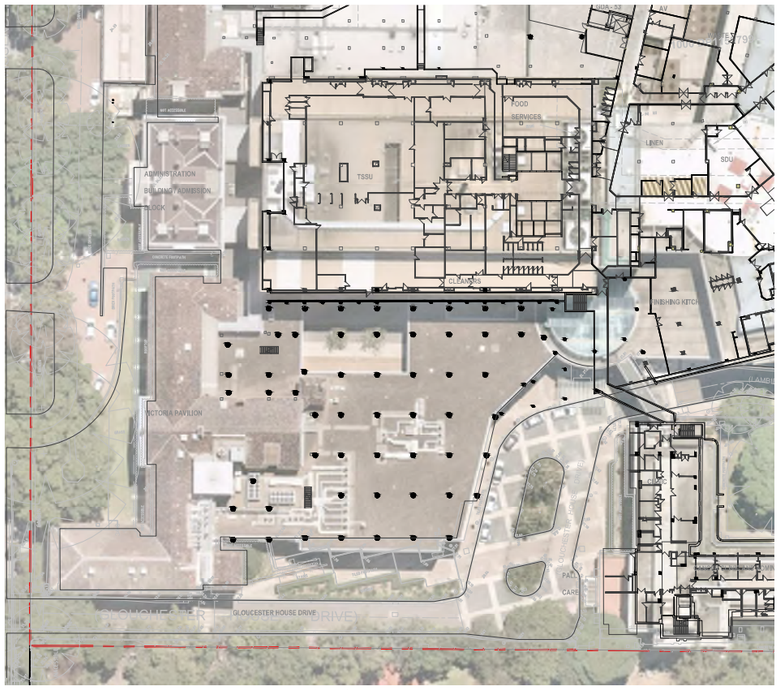
STATUS FOR TENDER
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED
WW	**DM**
CHECKED	APPROVED
TM	TM

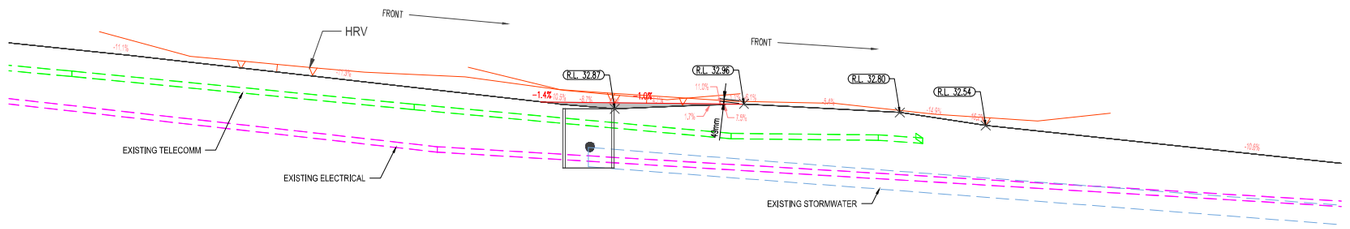
SCALE @ B1
AS SHOWN

DRAWING NO. RPA-CIV-TTW-DRG-EW-XX-0251 REVISION B

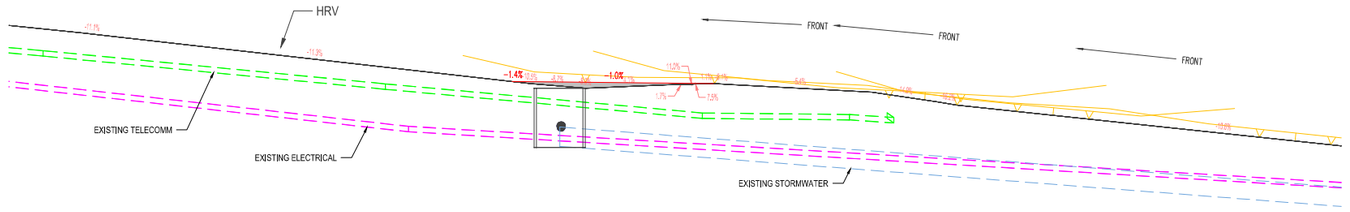
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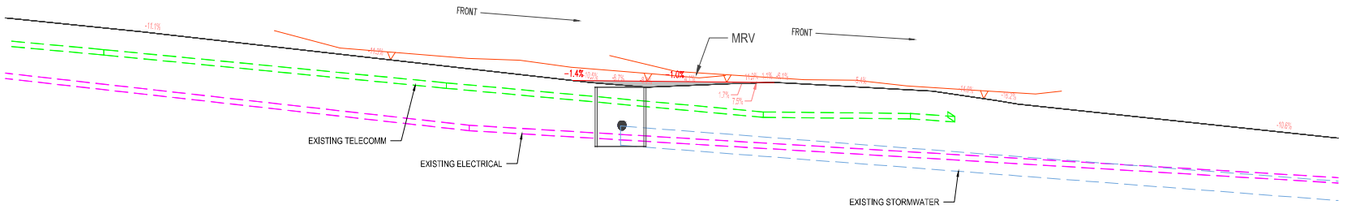
KEY PLAN
SCALE 1: 500



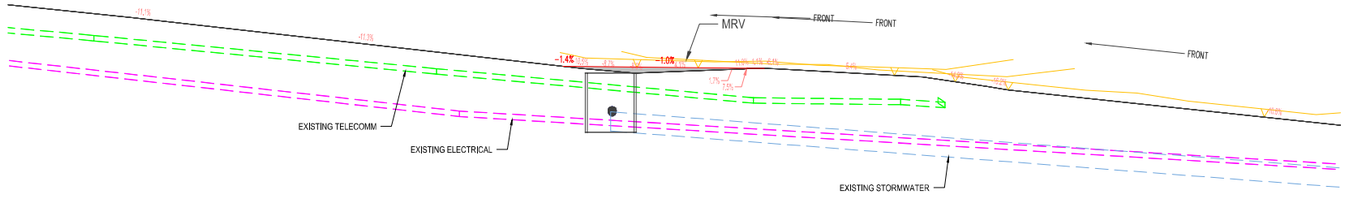
GLOUCESTER HOUSE DRIVE RAISED CROSSING SCRAPPING CHECK – HRV DRIVE IN
SCALE 1: 50



GLOUCESTER HOUSE DRIVE RAISED CROSSING SCRAPPING CHECK – HRV DRIVE OUT
SCALE 1: 50



GLOUCESTER HOUSE DRIVE RAISED CROSSING SCRAPPING CHECK – MRV DRIVE IN
SCALE 1: 50



GLOUCESTER HOUSE DRIVE RAISED CROSSING SCRAPPING CHECK – MRV DRIVE OUT
SCALE 1: 50

SCALE 1:500 0 5 10 15 20 25 m
AT ORIGINAL SIZE
SCALE 1:50 0 .5 1.0 1.5 2.0 2.5 m
AT ORIGINAL SIZE

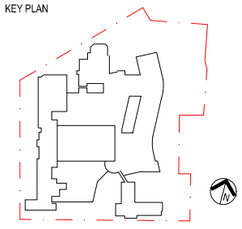
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REV	DATE	AMENDMENT
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KEY PLAN



PROJECT MANAGER

TSA

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Health Sydney Local Health District
Health Infrastructure

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Jacobs

TTW Structural Civil Traffic Façade
61 2 9439 7288 | 48 Chandos Street St Leonards NSW 2065

PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

TTW JOB NO.
201957

DRAWING TITLE
REF2 - SCRAPPING CHECK SHEET 1

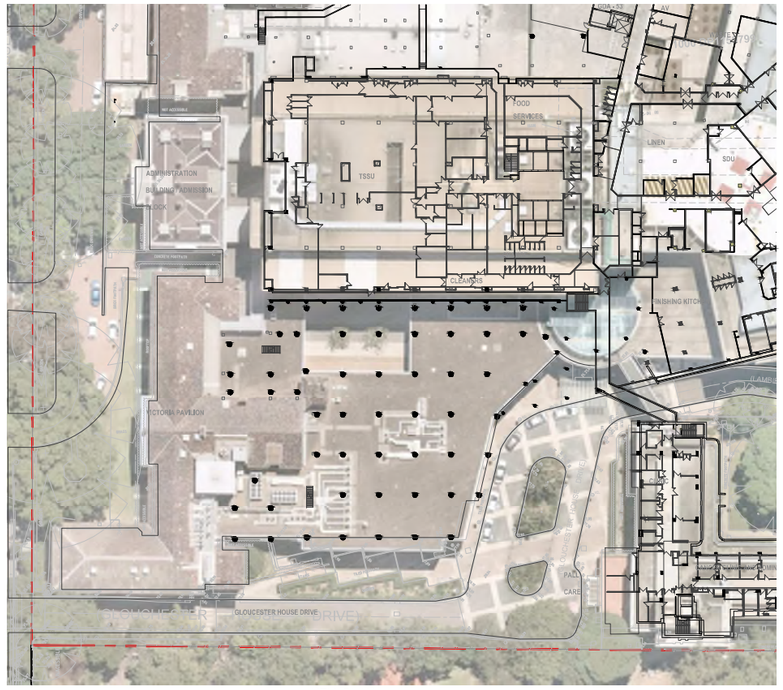
STATUS
FOR TENDER
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED
WW	**DM**
CHECKED	APPROVED
TM	TM

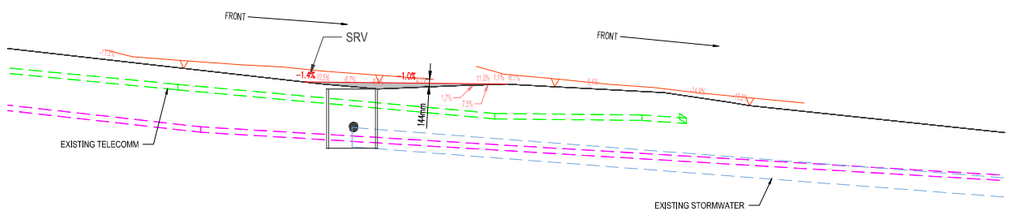
SCALE @ B1
AS SHOWN

DRAWING NO. RPA-CIV-TTW-DRG-EW-XX-0260 REVISION B

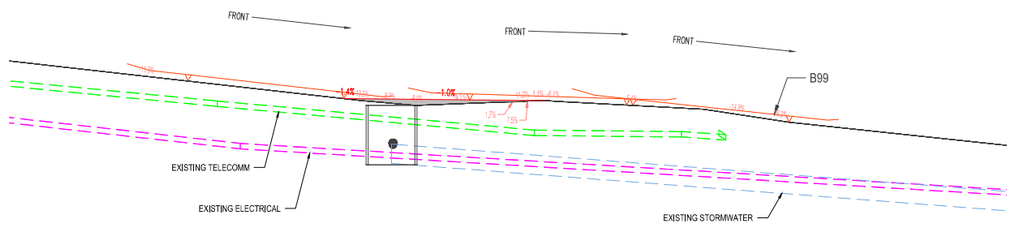
Filename: RPA-CIV-TTW-DRG-EW-XX-0260 REF2 - SCRAPPING CHECK SHEET 1.dwg - 1:500; wwalyw - Plot: File Checked: May 30, 2022 - 6:14pm



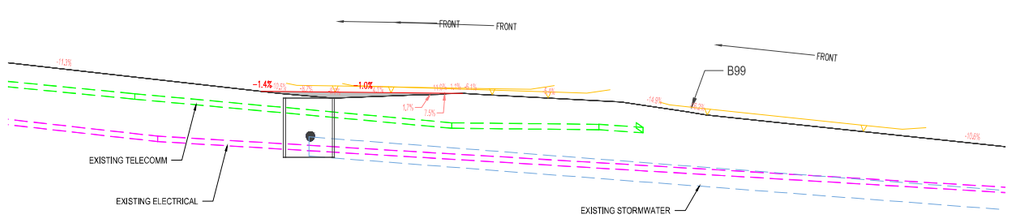
KEY PLAN
SCALE 1: 500



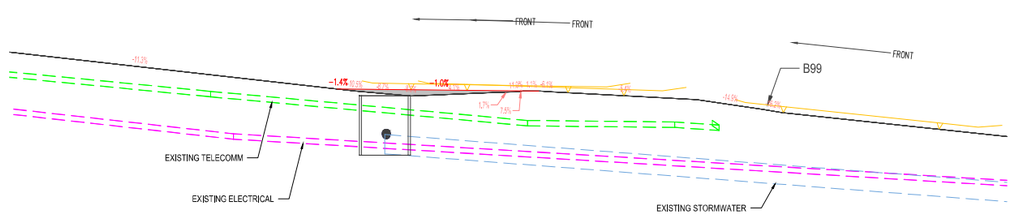
GLOUCESTER HOUSE DRIVE RAISED CROSSING SCRAPPING CHECK – SRV DRIVE IN
SCALE 1: 50



GLOUCESTER HOUSE DRIVE RAISED CROSSING SCRAPPING CHECK – B99 DRIVE IN
SCALE 1: 50



GLOUCESTER HOUSE DRIVE RAISED CROSSING SCRAPPING CHECK – B99 DRIVE OUT
SCALE 1: 50



GLOUCESTER HOUSE DRIVE RAISED CROSSING SCRAPPING CHECK – B99 DRIVE OUT
SCALE 1: 50

SCALE 1:500 AT ORIGINAL SIZE 0 5 10 15 20 25 m
SCALE 1:50 AT ORIGINAL SIZE 0 .5 1.0 1.5 2.0 2.5 m

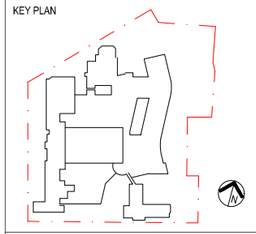
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REV	DATE	AMENDMENT
B	20.05.22	ISSUE FOR TENDER
A	13.05.22	DRAFT TENDER

KEY PLAN



PROJECT MANAGER

TSA

CLIENT

Health Sydney Local Health District
Health Infrastructure

ARCHITECT

Jacobs

TTW Structural Civil Traffic Façade
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

TTW JOB NO.
201957

DRAWING TITLE
REF2 - SCRAPPING CHECK SHEET 2

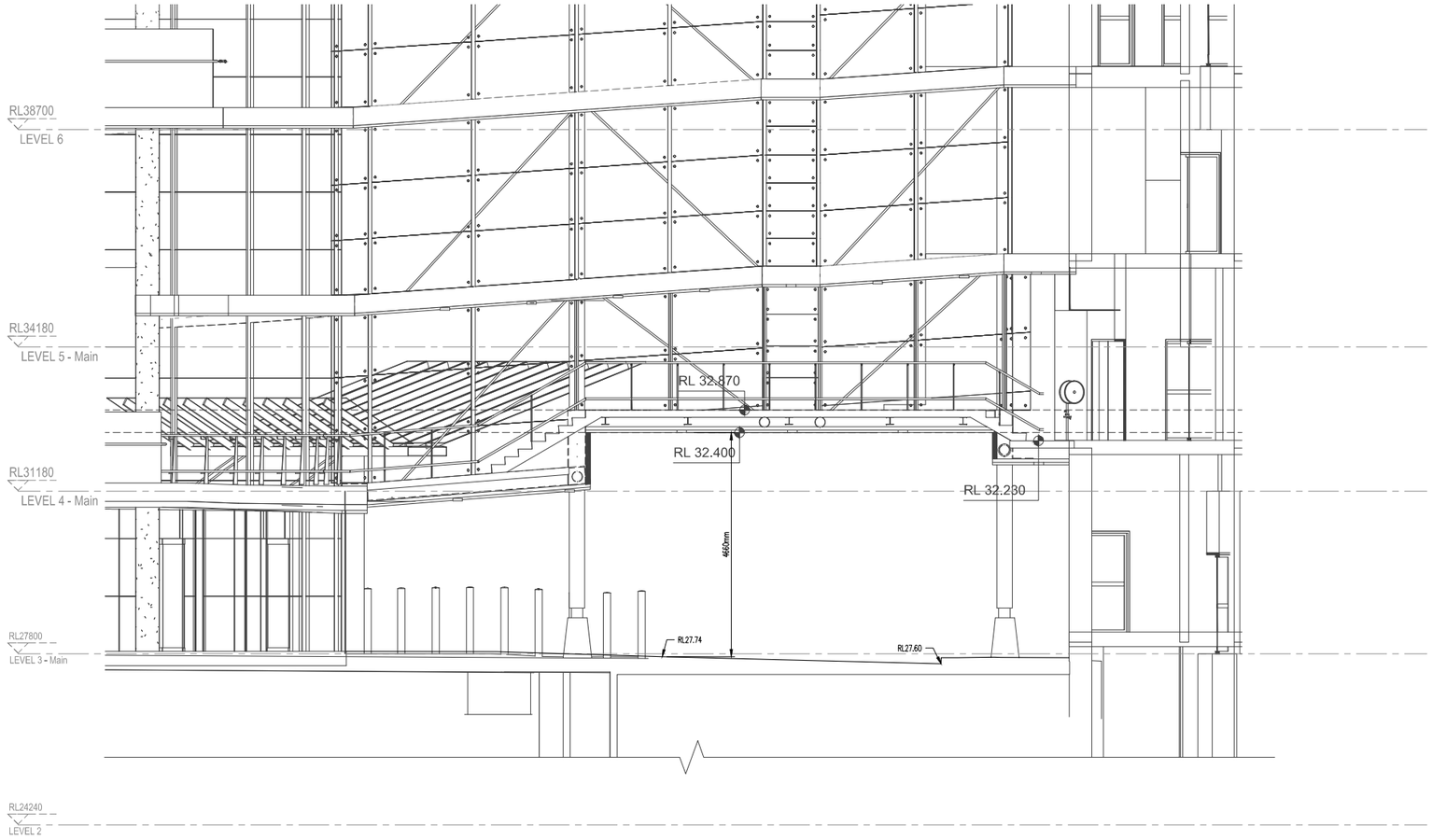
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TM	TM

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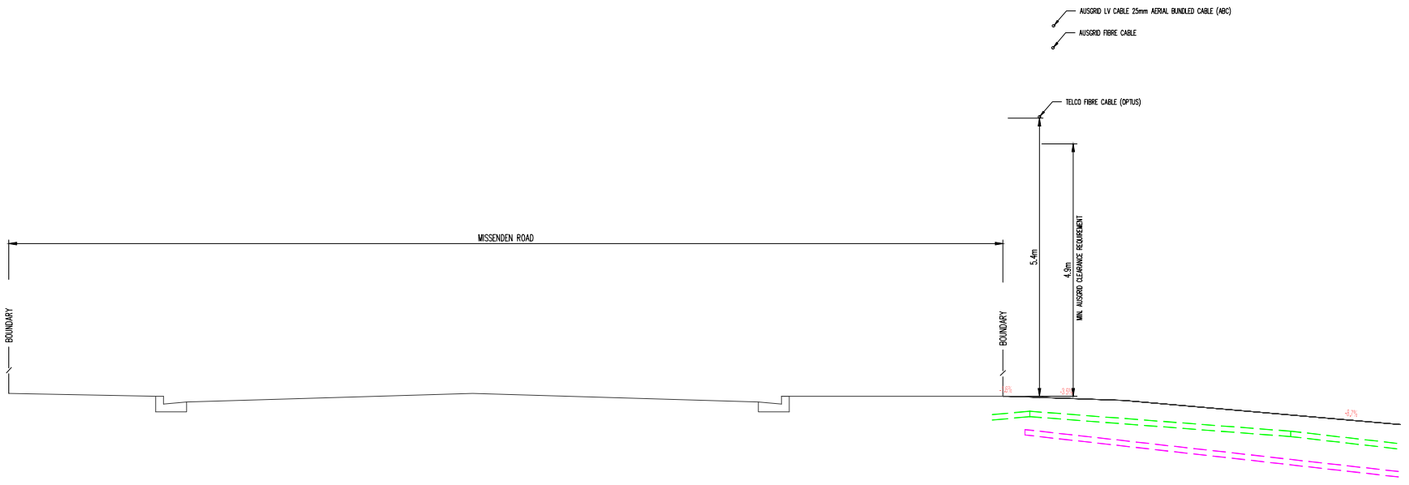
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REVISION B

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GLOUCESTER HOUSE DRIVE LINK BRIDGE HEADROOM

SCALE 1: 50



GLOUCESTER HOUSE DRIVE CLEARANCE CHECK

SCALE 1: 50

SCALE 1:50 AT ORIGINAL SIZE 0 .5 1.0 1.5 2.0 2.5 m

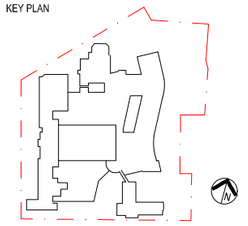
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REV	DATE	AMENDMENT
B	30.05.22	ISSUE FOR TENDER
A	13.05.22	DRAFT TENDER

KEY PLAN



PROJECT MANAGER

TSA

CLIENT

NSW GOVERNMENT Health Sydney Local Health District

NSW GOVERNMENT Health Infrastructure

ARCHITECT

Jacobs

TTW Structural Civil Traffic Façade

612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

PROJECT
ROYAL PRINCE ALFRED HOSPITAL REDEVELOPMENT STAGE 1

TTW JOB NO.
201957

DRAWING TITLE
REF2 - HEADROOM CHECK SHEET 1

STATUS
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NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED
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CHECKED	APPROVED
TM	TM

SCALE @ B1
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REVISION B

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BLACKETT MAGUIRE+ GOLDSMITH

NCC-BCA ASSESSMENT REPORT
REF2 SUBMISSION

RECONFIGUARATION GLOUCESTER HOUSE
LINK BRIDGE &
WORKS TO GLOCUESTER HOUSE DRIVE

NSW GOVERNMENT Health Infrastructure

Revision 0
Date: 14 June 2022
Reference: 210182

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CONTENTS

A. INTRODUCTION 4

A.1 Background / Proposal 4

A.2 Aim 5

A.3 Project Team 5

A.4 Documentation 6

A.5 Regulatory Framework 6

A.6 Compliance With The BCA 6

A.7 Stakeholders 6

A.7 Limitations & Exclusions 7

A.8 Terminology 7

B. BUILDING CHARACTERISTICS 11

B.1 BUILDING CLASSIFICATION 11

C. SUMMARY OF KEY COMPLIANCE ISSUES 13

C.1 SUMMARY OF KEY COMPLIANCES ISSUES: 13

C.2 SUMMARY OF ITEMS THAT MAY REQUIRE A PERFORMANCE SOLUTION: 15

D. BCA ASSESSMENT 16

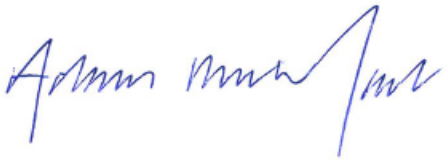
D.1 BCA DEEMED-TO-SATISFY COMPLIANCE ISSUES: 16

SECTION A – GENERAL PROVISIONS 16
PART A6 – BUILDING CLASSIFICATION 16
SECTION B – STRUCTURE 16
PART B1 – STRUCTURAL PROVISIONS 16
SECTION C – FIRE RESISTANCE 17
PART C1 – FIRE RESISTANCE AND STABILITY 17
PART C2 – COMPARTMENTATION AND SEPARATION 18
PART D2 – CONSTRUCTION OF EXITS 20
PART D3 – ACCESS FOR PEOPLE WITH A DISABILITY 23
SECTION E – SERVICES AND EQUIPMENT 33
PART E1 – FIRE FIGHTING EQUIPMENT 33
PART E2 – SMOKE HAZARD MANAGEMENT 35
PART E4 – VISIBILITY IN AN EMERGENCY, EXIT SIGNS AND WARNING SYSTEMS 35
SECTION F – HEALTH & AMENITY 35
PART F1 – DAMP AND WEATHERPROOFING 35
PART F3 – ROOM HEIGHTS 35
SECTION J – ENERGY EFFICIENCY 36

E. CONCLUSION 37

REVISION STATUS				
REVISION	**DATE**	**STATUS**	**PREPARED BY**	**REVIEWED BY**
0	14.06.2022	REF 2 Submission	Adam Durnford	David Blackett

Prepared by:



Adam Durnford
Accredited Certifier (BPB1821)
Associate Director

Reviewed by:



David Blackett
Accredited Certifier (BPB0032)
Director

A. INTRODUCTION

A.1 BACKGROUND / PROPOSAL

Blackett Maguire + Goldsmith Pty Ltd (BM+G) have been commissioned by Health Infrastructure to undertake a Building Code of Australia (BCA) 2019 assessment of the REF 2 Architectural Design Documentation for the proposed works to be undertaken as part of the RPA Hospital Redevelopment.

In March 2019, the NSW Government announced a significant expansion of the Royal Prince Alfred (RPA) Hospital with the $750 million RPA Redevelopment Stage 1 Project ('the Project').

The Project will include the development of clinical and non-clinical services infrastructure to expand, integrate, transform, and optimise current capacity at the RPA to provide contemporary patient-centered care that is evidence based including expanded and enhanced facilities and services for:

- Emergency Department (ED)
- Intensive Care Unit (ICU)
- Operating Theatres (OT)
- Interventional Cardiology
- Adult Acute Inpatient accommodation
- Medical imaging services (including Intervention)
- Clinical and non-clinical support services

The Project has currently completed Feasibility Development, with refinement of site wide infrastructure requirements and identification of a Preferred Service Configuration Option for further design development.

The Project has identified opportunities to provide early capacity ("early works") or activities which are required to be complete before main works commences ("enabling works").

In this instance, the proposed REF 2 works comprise the following:

- Reconfigure Lambie Dew Drive Turning Bay
- Remove existing trees
- Reconfigure the existing Gloucester House Bridge and associated roadworks
- Gloucester House Road hump adjustment
- Tree pruning at Missenden Road

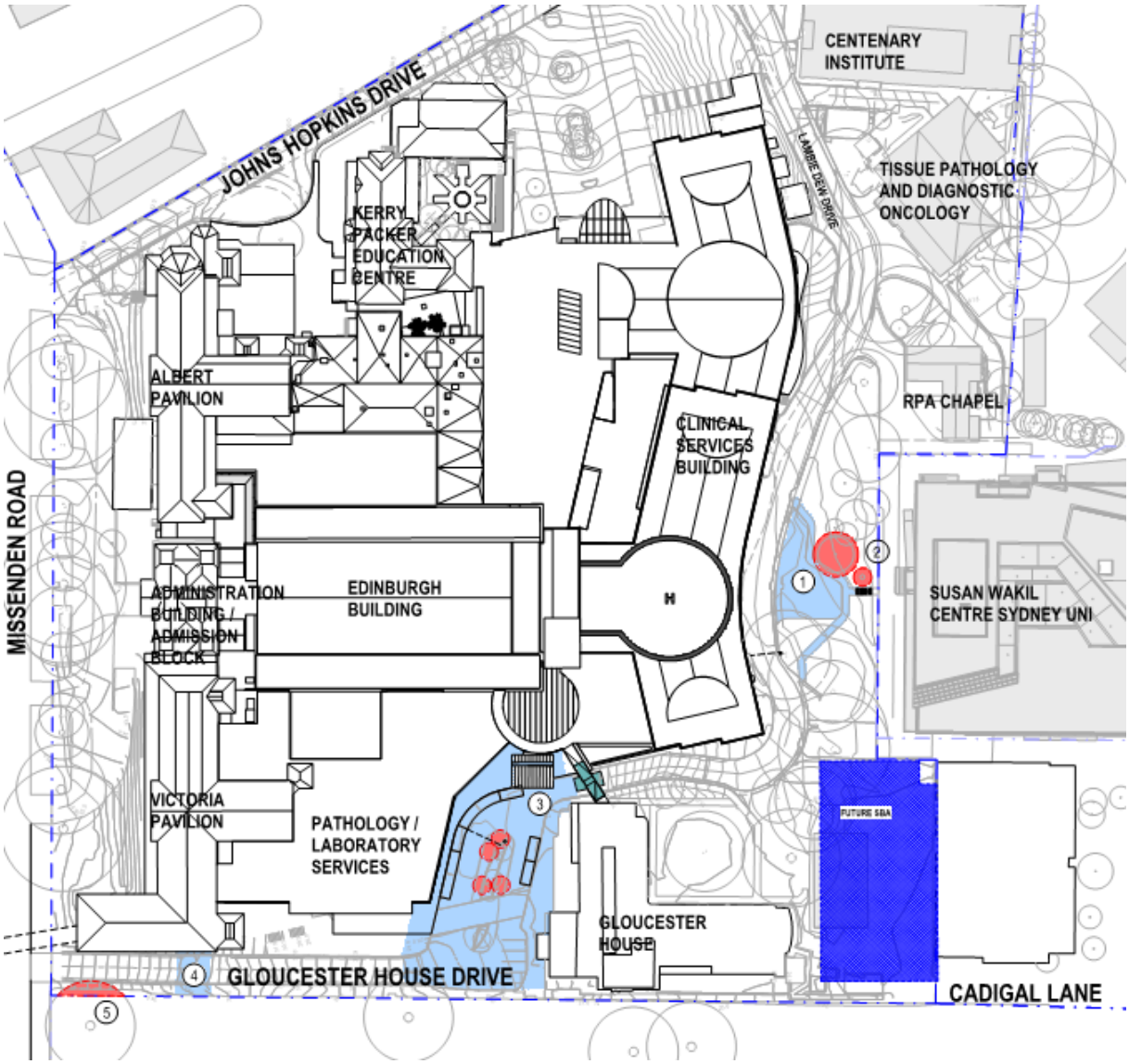


Figure No. 1 – Site Plan identifying location of REF 2 works

A.2 AIM

The aim of this report is to:

- Undertake an assessment of the proposed alterations and additions against the Deemed-to-Satisfy (DtS) provisions of Part C, D, E, F & J of the BCA 2019.
- Identify any BCA compliance issues that require resolution/attention for the proposed redevelopment.
- Identify non compliances that will be required to be assessed as part of the proposed Fire Engineering Assessment to be prepared by the appointed Fire Safety Engineer.
- Identify the relevant Performance Requirements that will be required to be assessed as part of the Fire Engineering Assessment.
- Review the design documentation against the Access to Premises Standards 2010.
- Identify a list of essential fire safety measures that are required to be installed within the building.

A.3 PROJECT TEAM

The following BM+G Team Members have contributed to this Report:

- Adam Durnford (Associate Director)
- David Blackett (Director)

A.4 DOCUMENTATION

The following documentation has been reviewed, referenced and/or relied upon in the preparation of this report:

- Building Code of Australia 2019
- Guide to the Building Code of Australia 2019
- Access to Premises Standards 2010
- Architectural Drawing Nos. RPA-ARC-JAC-DRG-REF2-0000 (B), 3221 (E), 3222 (E), 3223 (F), 3224 (E), 3225 (E), 3226 (E) & 3230 (E) prepared by Jacobs.

A.5 REGULATORY FRAMEWORK

Pursuant to Section 19 of the Environmental Planning and Assessment (Building Certification & Fire Safety) Regulation 2021 all new building work must comply with the applicable BCA. In relation to Crown Development, the applicable BCA is the BCA in force at time of calling for tenders or in the absence of calling for tenders, at the time of application for a Crown Certificate.

The BCA Assessment has been prepared in accordance with the Building Code of Australia 2019 Amendment No. 1.

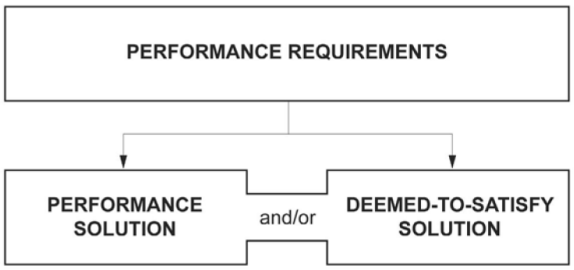
A.6 COMPLIANCE WITH THE BCA

Compliance with the NCC is achieved by complying with -

- The Governing Requirements of the NCC; and
- the Performance Requirements.

Performance Requirements are satisfied by one of the following, as shown in the Figure below:

- A Performance Solution.
- A Deemed-to-Satisfy Solution.
- A combination of the above two options.



A.7 STAKEHOLDERS

The relevant stakeholders for the project are detailed in the table below:

Role	Organisation	Representative(s)
Architect	Jacobs	Chin Young Donald Garner Vanessa Hawkes Russell Goldstein Matina Rajbhandari Leslie Hui

		Nathan Zhuang Beth Li Domenico Fimmano
Project Manager	TSA Management	Tim McNair Greg Barlow
Structural Services Engineer	TTW	Michael Barrett
Structural Services Engineer	TTW	Tim Moore
Mechanical Services Engineer	Arup	Mairead Hogan Bruce Fernandes
Electrical Services Engineer	Arup	Ryan Fisher
Hydraulic Services Engineers	WSP	Manu John James Skubevski
Fire Services Engineers	WSP	Manu John James Skubevski
Section J Consultant		

Table No. 1 – Summary of project stakeholders

A.7 LIMITATIONS & EXCLUSIONS

The limitations and exclusions of this report are as follows:

- The following assessment is based upon a review of the architectural documentation.
- The Report does not address matters in relation to the following:
- Local Government Act and Regulations.
- Occupational Health and Safety (OH&S) Act and Regulations.
- WorkCover Authority requirements.
- Water, drainage, gas, telecommunications, and electricity supply authority requirements.
- BM+G Pty Ltd do not guarantee acceptance of this report by Local Council, NSW Fire Brigades, or other approval authorities.
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A.8 TERMINOLOGY

Accessible

Means having features to enable use by people with a disability.

Accessway

Means a continuous accessible path of travel (as defined by AS 1428.1) to, into or within a building.

Alternative Solution

Means a Performance Solution

Building Code of Australia (BCA)

Document published on behalf of the Australian Building Codes Board. The BCA is a uniform set of technical provisions for the design and construction of buildings and other structures throughout Australia and is adopted in New South Wales (NSW) under the provisions of the EPA Act and Regulation. Building regulatory legislation stipulates that compliance with the BCA Performance Requirements must be attained and hence this reveals BCA's performance-based format.

Construction Type

The construction type is a measure of a buildings ability to resist a fire. The minimum type of fire-resisting construction of a building must be that specified in Table C1.1 and Specification C1.1, except as allowed for—

(i) certain Class 2, 3 or 9c buildings in C1.5; and
(ii) a Class 4 part of a building located on the top storey in C1.3 (b); and
(iii) open spectator stands and indoor sports stadiums in C1.7.

Note: Type A construction is the most fire-resistant and Type C the least fire-resistant of the types of construction.

Climatic Zone

Is an area defined in BCA Figure A1.1 and in Table A1.1 for specific locations, having energy efficiency provisions based on a range of similar climatic characteristics.

Deemed to Satisfy Provisions (DtS)

Provisions which are deemed to satisfy the Performance Requirements.

Effective Height

The vertical distance between the floor of the lowest storey included in the calculation of the rise in storeys and the floor of the topmost storey (excluding the topmost storey if it contains only heating, ventilating, lift or equipment, water tanks or similar service units).

Fire Resistance Level (FRL)

The grading periods in minutes for the following criteria-

(a) structural adequacy; and
(b) integrity; and
(c) insulation,

and expressed in that order.

Fire Source Feature (FSF)

The far boundary of a road which adjoins the allotment; or a side or rear boundary of the allotment; or an external wall of another building on the allotment which is not a Class 10 building.

Flight

Means that part of a stair that has a continuous series of risers, including risers of winders, not interrupted by a landing or floor.

Health-care building

A building whose occupants or patients undergoing medical treatment generally need physical assistance to evacuate the building during an emergency and includes—

(a) a public or private hospital; or
(b) a nursing home or similar facility for sick or disabled persons needing full-time care; or

(c) a clinic, day surgery or procedure unit where the effects of the predominant treatment administered involve patients becoming non-ambulatory and requiring supervised medical care on the premises for some time after the treatment.

Landing

Means an area at the top or bottom of a flight or between two flights.

Loadbearing

Means intended to resist vertical forces additional to those due to its weight.

Non-combustible

Means

a) Applied to a material – not deemed combustible as determined by AS 1530.1 – Combustibility Tests for Materials; and
b) Applied to construction or part of a building – constructed wholly of materials that are not deemed combustible

National Construction Code Series (NCC)

The NCC was introduced 01 May 2011 by the Council of Australian Governments. The BCA Volume One (Class 2 to 9 Buildings) is now referenced as the National Construction Code Series Volume One — BCA.

Occupation Certificate

Building Occupation Approval issued by the Principal Certifying Authority pursuant to Part 4A of the EPA Act 1979.

Open Space

A space on the allotment, or a roof or other part of the building suitably protected from fire, open to the sky and connected directly with a public road.

Performance Solution (Alternative Solution)

Means a method of complying with the Performance Requirements other than by a Deemed-to-Satisfy Solution.

Patient care area

A part of a healthcare building normally used for the treatment, care, accommodation, recreation, dining and holding of patients including a ward area and treatment area.

Performance Requirements of the BCA

A Building Solution will comply with the BCA if it satisfies the Performance Requirements. A Performance requirement states the level of performance that a Building Solution must meet.

Compliance with the Performance Requirements can only be achieved by-

(a) complying with the DtS Provisions; or
(b) formulating an Alternative Solution which-
    i. complies with the Performance Requirements; or
    ii. is shown to be at least equivalent to the DtS Provisions; or
(c) a combination of (a) and (b).

Sole occupancy Unit (SOU)

A room or other part of a building for occupation by one or joint owner, lessee, tenant, or other occupier to the exclusion of any other owner, lessee, tenant, or other occupier and includes a dwelling.

Treatment area

An area within a patient care area such as an operating theatre and rooms used for recovery, minor procedures, resuscitation, intensive care, and coronary care from which a patient may not be readily moved.

Ward area

That part of a patient care area for resident patients and may contain areas for accommodation, sleeping, associated living and nursing facilities.

B. BUILDING CHARACTERISTICS

B.1 BUILDING CLASSIFICATION

The following table presents a summary of relevant building classification items of the existing RPA Main Hospital Building (incorporating Building 89) where the proposed alterations and additions are proposed to be undertaken to accommodate the new Mortuary lift and lobby area.

Existing Main Hospital Building

+ **BCA Classification:**	Class 9a (Health-care Building) Class 5 (professional consultation)
+ **Storeys Contained**	Twelve (12)
+ **Rise in Storeys:**	Twelve (11)
+ **Effective Height:**	> 25 m & < 50 m
+ **Type of Construction:**	Type A Construction
+ **Sprinkler System Installed Throughout**	The existing building is provided with an Automatic Fire Suppression System installed in accordance with AS 2118.1 & AS 2118.6.
+ **Importance Level**	Importance Level 4
+ **Climate Zone:**	Energy Efficiency Zone 5
+ **Maximum Floor Area:**	Max 5,000 m² compartments for Class 9a Health Care buildings. Note: 2,000 m² compartments applies to all Patient Care Areas within the building.
+ **Maximum Volume:**	Max 30,000 m³ compartments for Class 9a Health Care buildings.
+ **Largest Fire Compartment within Refurbishment Area**	TBC

Table No. 2 – Summary of building classification items for the Main Hospital Building

Gloucester House

+ **BCA Classification:**	Class 9a (Health-care Building) Class 5 (professional consultation)
+ **Storeys Contained**	Six (6)
+ **Rise in Storeys:**	Six (6)
+ **Effective Height:**	< 25 m
+ **Type of Construction:**	Type A Construction

+ **Sprinkler System Installed Throughout**	No
+ **Importance Level**	Importance Level 3
+ **Climate Zone:**	Energy Efficiency Zone 5
+ **Maximum Floor Area:**	Max 8,000 m²
+ **Maximum Volume:**	Max 30,000 m³

Table No. 3 – Summary of building classification items for the Gloucester House

C. SUMMARY OF KEY COMPLIANCE ISSUES

Based on the REF 2 Issue Architectural Drawings prepared by Jacobs, the following is a summary of the key compliance issues identified having regard to the proposed works that are proposed to be undertaken as part of the REF 2 works.

C.1 SUMMARY OF KEY COMPLIANCES ISSUES:

No.	BCA Clause	Description
1.	B1.2	*Importance Level* The alterations and additions to the existing Hospital Building will be required to be designed and constructed in accordance with the requirements of Importance Level 4 (post disaster operations) including structure and services as detailed in Clause B1.2 of the BCA. Verification will be required from the Structural Engineer and respective Services Engineers that the new building structure and services have been designed in accordance with the requirements for Importance Level 4.
2.	D1.4	*Egress Travel Distance* Egress travel distance has not been affected by the proposed works to the Gloucester House bridge link works.
3.	D1.5	*Egress Travel Distance* Egress travel distance between alternative exits has not been affected by the proposed works to the Gloucester House bridge link works.
4.	Part D3	*Access between Buildings via the Gloucester House Link Bridge* By virtue of the proposed works to the Link Bridge on Level 4, access for a person with a disability will not be able to be provided between the existing Main Hospital and Gloucester House via the link bridge on Level 4 and thus an occupant who is wheelchair bound will be required to be directed via way finding signage installed throughout Level 4 (directing them to the passenger lift and then to Level 5) and Level 5 of Gloucester House (directing them to the link bridge from the passenger lift). Way finding signage will also be required to be installed within the atrium of the Main Hospital on Level 4 directing occupants to use the passenger lift to Level 5 to access the link bridge on Level 5 leading to Gloucester House. *Accessible Stairways* The proposed stairway within the Link Bridge along with the new external stairway in the landscaped area will be required to be designed and constructed in accordance with AS 1428.1. *Tactile Ground Surface Indicators* Tactile ground surface indicators will be required to be installed to the set down area which is on the same level as the carriageway within Gloucester House Drive along with the external stairway within the landscaped area in accordance with AS 1428.4.1.

No.	BCA Clause	Description
5.	E1.3	*Fire Hydrants* The proposed works will have no impact on existing fire hydrant coverage. Notwithstanding the above, fire hydrant coverage to Level 4 of the Link Bridge should be verified by the Fire Services Consultant.
6.	E1.4	*Fire Hose Reels* The proposed works will have no impact on existing fire hydrant coverage. Notwithstanding the above, fire hose reel coverage to Level 4 of the Link Bridge should be verified by the Fire Services Consultant.
7.	E1.5	*Sprinklers* The proposed works will have no impact on existing fire sprinkler coverage. Notwithstanding the above, sprinkler coverage to Level 4 of the Link Bridge in addition to below the Link Bridge should be verified by the Fire Services Consultant.
8.	F1.0	*Waterproofing of External Walls* Performance Requirement FP1.4 relating to the prevention of water through the external is required to be demonstrated as being complied. There is no specific DtS Clause for this Performance Requirement in respect of external walls. In this instance a Performance Solution Report is required to be prepared to demonstrate that **any new** external walls and roof weatherproofing system meets Performance Requirement FP1.4 and will prevent the penetration of water through the external walls.
9.	F3.1	*Link Bridge Ceiling Height* All corridors, passageway within a Class 9a Hospital are required to have a minimum ceiling height of 2400 mm. As a result of the proposed stairway to be constructed within the Link Bridge, the existing ceiling height within the Link Bridge may be reduced below the minimum 2400 mm. Any reduction below a minimum ceiling height of 2400 mm will be required to be subject of a Performance Solution.
10.	Section J	*Energy Efficiency* The energy efficiency provisions of Section J are applicable to the new building works only. In this regard Parts J1 - Building Fabric, Part J3 - Building Sealing, Part J5 - Air Conditioning and Mechanical Ventilation, Part J6 - Artificial Lighting and Power, and Part J7 - Hot water supply & Part J8 – Access for Maintenance is required to be provided. If the proposed design will not comply with the DtS provisions of the BCA, then a JV3 Assessment will be required to be undertaken to demonstrate compliance with the Performance Requirements of the BCA.

Table No. 4 – Summary of key compliance items

C.2 SUMMARY OF ITEMS THAT MAY REQUIRE A PERFORMANCE SOLUTION:

No.	DTS CLAUSE	BCA PERFORMANCE REQUIREMENT	DTS DEPARTURE
1.	F1.0	FP1.4	Weatherproofing of roof and external wall

Table No. 5 – Summary of required non-compliances to be addressed via a Performance Solution

D. BCA ASSESSMENT

D.1 BCA DEEMED-TO-SATISFY COMPLIANCE ISSUES:

The following comments have been made in relation to the relevant BCA compliance issues associated with the proposed alterations and additions are proposed to be undertaken to accommodate Anatomical Pathology and the new Mortuary lift and lobby area.

SECTION A – GENERAL PROVISIONS

PART A6 – BUILDING CLASSIFICATION

1. Part A6 – Building Classification

The existing Main Hospital Building has a primary classification as Class 9a (health care) and Class 5 (professional consultation).

Gloucester House a classification of Class 5 (professional consultation).

SECTION B – STRUCTURE

PART B1 – STRUCTURAL PROVISIONS

2. Part B1 – Structural Provisions

Structural engineering details prepared by an appropriately qualified structural engineer to be provided to demonstrate compliance with Part B1. This will include the following Australian Standards (where relevant):

1. AS 1170.0 – 2002: Structural Design Actions - General Principles
2. AS 1170.1 – 2002: Structural Design Actions – Permanent, Imposed and Other Actions including certification for balustrading (dead and live loads)
3. AS 1170.2 – 2002: Structural Design Actions – Wind Actions
4. AS 1170.4 – 2007: Structural Design Actions – Earthquake Actions in Australia
5. AS 3700 – 2018: Masonry Structures
6. AS 3600 – 2018: Concrete Structures
7. AS 4100 – 1998: Steel Structures
8. AS/NZS 4600 – 2018: Cold formed steel.
9. AS 2047 – 2014: Windows and External Glazed Doors in Buildings
10. AS 1288 – 2006: Glass in buildings.

Importance Level

The BCA outlines minimum Importance Levels which reflect the values and expectations the community place on specific types of buildings in the event of an earthquake.

It is generally accepted that the structure is expected not to collapse but substantially damaged when this condition is reached. The interpretation of the performance expectations for buildings of different Importance Level in the event of an earthquake are generally as follows:

- Buildings of Importance Level 1: not expect to survive
- Buildings of Importance Level 2: expect not to collapse but substantially damaged
- Buildings of Importance Level 3: expect to survive with some damage
- Buildings of Importance Level 4: expect to survive intact and continue to function

AS1170.0-2002 *Structural design Actions – General Principals* categorises the Importance Levels for different building types as outlined below. *Note that the BCA only identifies Importance Levels 1-4, and hence Importance Level 5 is not a mandatory requirement under the National Code.*

In this regard, the new building works are required to be designed in accordance with the requirements for **Importance Level 4**.

The Structural Engineer has confirmed that the building has been designed to comply with Importance Level 2. Design Verification in the form of a Design Statement is to be submitted to the Registered Certifier confirming compliance.

SECTION C – FIRE RESISTANCE

PART C1 – FIRE RESISTANCE AND STABILITY

3. Clause C1.1 – Type of Construction Required

All new building elements constructed as part of the Gloucester House Bridge Link works will be required to be constructed in Type A Construction.

The new building elements will be required to be constructed in accordance with the FRL's detailed in Table 3 of Specification C1.1 for Type A Construction (refer to table below).

TYPE A CONSTRUCTION	
BUILDING ELEMENT	**CLASS 5 & 9a**
EXTERNAL WALL (including any column and other building element incorporated within in) or other external building element, where the distance from any fire-source feature to which it is exposed is –	
For load bearing parts-	
less than 1.5m	120/120/120
1.5m to less than 3m	120/90/90
3m or more	120/60/30
For non-load bearing parts-	
less than 1.5m	-/120/120
1.5m to less than 3m	-/90/90
3m or more	-/-/-
EXTERNAL COLUMN not incorporated in an external wall, where the distance from any fire source feature to which it is exposed is –	
Less than 3m	120/-/-
3m or more	-/-/-
COMMON WALLS & FIRE WALLS	120/120/120
INTERNAL WALLS	
Fire Resisting lift and stair shafts –	
Loadbearing	120/120/120
Non-loadbearing	-/120/120
Ventilating, pipe, garbage, and the like shafts not used for the discharge of hot products of combustion –	
Loadbearing	120/90/90
Non-loadbearing	-/90/90
OTHER LOADBEARING INTERNAL WALLS & COLUMNS	120/-/-
FLOORS	120/120/120

ROOF	120/60/30

Table No. 6 – Required FRL's for building elements

4. Clause C1.9 – Non-Combustible Construction

In a building required to be constructed of Type A Construction (in accordance with DtS Provisions) and all buildings (as required by Health Infrastructure Design Guidance Note 32), external walls including all components incorporated in them including all façade covering, framing and insulation are required to be constructed of non-combustible construction.

Aluminium Cladding

In this instance any proposed panels to be used on the external walls of the building will be required to comply with the requirements of Clause C1.9 i.e. single piece of pre-finished metal sheeting having a combustible surface finish not exceeding 1mm thickness and where the Spread of Flame Index of the product is not greater than 0.

Appropriate Test Reports / Certificates will be required to be submitted for any Aluminium Cladding demonstrating compliance with Clause C1.9 of the BCA.

Sarking within the External Wall Assembly

Sarking type materials installed within existing or new external walls will be required to have a thickness not exceeding 1mm and have a Flammability Index not greater than 5.

Insulation within the External Wall Assembly

Insulation installed within the external wall assembly will be required to be non-combustible.

5. Clause C1.10 – Fire Hazard Properties

The fire hazard properties of all new building materials and assemblies as well as all new floor materials, floor coverings, wall and ceiling lining materials used in the development must comply with the requirements of Specification C1.10 of the BCA.

PART C2 – COMPARTMENTATION AND SEPARATION

6. Clause C2.2 – General Floor Area and Volume Limitations

The proposed works have no impact on the existing fire compartmentation sizes within the buildings.

7. Clause C2.5 – Class 9a Buildings

Fire & Smoke separation is required to be provided throughout the Patient Care Areas in accordance with Clause C2.5.

All Patient Care Areas must be divided into fire compartments not exceeding 2,000m^2. It is noted that the Tender Issue Architectural Drawings indicate that compliance is achievable in this instance.

Ward and Treatment Areas are required to be designed in accordance with the following table.

Area Use		**Max. Compartment Size**		
Patient Care Area (Max 2,000m2)	**Ward Area**	Where total floor area is less than 500m^2:	Where total floor area is greater than 500m^2, but less than 1000m^2:	Where total floor area is greater than 1000m^2:
		Separate from other areas with Smoke Walls	Separate with smoke walls into areas less than 500m^2	Separate with smoke walls with an FRL of not less 60/60/60 into areas less than 1000m^2

	Treatment Area	Where total floor area is less than 1000m$^{2:}$	Where total floor area is greater than 1000m$^{2:}$
		Separate from other areas with Smoke Walls	Separate with smoke walls into areas less than 1000m^2
Note: Walls identified above which are required to achieve an FRL or be smoke separated must be of non-combustible construction i.e., no timber framed stud walls.			

Table No. 7 – Required fire and smoke compartmentation for patient care areas

It is noted that the REF2 scope does not include any refurbishment works to patient care areas and thus the additional compartmentation requirements of Clause C2.5 are not applicable.

8. Specification C1.1 – Fire Resisting Construction

New building elements associated with the Gloucester House Link Bridge are required to comply with the requirements of Specification C1.1 for a building of Type A Construction. The following key items of Specification C1.1 are identified:

General Requirements

- Where part of a building required to have an FRL depends on direct vertical or lateral support from another part to maintain its FRL, that supporting part must:
  - Have an FRL not less than the required by other provisions of Specification C1.1; and
  - If located within the same fire compartment as the part its supports have an FRL in respect of structural adequacy the greater of that required –
    - For the supporting part itself; and
    - For the part is supports
  - Be non-combustible –
    - If required by other provisions of Specification C1.1; or
    - If the part is supports is required to be non-combustible
- Shafts required to have an FRL must be enclosed at the top and bottom by construction having an FRL not less that the required for the walls of a non-loadbearing shaft in the same building except the provisions do not apply to the top of a shaft extending beyond the roof covering (other than one enclosing a fire stair or ramp) or the bottom of a shaft if it is non-combustible and laid directly on the ground.
- All internal walls that are required to have a fire rating must extend to the underside of the slab above.
- All loadbearing internal walls must be constructed of concrete or masonry.
- Due to the fact that the building is required to be constructed of Type A Construction, the FRL to the load bearing elements of the external applies in both directions.
- Any load bearing structural steel columns installed in the external wall of the building will require an FRL in accordance with the Table 3. This applies to Structural Steel columns located within the external wall assembly that may be supporting any roof etc above.

  Note: Only internal walls and columns located in the storey directly below the roof received a concession in terms of their FRL's being reduced down to 60 minutes.
- All internal non-loadbearing walls that are required to be fire resisting and lift, ventilating, pipe, garbage, or similar shaft that is not for the discharge of hot products of combustion is required to be constructed of non-combustible construction

SECTION D - ACCESS & EGRESS

PART D1 – PROVISION FOR ESCAPE

9. Clause D1.2 – Number of Exits Required

A minimum of two (2) exits (in addition to any horizontal exit) must be provided from each part of the storeys within the building which contains patient care areas.

The minimum number of exits from both buildings served by the Link Bridge has not been impacted in any way.

10. Clause D1.4 – Exit Travel Distances

Egress travel distance from non-patient care areas is permitted to extend to 20m to a point of choice and a maximum distance of 40m to an alternative exit.

Egress travel distance has not been affected by the proposed works to the Gloucester House bridge link works.

11. Clause D1.5 – Distances Between Alternative Exits

The maximum travel distance between alternative exits from non-patient care areas cannot exceed 60m.

Egress travel distance between alternative exits has not been affected by the proposed works to the Gloucester House bridge link works.

12. Clause D1.6 – Dimensions of Exits

The unobstructed height throughout an exit or a path of travel to an exit must not be less than 2 metres, except for doorways which may be reduced to not less than 1980mm.

All other doorways are to achieve an unobstructed width of not less than 850mm.

PART D2 – CONSTRUCTION OF EXITS

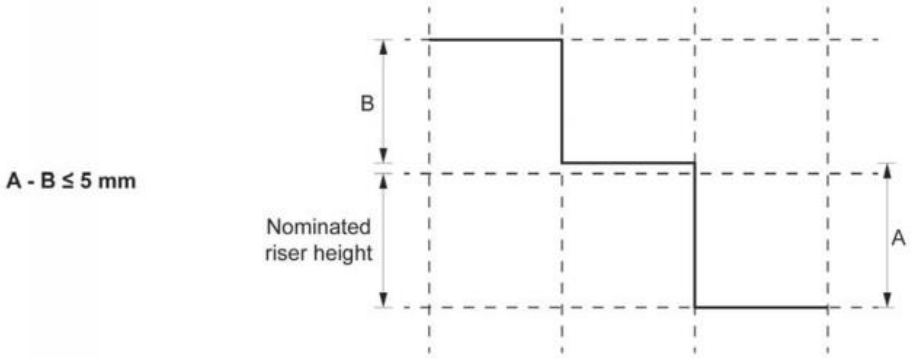
13. Clause D2.13 – Goings & Risers

In relation to the construction of the proposed new stairways we note the following:

+ Stairway must have not more than 18 and not less than 2 risers in each flight.
+ Goings and risers within the stair flights must be constant throughout.
+ Goings and risers are to be in accordance with the following dimensions.

Riser and Going Dimensions (mm)			
	Riser (R)	**Going (G)**	**Quantity (2R + G)**
Maximum	190	355	700
Minimum	115	250	550

Table No. 8 – Riser and going dimensions for stairways

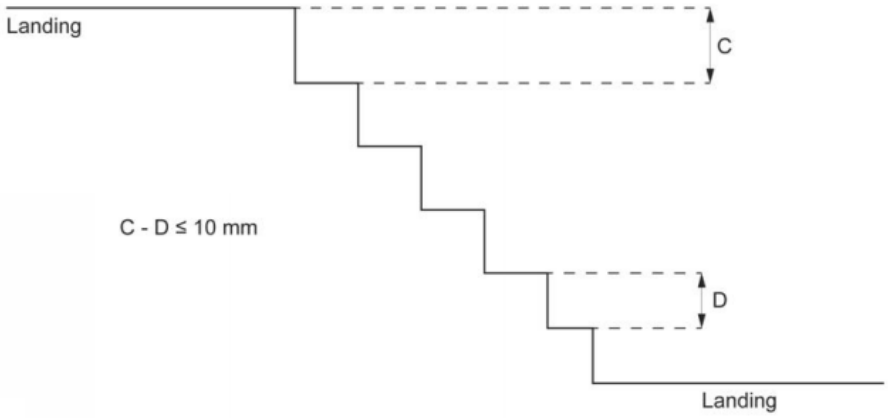


Notes:

1. A = larger riser of two adjacent risers.
2. B = smaller riser of two adjacent risers.
3. This figure only shows deviations in risers, however the same principle can apply for goings.

Figure No. 2 – Permitted deviations in adjacent stair risers

Figure D2.13(2) Deviations over a flight



Notes:

1. C = largest riser of the flight.
2. D = smallest riser of the flight.
3. This diagram only shows deviations in risers, however the same principle can apply for goings.

Figure No. 3 – Permitted deviations over a stair flight

- The stair treads are required to be provided with the following:
  - Have a surface with a slip resistance classification not less than that listed in Table D2.14 when tested in accordance with AS 4586; or
  - Be provided with a nosing strip with a slip resistance classification not less than that detailed in Table D2.14 when tested in accordance with AS 4586.
- Each stairway is to be provided with a contrast strip to the nosing in accordance with AS1428.1-2009.

Table D2.14 Slip Resistance Classification

Application	Surface Conditions	
	Dry	Wet
Ramp steeper than 1:14	P4 or R11	P5 or R12
Ramp steeper than 1:20 but not steeper than 1:14	P3 or R10	P4 or R11
Tread or landing surface	P3 or R10	P4 or R11
Nosing or landing edge strip	P3	P4

Table No. 9 – Minimum slip resistance ratings required to stairs and ramps

In addition to the slip resistance ratings detailed within the table, the following slip resistance ratings are required throughout the building:

Location	Minimum Slip Resistance
Link Bride Walkway	P2 or R9
Building Entry (transitional area)	P3 or R10
Building Entry (dry area)	P2 or R9
External walkways etc	P4 or R11

Table No. 10 – Minimum slip resistance ratings required to specific areas throughout the hospital

14. Clause D2.15 – Thresholds

No steps can be located within the internal or external door thresholds unless the doorway is within a patient care area and the door sill is not more than 25mm above the finished level to which the doorway opens.

In areas other than patient care areas, where there are any steps within door thresholds, a threshold or step ramp is required to be installed in accordance with Clause 10 of AS 1428.1 which requires the following:

- Maximum rise of 35 mm
- Maximum length of 280 mm
- Maximum gradient of 1:8
- Be located within 20 mm of the door leaf it serves

Where the threshold ramp does not abut a wall, the edges of the threshold ramp are required to be tapered or splayed at a minimum of 45º.

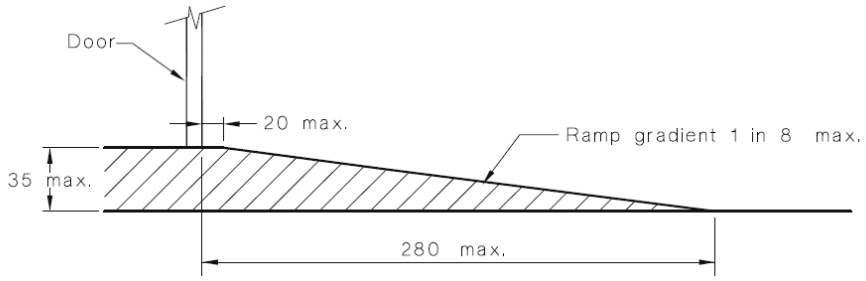


Figure No. 4 – Threshold ramp dimensions

PART D3 – ACCESS FOR PEOPLE WITH A DISABILITY

15. Clause D3.1 – General Building Access Requirements

Access for a person with a disability must be provided, at a minimum, to and within all areas normally used by the occupants throughout the hospital building.

16. Clause D3.2 – Access to Buildings

Access to the building is required as follows:

- An accessible accessway is required to be provided as follows:
  - From the main points of a pedestrian entry at the allotment boundary, and
  - From another accessible building connected by a pedestrian link; and
  - From any required accessible carparking space on the allotment

Access between Buildings via the Gloucester House Link Bridge

By virtue of the proposed works to the Link Bridge on Level 4, access for a person with a disability will not be able to be provided between the existing Main Hospital and Gloucester House via the link bridge on Level 4 and thus an occupant who is wheelchair bound will be required to be directed via way finding signage installed throughout Level 4 (directing them to the passenger lift and then to Level 5) and Level 5 of Gloucester House (directing them to the link bridge from the passenger lift).

Way finding signage will also be required to be installed within the atrium of the Main Hospital on Level 4 directing occupants to use the passenger lift to Level 5 to access the link bridge on Level 5 leading to Gloucester House.

17. Clause D3.3 – Parts of Buildings to Be Accessible

In a building required to be accessible –

- Every ramp and stairway, excepts for ramps and stairways in areas exempted from Clause D3.4, are required to comply with –
  - For a ramp, except a fire isolated ramp, Clause 10 of AS 1428.1; and
  - For a stairway, except a fire isolated stairway, Clause 11 of AS 1428.1; and
  - For a fire isolated stairway, Clause 11 (f) and (g) of AS 1428.1.
  - Door handles less than 900 mm above the finished floor
- Every passenger lift is required to be designed in accordance with Clause E3.6
- Accessways throughout the building are required to have –
  - Passes spaces complying with AS 1428.1 at a maximum 20m intervals on those parts of an access where a direct line of sight is not available; and
  - Turning spaces complying with AS 1428.1 –
    - Within 2 m of the end of accessways where it is not possible to continue travelling along the accessway, and
    - At maximum 20 m intervals along the accessway
- All dead-end corridors where a person in a wheelchair is required to make a 90º to 180º turn is required to be not less than 2070mm in the direction of travel and not less than 1540 mm wide.

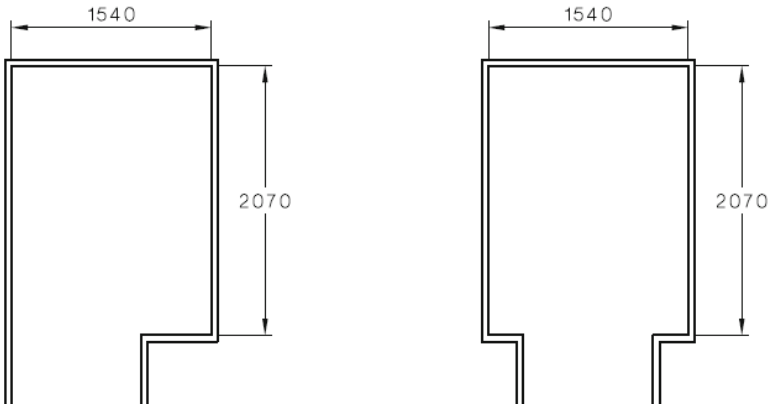


Figure No. 5 – Minimum space required for >90° to 180° turn

Accessible Walkways (AS1428.1 – 2009 Section 10.2):

The requirements for walkways serving the development are as follows:

- Walkways can have a gradient up to 1:20. Anything steeper is a ramp and requires kerbs or kerb rails plus handrails to both sides.
- A walkway with a gradient less than 1 in 33 does not require landings but does require a crossfall of maximum 1 in 40 (maximum cross fall of 1 in 33 if the surface is bitumen).
- Walkways steeper than 1 in 33 do not require a crossfall to the main walkway but do require a crossfall of 1 in 40 to landings

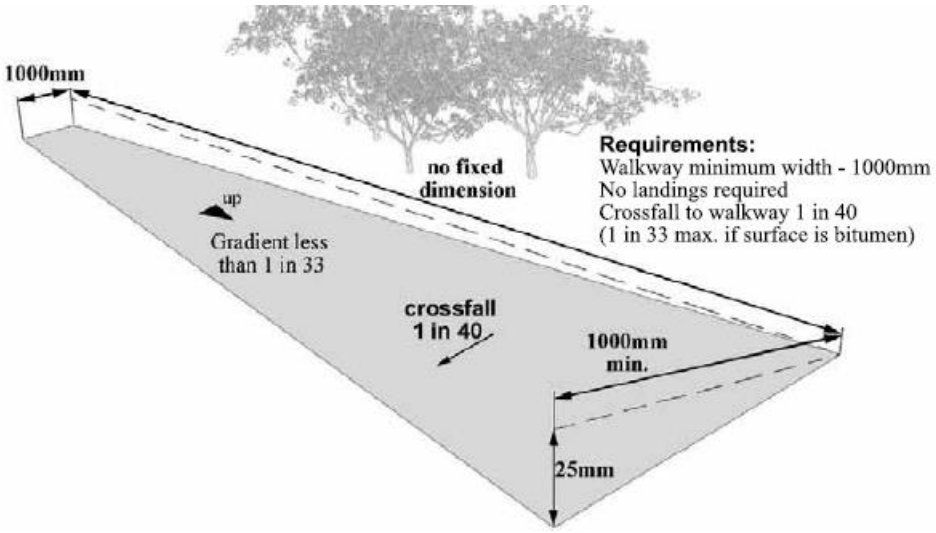


Figure No. 6 - Requirements for a Walkway with a Gradient Less Than 1 in 33

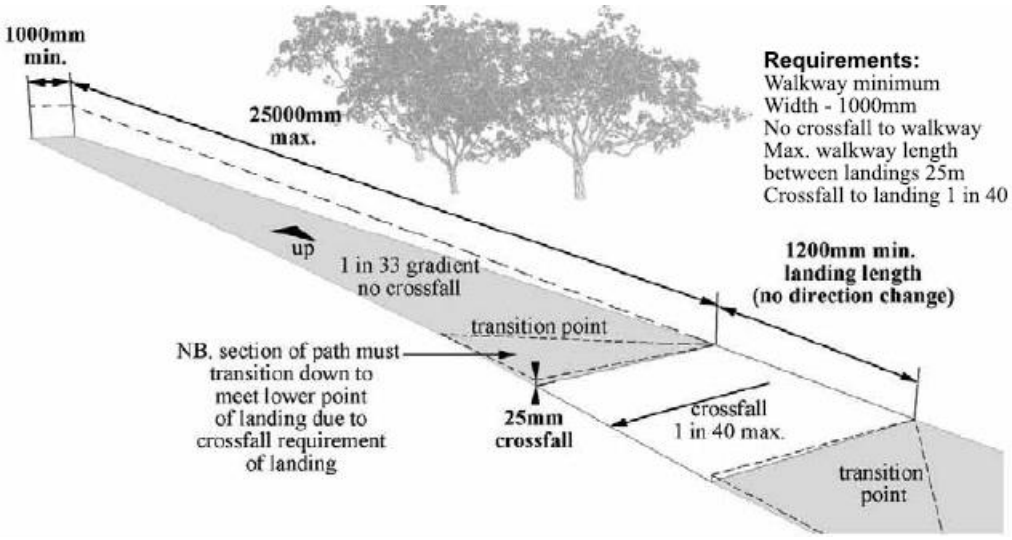


Figure No. 7 - Requirements for a Walkway with a 1 in 33 Gradient

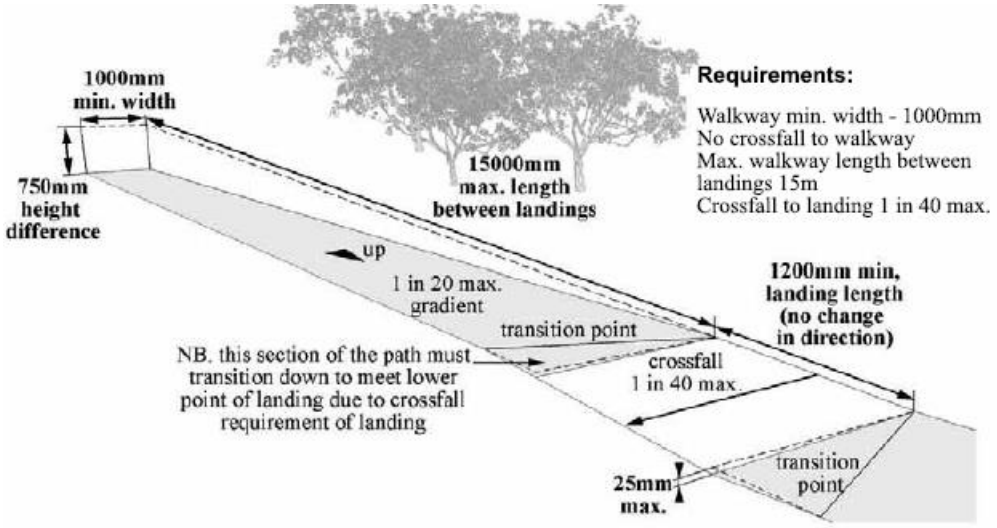


Figure No. 8 - Requirements for a Walkway with a 1 in 20 Gradient

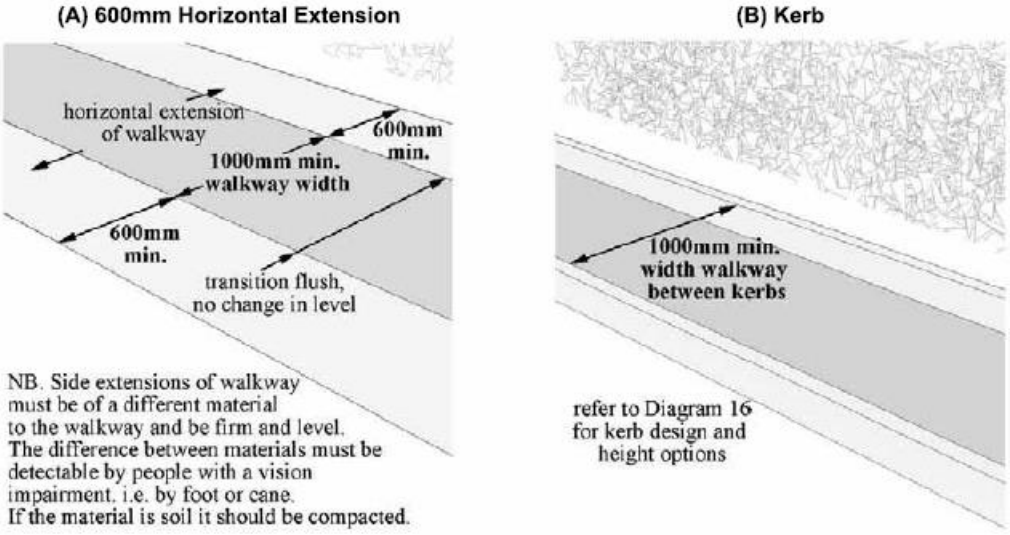


Figure No. 9 - Requirements for Edges of Walkways

Accessible Ramps (AS1428.1-2009 Section 10.3):

Accessible ramps are required to be designed and constructed in accordance with the following:

- The maximum gradient is to be 1:14.
- Landings are to be provided at the top and bottom of the ramp and at intervals not exceeding 9m.

  The landings to the ramps are required to have a minimum width of 1200mm.
- Handrails are to be provided to both sides of the ramp. The handrails are required to be extended 300mm at both the top and bottom of the ramp.
  - The ramps are to be provided with kerb rails that comply with the following:
  - The minimum height above the finished floor shall be 65mm
  - The height of the top of the kerb or kerb rail shall not be within the range of 75mm to 150mm above the finished floor.
  - There cannot be a longitudinal gap or slot greater than 20mm in the kerb or kerb rail within the range 75mm to 150mm above the finished floor.
- Where ramps are constructed with a change in direction, the angle of approach shall create a 90° angle to the line of transition between the ramp surface and the landing surface.

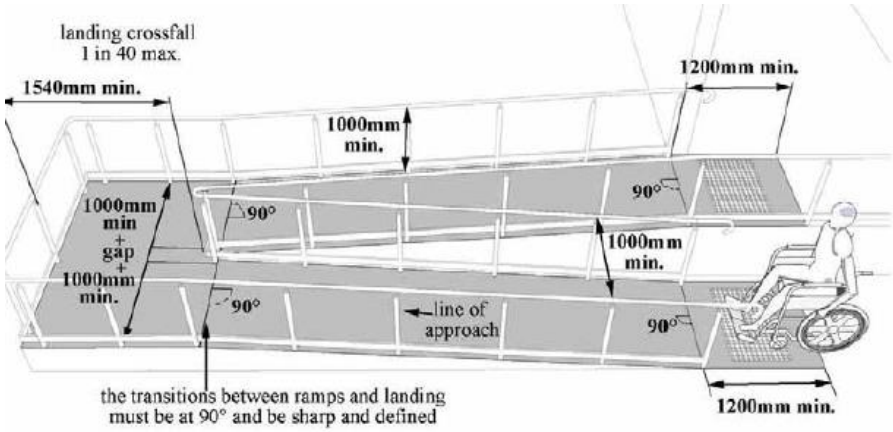


Figure No. 10 – Ramp and Landing with Change in Direction of 180°

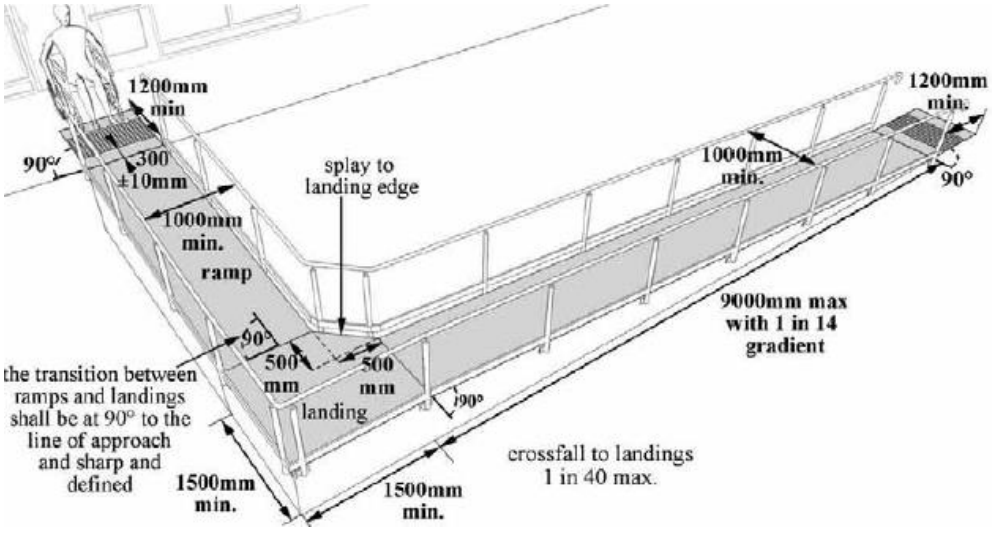


Figure No. 11 – Ramp and Landing with Change of 90°

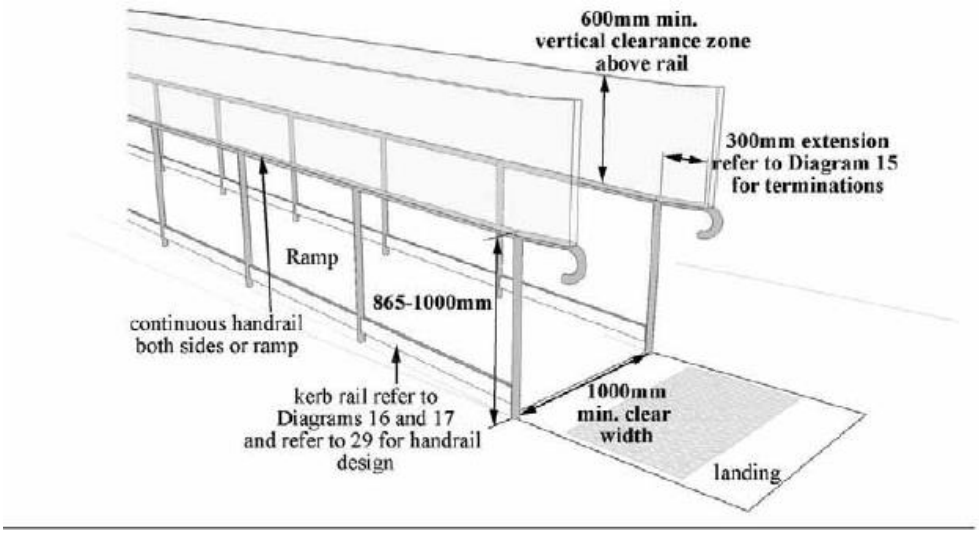


Figure No.12 – Handrail Extensions at Ramp Ending

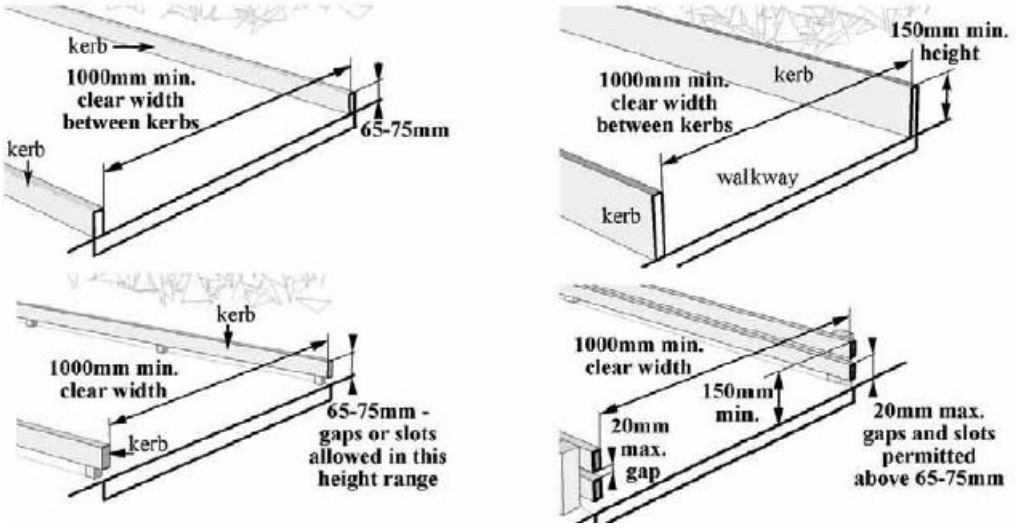


Figure No. 13 – Kerb and Kerb Rail Design Options

Accessible Stairways:

The new stairway within the Link Bridge along with the external stairway within the landscaped external area will be required to be designed in accordance with AS 1428.1. In this instance, the following is required:

- A handrail to each side of stairway.
- Handrails are required to be extended at the top and bottom of the stairway. At the bottom of the stairway, the handrails are required to extend one tread width plus 300mm from the last riser. At the top of the stairway, the handrails are required to extend 300mm from the last riser.
- Solid opaque risers.
- Contrast nosing's to the stair treads.
- The handrails are to have a maximum dimension of 50mm and be spaced a minimum distance of 50mm from the wall.

  Note: -
  Handrails within fire isolated stairways are only required to comply with Clause 12 of AS 1428.1 which regulates the size of the handrails, cross section and distance from adjacent walls surfaces etc. In this

instance the extensions at the top and bottom of the handrails are not required within the fire isolated stairway.

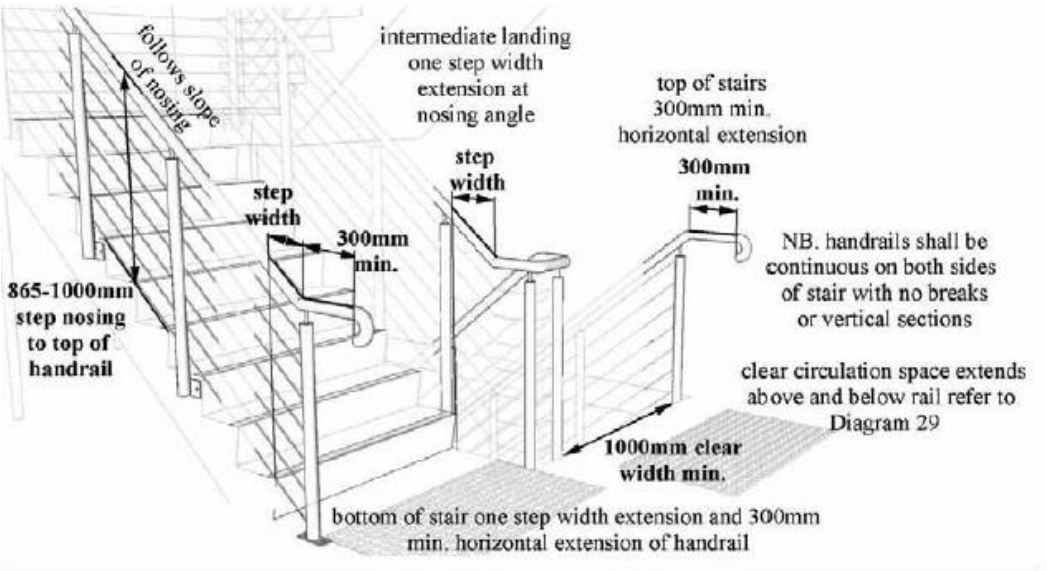


Figure No. 14 – Handrails to Stairways

Access Control

Access control swipe readers are required to be installed between 900 – 1100 mm above FFL and not closer than 500 mm to an internal corner.

Door release buttons are required to be located between 900 – 1100 mm above FFL and closer than 500 mm to an internal corner. Door release buttons will need to be large format switches (35 mm x 35 mm rocker style switches) or a 'mushroom' push button type.

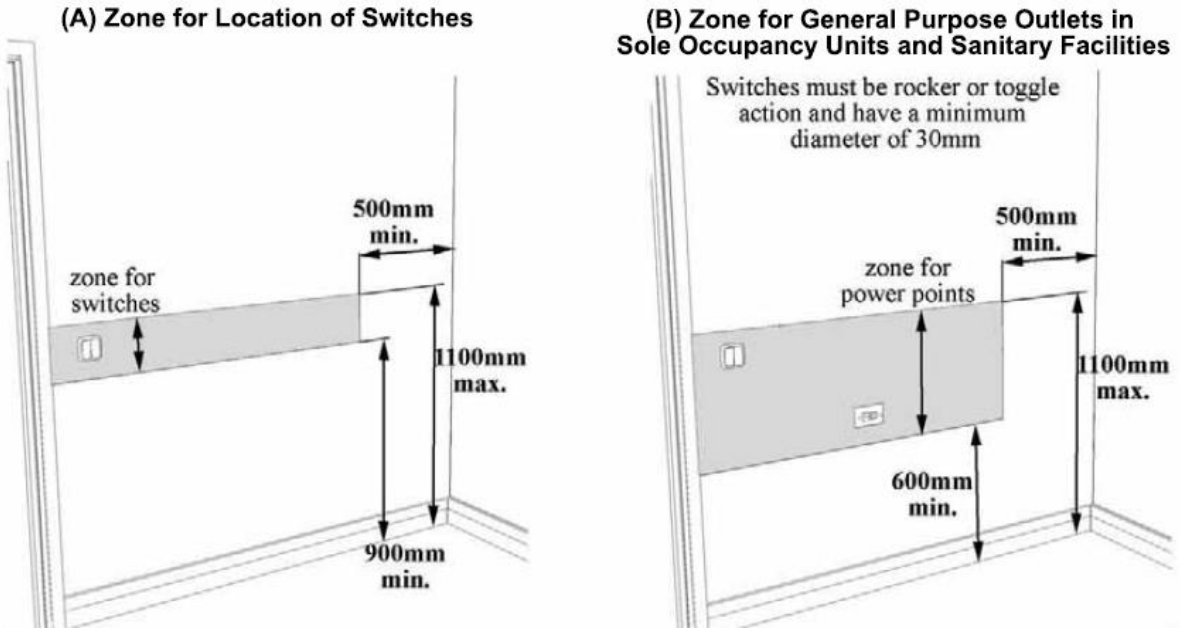


Figure No. 15 – Zones for the location of switches and power outlets

Accessible Fixtures & Fittings:

- All fixtures, fittings and door hardware are to comply with Section 13.5 & Section 14 of AS1428.1-2009.

  In this instance, toggle style light switches and GPO outlets etc. should be provided within all patient care areas and to all accessible sanitary facilities (unless automatic lighting is provided within the sanitary facility)

- Braille tactile signage will be required to be installed throughout the building identifying accessible sanitary facilities, exits and lifts in accordance with the DTS Provisions of the BCA and AS 1428.1.

  Signage to identify any ambulant or accessible sanitary facility is required to be located on the wall on the latch side of door or on the door itself leading to the sanitary facility.

18. Clause D3.6 – Signage

Braille and tactile signage complying the requirements of Specification D3.6 is required to:

- Incorporate the international symbol of access or deafness, as appropriate, in accordance with AS 1428.1 and identify each -

- Sanitary facility; and

- A space with a hearing augmentation system; and

- Identify each door required by **E4.5** (door to be provided with exit signs) to be provided with an exit sign and state –

  a. ***"Exit"***; *and*
  b. ***"Level"*** *followed by the floor number*

- Signage including the international symbol for deafness in accordance with AS 1428.1 must be provided within a room containing a hearing augmentation system identifying –

  - The type of hearing augmentation; and

  - The area covered within the room; and

  - If receivers are being used and where the receivers can be obtained

- Signage in accordance with AS 1428.1 must be provided for accessible unisex sanitary facilities to identify the facility is suitable for left or right-handed use.

- Signage to identify an ambulant accessible sanitary facility in accordance with AS 1428.1 must be located on the door of the facility.

- Where a pedestrian entrance is not accessible, directional signage incorporating the international symbol of access, in accordance with AS 1428.1 must be provided to the location of the nearest accessible pedestrian entrance.

- Where a bank of sanitary facilities is not provided with an accessible unisex sanitary facility, directional signage incorporating the international symbol of access in accordance with AS 1428.1 must be placed at the location of the sanitary facilities that are not accessible, to direct a person to the location of the nearest accessible unisex sanitary facility.
  Signs identifying a door required by E4.5 to be provided with an exit sign must be located:

  i. On the side that faces a person seeking egress; and

ii. On the wall on the latch side of the door with the leading edge of the sign located between 50mm and 300mm from the architrave; and

iii. Where (ii) is not possible, the sign may be placed on the door itself.

The provision of Braille and tactile exit signage with the message, *for example*. *"**Exit - Level 1**"* assists people with vision impairment to orientate themselves in case of an emergency situation and to find an exit and evacuate the area in a safe and equitable manner.

Location of Braille and Tactile Signs

Braille tactile signage including symbols, numbering and lettering is required to be designed in accordance with the following: -

- Braille and tactile components of the sign must be located not less than 1200 - 1600mm above the ground or floor surface.
- Signs with single lines of characters are to have the line of the tactile characters not less than 1250 mm and not more than 1350 mm above the floor or ground surface.
- Signs identifying rooms containing features or facilities listed in D3.6 are required to be located –
  - On the wall on the latch side of the door with the leading edge of the sign located between 50 mm and 300 mm from the architrave; and
  - Where the above is not possible, the sign is permitted to be located on the door itself.
- Signs identifying a door required to by Clause E4.5 to be provided with an exit must be located –
  - On the side that faces a person seeking egress; and
  - On the wall on the latch side of the door with the leading edge of the sign located between 50 mm and 300 mm from the architrave; and

The Braille & tactile egress signage is to be located adjacent or on (see above) each door that: -

- Provides direct egress into a fire isolated stairway
- Provides direct discharge from the storey into a passageway or lobby (airlock) associated with the fire isolated stairway
- Provide direct discharge from a fire isolated stairway to open space (discharge door)
- Horizontal exit doors providing egress into an adjoining fire compartment
- Provides direct egress to a roadway or open space

The below signage is an example of what will be required: -



Signage Specification: -

- Tactile characters must be raised or embossed to a height of not less than 1 mm and not more than 1.5 mm.
- Title case must be used for all tactile characters, and

- Upper case tactile characters must have a height of not less than 15 mm and not more than 55 mm, except that the upper-case tactile characters on a sign identifying a door required by Clause E4.5 to be provided with an exit sign must have of not less 20 mm and not more than 55 mm; and

- Lower case tactile characters must have a minimum height of 50% of the related uppercase characters.

+ Tactile characters, symbols, and the like, must have rounded edges.

+ The entire sign, including any frame, must have all edges rounded.

+ The background, negative space or fill of signs must be of matt or low sheen finish.

+ The characters, symbols, logos and other features on signs must be matt or low sheen finish.

+ The minimum letter spacing of tactile characters on signs must be 2 mm.

+ The minimum word spacing of tactile characters on sigs must 10 mm.

+ The thickness of letter strokes must not be less than 2 mm and not more than 7mm.

+ Tactile text must be left justified, except that single words may be centre justified.

+ Tactile text must be Aerial typeface

19. Clause D3.8 – Tactile Indicators

Tactile ground surface indicators (and bollards) will be required to be installed to the set down area which is on the same level as the carriageway within Gloucester House Drive along with the external stairway within the landscaped area in accordance with AS 1428.4.1.

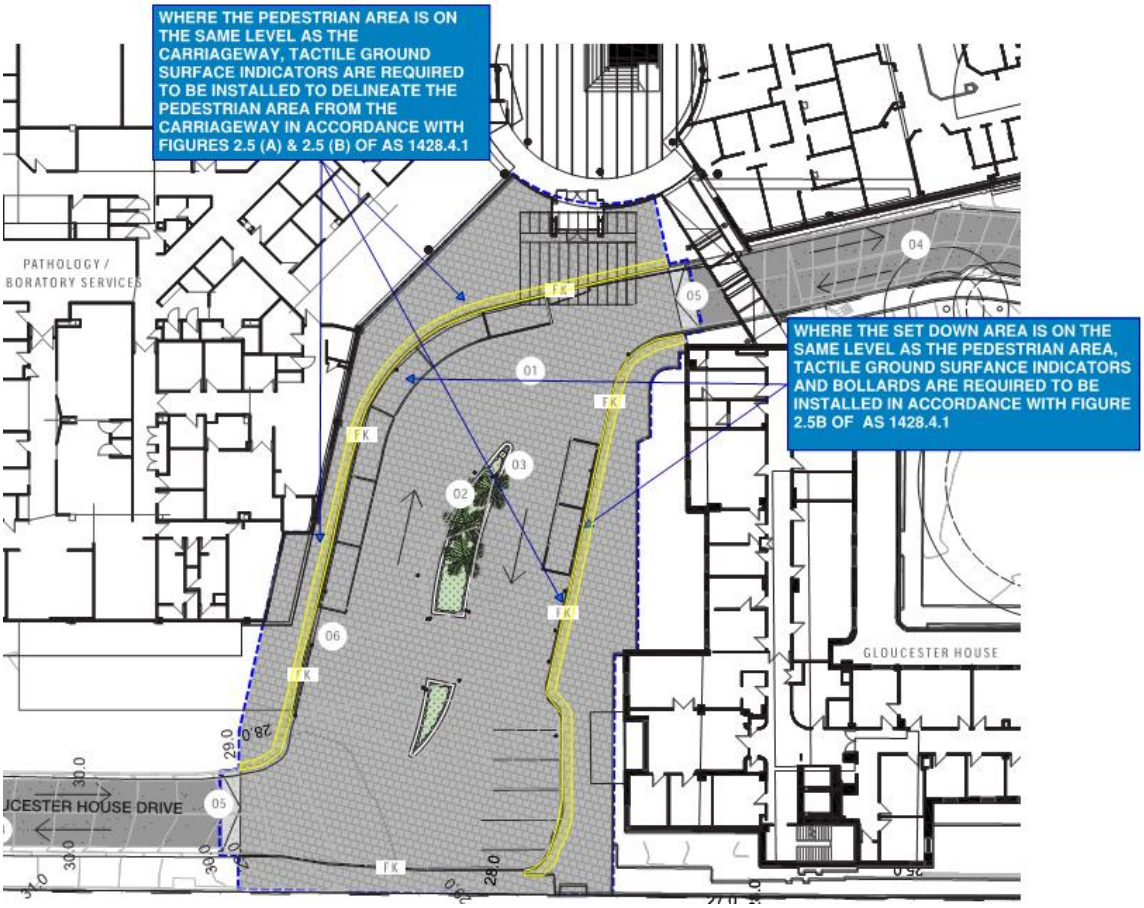


Figure No. 16 – Set down are adjoining the road carriageway to Gloucester House Drive

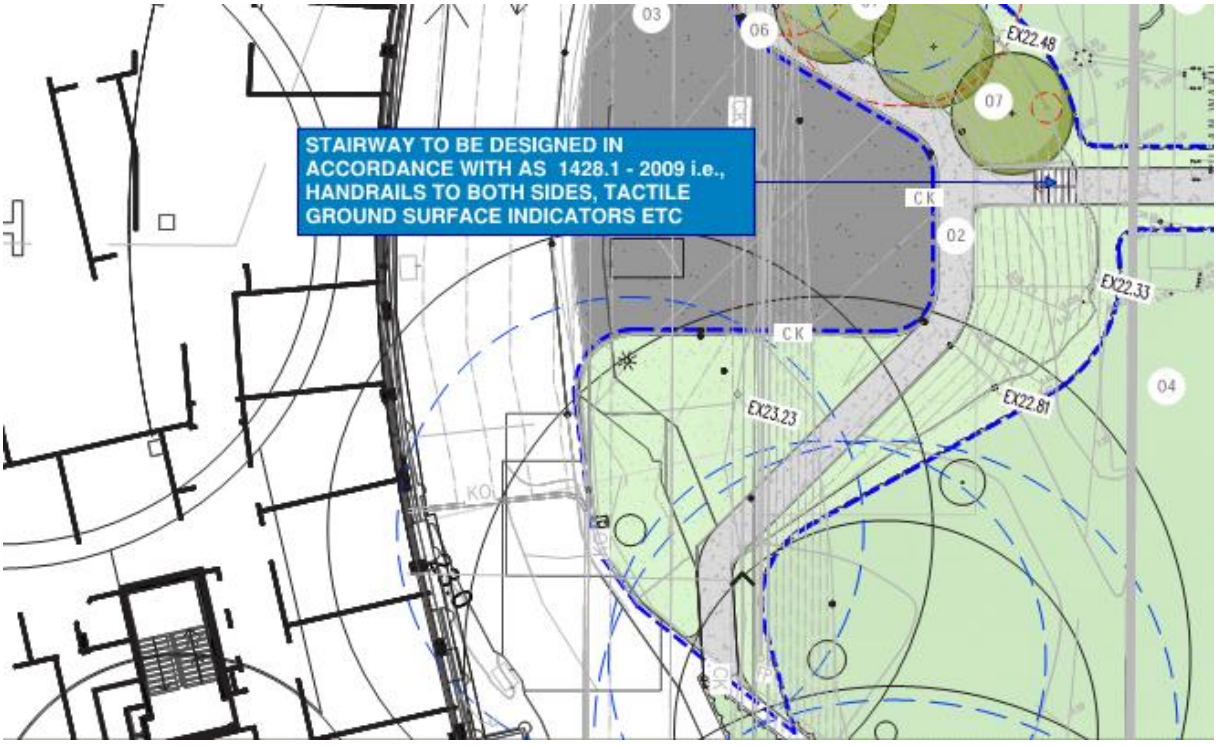


Figure No. 17 – Tactile ground surface indicators required to be installed to external stairway

Tactile ground surface indicators are not required to be installed to the stairway within the Link Bridge on the basis that the handrails are provided with domed buttons which are installed 150 mm from the end of the handrail.

20. Clause D3.12 – Glazing on An Accessway

- On an accessway where there is no rail, handrail or transom provided to glazed walls and doors which may be mistaken as an opening must be clearly line marked in accordance with the following:
  - Must be clearly marked for the full width of the glazed element,
  - Must be a solid and non-transparent contrasting line,
  - The contrasting line must have a minimum of 30% luminance contrast when viewed against the floor surface or surfaces within 2m of the glazing of the opposite side.
  - Must be not less than 75mm in width,
  - The lower edge of the contrasting line must be located between 900 mm and 1000 mm above the finished floor level

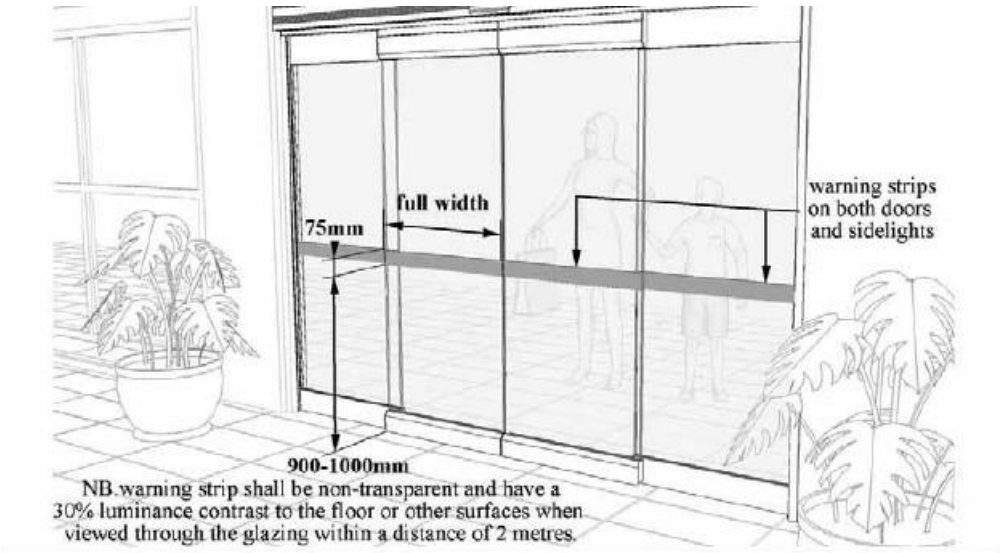


Figure No. 18 – Warning Strips to Full Height Glazing

SECTION E – SERVICES AND EQUIPMENT

PART E1 – FIRE FIGHTING EQUIPMENT

21. Clause E1.3 – Fire Hydrants

Fire Hydrants

The proposed works will have no impact on existing fire hydrant coverage.

Notwithstanding the above, fire hydrant coverage to Level 4 of the Link Bridge should be verified by the Fire Services Consultant.

Building and Structure Clearance Height

In accordance with the FRNSW Policy No. 4 ‘Guidelines for Emergency Vehicle Access’, an unobstructed clearance height of 4.5 m is to be maintained above all access ways including clearance from building construction, archways, gateways/doorways, and overhanging structures (e.g., ducts, pipes, sprinklers, walkways, signs, and beams).

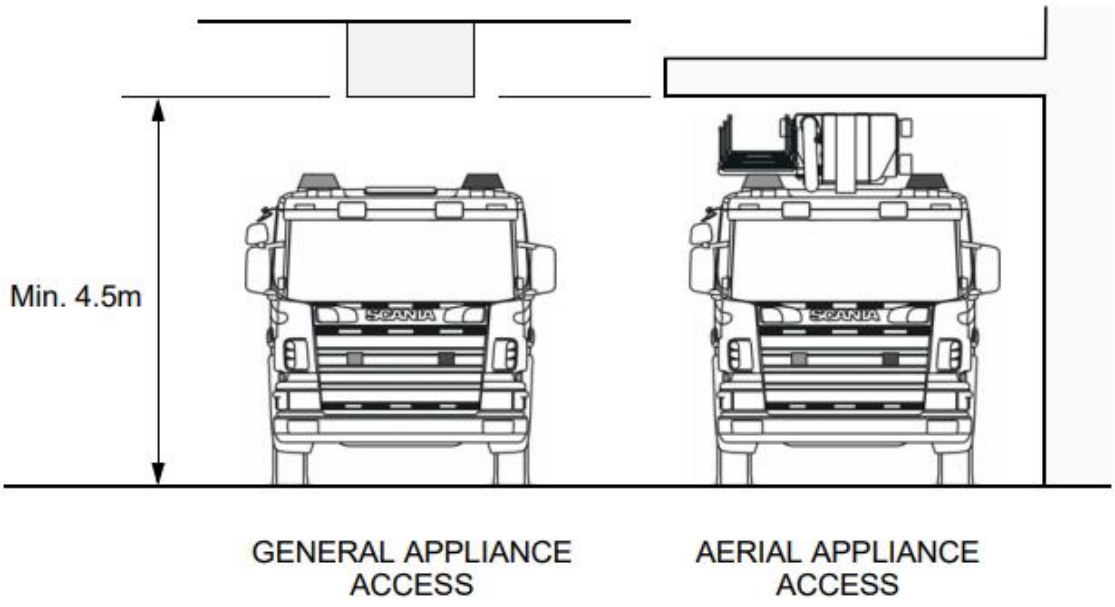


Figure No. 19 – Required clearance below buildings and structures as detailed in FRNSW Policy No. 4

It is noted that the Architectural Drawings have indicated a minimum clearance height of 4500 mm being provided below the Link Bridge as detailed in the figure below.

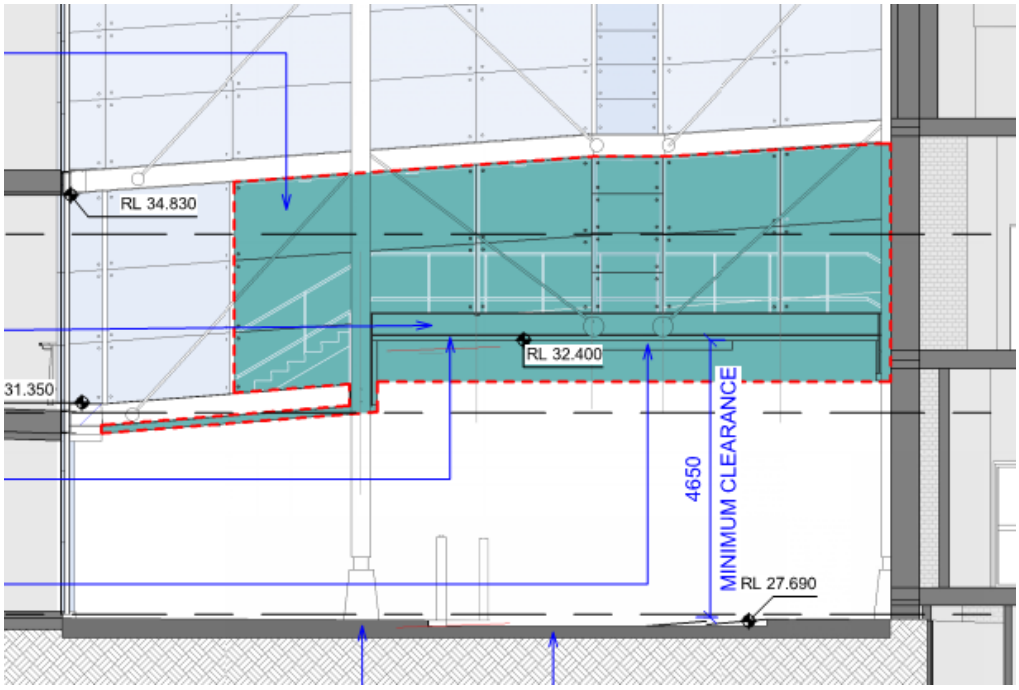


Figure No. 20 – 4500 mm clearance documented below the Link Bridge structure

22. Clause E1.4 – Hose Reels

Fire Hose Reels

The proposed works will have no impact on existing fire hydrant coverage.

Notwithstanding the above, fire hose reel coverage to Level 4 of the Link Bridge should be verified by the Fire Services Consultant.

23. Clause E1.5 – Sprinklers

Sprinklers

The proposed works will have no impact on existing fire sprinkler coverage.

Notwithstanding the above, sprinkler coverage to Level 4 of the Link Bridge in addition to below the Link Bridge should be verified by the Fire Services Consultant.

PART E2 – SMOKE HAZARD MANAGEMENT

24. Clause E2.2 – Smoke Hazard Management

Automatic Fire Detection & Alarm System

The existing Automatic Fire Detection & Alarm System is be maintained throughout the Link Bridge.

PART E4 – VISIBILITY IN AN EMERGENCY, EXIT SIGNS AND WARNING SYSTEMS

25. Clause E4.2 – Emergency Lighting

Emergency Lighting is required to be maintained throughout the Link Bridge.

26. Clause E4.5 – Exit Signs

Exit signs are to be maintained throughout the Link Bridge so as to direct occupants to the alternative exits.

27. Clause E4.9 – Sound System and Intercom System for Emergency Purposes

The existing EWIS System is to be maintained throughout the Link Bridge.

SECTION F – HEALTH & AMENITY

PART F1 – DAMP AND WEATHERPROOFING

28. Clause F1.0- Deemed to Satisfy Provisions

Performance Requirement FP1.4 relating to the prevention of water through the external is required to be demonstrated as being complied. There is no specific DtS Clause for this Performance Requirement in respect of external walls.

In this instance a Performance Solution Report is required to be prepared to demonstrate that any new external walls and roof weatherproofing system meets Performance Requirement FP1.4 and will prevent the penetration of water through the external walls.

29. Clause F1.4 – External above Ground Membranes

All waterproofing membranes to external areas are to be designed and constructed in accordance with AS 4654 Parts 1 & 2. Particular attention is required to doorways leading to external areas where there is a level threshold.

This is not just a waterproofing issue but also an architectural design issue where grated drains may be required to be installed in front of the door where a step down is not provided.

PART F3 – ROOM HEIGHTS

30. Clause F3.1 – Height of Rooms

The floor to ceiling heights throughout shall comply with the following:

+ Passageway, corridor, or the like – 2400mm

Link Bridge Ceiling Height

All corridors, passageway within a Class 9a Hospital are required to have a minimum ceiling height of 2400 mm.

As a result of the proposed stairway to be constructed within the Link Bridge, the existing ceiling height within the Link Bridge may be reduced below the minimum 2400 mm. Any reduction below a minimum ceiling height of 2400 mm will be required to be subject of a Performance Solution.

31. Clause F4.4 – Artificial Lighting

Artificial lighting to the new works is required in accordance with AS 1680.0 - 2009.

Artificial lighting is required to be maintained within the Link Bridge.

32. Clause F4.5 – Ventilation of Rooms

Mechanical Ventilation and Air Conditioning will be required to be maintained to the Link Bridge in accordance with DTS Provisions of the BCA and AS 1668.2 - 2012.

SECTION J – ENERGY EFFICIENCY

33. Parts J1 – J8

The energy efficiency provisions of Section J are applicable to the new building works.

In this regard Parts J1 - Building Fabric, J2 - External Glazing, J3 - Building Sealing and J5 - Air Conditioning and Mechanical Ventilation, Part J6 - Artificial Lighting and Power, and Part J7 - Hot water supply & Part J8 – Access for Maintenance is required to be provided.

If the proposed design will not comply with the DtS provisions of the BCA, then a JV3 Assessment will be required to be undertaken to demonstrate compliance with the Performance Requirements of the BCA.

E. CONCLUSION

This report contains a BCA2019 and Access to Premises Standards 2010 assessment of the referenced REF2 Issue Architectural Drawings prepared by Jacobs for the proposed early works within the RPA Hospital campus against the requirements of the Building Code of Australia 2019 (BCA).

Arising from our assessment we are satisfied that the proposed works can satisfy the requirements of the BCA2019 and the Access to Premises Standards 2010 if the works are designed and constructed in accordance with the requirements of this BCA Report.

Targeted Soil Investigation Report

Royal Prince Alfred Hospital, East Campus

80022026



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Prepared for

TSA Management

22 June 2022

Cardno

now

Stantec

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Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.

Executive Summary

Cardno has completed a Targeted Soil Investigation Report for the for the landscaped area east of Royal Prince Alfred Hospital (RPA) loading dock (Area B) and Gloucester House Plaza (Area C); both of which are located within the East Campus of the RPA building, Camperdown, NSW ("the site"). The investigation was considered limited in its extent and did not constitute a Detailed Site Investigation as defined in the NSW legislative framework.

Upon completion of the agreed scope of works the following was concluded:

Area B and Area C

- Area B and Area C are proposed for various forms of development. This investigation was undertaken to preliminarily identify contamination within the top 1m of soil profile and identify potential environmental contamination constraints to the development. At the time of preparing this report Cardno understood that construction activities requiring ground disturbance were limited to the shallow fill (~1 m BGL) within Areas B and C.
- The investigation followed on from various previous investigation completed by Cardno (2022a, 2022b and 2022c). The investigation which contributed the most information to this investigation was the Preliminary Site Investigation report (Cardno, 2022b), which comprised of desktop searches of the East Campus of the RPA building and soil sampling along the northern and eastern boundary of the East Campus.

  Given that Areas B and C form part of "the site" that was investigated in the Cardno (2022b) report, and the uses of the areas that have been investigated are that of landscaping and driving bay; it was considered that no additional desktop searches were required. Based on the information provided in Cardno (2022b) report, the specific activities of relevance to potential contamination for the areas of investigation include demolition, filling, possible pesticide spraying and leakage from parked motor vehicles.
- Soil samples were collected from ten boreholes that were drilled using a hand auger. The boreholes were advanced to a maximum depth of 1m BGL or refusal, whichever one was encountered first. Fill material was identified to extend to the maximum depth of drilling (1.1 mBGL). Anthropogenic materials in fill were not observed with the exception of roadbase underlying concrete and organic matter such as roots.
- The soils encountered and sampled during the investigation are preliminarily classified as General Solid Waste (non-putrescible), however, we note that the level of investigation completed does not enable off-site disposal of materials.

Area B - Landscape and Loading Dock

- Soils encountered across Area B generally consisted of:
  - Fill consisting of Silty Clay, and Clay between 0.0 m and 1.0 m (maximum depth of borehole), overlying;
  - Possible residual soil, comprising of silty CLAY, between 0.8 m to 1.1 m (maximum depth of borehole).
- A limited number (3) of soil samples at two (2) locations contained contaminant concentrations above the applicable ecological Tier 1 guideline values for copper and benzo(α)pyrene; the exceedances were considered localised and not wide spread. These exceedances were not considered to be a cause of significant environmental concern. As such the soil within the top 1m profile of the tested area (Area B) is suitable to remain onsite and/or reused under hardstand flooring. Where these soils are to be used in landscaped areas there may be some residual impacts to plantings.
- Traces of OCPs (DDE and DDT) were detected in fill sample BH320_0.0-0.2 (0.08 mg/kg and 0.06 mg/kg respectively), but concentrations were below the adopted NEPC 2013 Tier 1 human health screening criteria. These detections indicate historic use of pesticides at the site.
- All soil samples were below the adopted NEPC 2013 Tier 1 human health screening criteria for the analytes tested. Asbestos was not detected in any soil samples submitted for laboratory testing. Soil analytical results were representative of conditions at the specific locations where samples were collected.

Area C - Gloucester House Plaza

- Soils encountered across Area C generally consisted of:
  - Asphaltic concrete / concrete paver and roadbase gravel, between 0.00 m and 0.45 m;
  - Fill consisting of Silty Sand, between 0.0 m and 0.7 m.

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- Exceedances of the adopted human health criteria were limited to one fill sample collected from borehole BH325, which contained a benzo(α)pyrene TEQ concentration marginally above the HIL-B and HIL-C criteria. Based on all the soil analysis this is not considered to be wide spread.
- No other exceedances of the adopted NEPC 2013 Tier 1 human health screening criteria were observed and asbestos was not detected in any soil samples submitted for laboratory testing. However, Cardno note that asbestos has been previously found within the undercroft area located to the west of Area C (Cardno, 2022a).
- One soil sample contained contaminant concentrations above the applicable ecological Tier 1 guideline value for benzo(α)pyrene. The exceedance of the ecological criteria was found to be localised and not a cause for environmental concern.

Based on the findings of this assessment and with reference to the purpose and objectives of this investigation, the following recommendations were made:

Area B - Landscape and Loading Dock

- Whilst the laboratory data and observations gathered during the preliminary investigation generally indicated the absence of contaminants in soil that would constrain the future development, an extensive fill profile was encountered across Area B and presence of contamination including asbestos cannot be ruled out. As such, it is recommended that excavation works are conducted in accordance with a Construction Environmental Management Plan and an Unexpected Finds Protocol.
- It is recommended that the soils located within the vicinity of boreholes BH318 and BH320, which exceeded the ecological criteria; are used beneath hardstand areas.
- Any material being removed from site (including virgin excavated natural materials or VENM) must be classified for off-site disposal in accordance the EPA (2014) Waste Classification Guidelines.

Area C – Gloucester House Plaza

- The vertical and lateral extent of the benzo(α)pyrene TEQ and benzo(α)pyrene human health and ecological contamination detected at BH325 (Area C) should be further assessed to confirm the volume of contaminated soil and determine the management strategy for the soil. Additional testing could also be used to apply statistical analysis to confirm the contamination.
- It is recommended that excavation works are conducted in accordance with a Construction Environmental Management Plan and an Unexpected Finds Protocol.
- Any material being removed from site (including virgin excavated natural materials or VENM) must be classified for off-site disposal in accordance the EPA (2014) Waste Classification Guidelines.

DRAFT

Table of Contents

Abbreviations vii
1 Introduction 1
1.1 Background and Project Context 1
1.2 Purpose and Objectives 3
1.3 Scope of Works 3
1.4 Legislation and Guidelines 4
2 Area B and C Identification 5
2.1 Area B and C Details 5
2.2 Surrounding Land Use 5
2.3 Regional and Overall Site Settings 5
2.4 Area B and C Description 6
3 Previous Report Review 7
3.1 Cardno now Stantec (2022a), Report on Contamination Assessment Report – Delineation Sampling Royal Prince Alfred Hospital, East Campus 7
3.2 Cardno now Stantec (2022), Report on Preliminary Site Investigation Report Royal Prince Alfred Hospital, East Campus 8
3.3 Cardno now Stantec (2022c), Remediation Action Plan, Royal Prince Alfred Hospital, East Campus 9
3.4 Area B and Area C History Review 9
4 Conceptual Site Model 10
4.1 Preliminary CSM 10
4.2 Data Gaps 11
5 Data Quality Objectives 12
5.1 Data Quality Objective 12
5.2 Data Quality Indicators 14
6 Assessment Criteria 16
6.1 Soil Contamination Assessment Criteria 16
7 Methodology 18
7.1 Site Investigation Program 18
8 Results 20
8.1 Soil Observations 20
8.2 Soil Laboratory Analysis 21
8.3 Data Quality Assessment 23
9 Site Characterisation 24
9.1 Soil Contamination 24
9.2 Preliminary Waste Classification Assessment 25
9.3 Conceptual Site Model Review 25
9.4 Data Gaps and Uncertainties 26
10 Conclusions and Recommendations 27
10.1 Recommendations 28

DRAFT

11 References 29
12 Limitations 30

Appendices

Appendix A Figures
Appendix B Photographic Log
Appendix C Data Summary Tables
Appendix D Borehole Logs and PID Calibration Certificate
Appendix E Laboratory Certificates
Appendix F QA/QC Results

Tables

Table 2-1 Area B and C Details 5
Table 2-2 Surrounding Land Use 5
Table 2-3 Site Setting Information 6
Table 2-4 Inspection Details 6
Table 4-1 Preliminary Conceptual Site Model 11
Table 5-1 Data Quality Objectives 12
Table 5-2 Data Quality Indicators 14
Table 6-1 Soil Assessment Criteria 16
Table 6-2 Soil Ecological Investigation Criteria 17
Table 7-1 Investigation Activity Summary 18
Table 8-1 Subsurface Conditions Summary 20
Table 8-2 Summary of Soil Analytical Results 21
Table 9-1 Revised Conceptual Site Model – Area B (Landscape and Loading Dock) 25
Table 9-2 Revised Conceptual Site Model – Area C (Gloucester House Plaza) 26
Table 12-1 Assessment of Field Data Quality 41
Table 12-2 Field QA/QC Collection Summary 42
Table 12-3 Assessment of Laboratory Data Quality 42

DRAFT

Abbreviations

ACM	Asbestos Containing Material
AST	Above Storage Tank
BoM	Bureau of Meteorology
BTEX	Benzene, toluene, ethylbenzene and xylenes
CBD	Central Business District
CLM	Contaminated Land Management
CSM	Conceptual Site Model
DBYD	Dial Before You Dig
DCP	Development Control Plan
DQI	Data Quality Indicators
DQO	Data Quality Objectives
EIL	Ecological Investigation Level
EPA	Environmental Protection Authority
ESL	Ecological Screening Level
HIL	Health Investigation Level
HSL	Health Screening Level
km	kilometres
LEP	Local Environmental Plan
LGA	Local Government Authority
LOR	Limit of Reporting
m	metres
mAHD	metres Australian Height Datum
mBGL	metres Below Ground Level
NATA	National Associated Testing Authority
NEMP	National Environmental Management Plan
NEPC	National Environmental Protection Council
NEPM	National Environmental Protection Measure
NSW	New South Wales
OCP	Organochlorine Pesticides
OEH	Office of Environment and Heritage
OPP	Organophosphorus Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PID	Photoionization Detector
PoEO	Protection of the Environment Operations
Ppm	parts per million
QA/QC	Quality Assurance / Quality Control
RL	Reduced Level

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RPD	Relative Percentage Difference
SEPP	State Environmental Planning Policies
SPR	Source – Pathway - Receptor
SWL	Static / Standing Water Level
SWMS	SafeWork Method Statement
TfNSW	Transport for New South Wales
TRH	Total Recoverable Hydrocarbons
UST	Underground Storage Tanks
VOC	Volatile Organic Compounds

DRAFT

1 Introduction

Cardno (NSW/ACT), now Stantec Pty Ltd ("Cardno") was engaged by TSA Management ("the client") to complete a Targeted Soil Investigation Report for the landscaped area east of Royal Prince Alfred Hospital (RPA) loading dock and Gloucester House Plaza; both of which are located within the East Campus of the RPA building, Camperdown, NSW (the site).

The site location is depicted on **Figure 1** and the site layout shown on **Figure 2.1 and 2.2** of **Appendix A**. The areas of investigation form a small part of the site and as such are referred herein as Area B (landscaped area east of RPA loading dock) and Area C (Gloucester House Plaza).

The scope of work for this investigation was completed in accordance with Cardno's proposal dated 15 June 2022, and it follows on from a previous investigation completed by Cardno in March 2022:

- Cardno (2022a). *Contamination Assessment Report – Delineation Sampling, Royal Prince Alfred Hospital*, Job Reference 80022026_R002_Undercroft Delineation, Revision 0, dated 23 February 2022;
- Cardno (2022b). *Preliminary Site Investigation Report, Royal Prince Alfred Hospital, East Campus*, Job Reference 80022026, Revision A, dated 3 March 2022; and
- Cardno (2022c). *Remediation Action Plan, Royal Prince Alfred Hospital, East Campus*, Job Reference 80022026 R004 Undercroft, Revision 0, dated 14 April 2022.

Based on the information provided by the client it is understood that the works proposed within the areas of investigation (Area B and Area C as outlined in **Figures 2.1 and 2.2**, **Appendix A**) will require excavation of soils to maximum depths of 1mBGL.

1.1 Background and Project Context

The RPA campus is located in Sydney's inner west suburb of Camperdown. It is situated between Sydney University to the east and the residential area of Camperdown to the west. The campus is divided by Missenden Road, which runs north to south dividing the campus into two distinct portions, called East Campus and West Campus as show in **Figure 1-1** below.

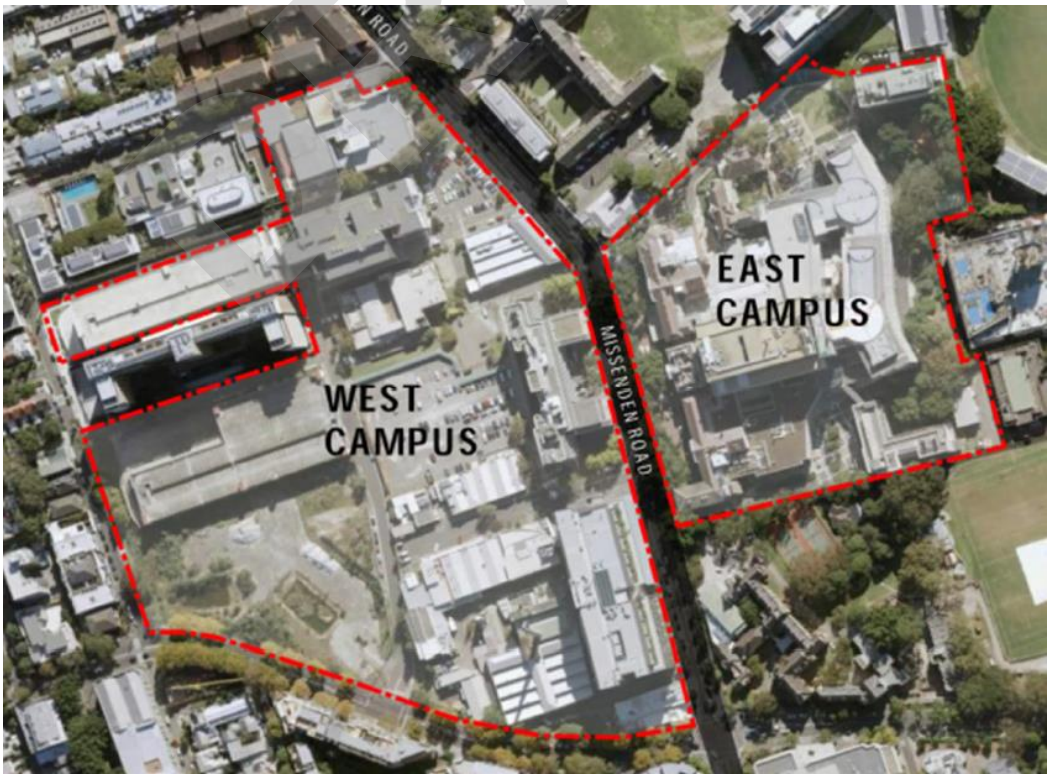


Figure 1-1 RPA Hospital Campus

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The proposed development zone is situated within the east campus as shown in the concept design plan prepared by Jacobs (Ref: IA0251300- MW- AR- DRG-0102(1)). The indicative lateral extent of the proposed development building footprint and proposed development testing zone are illustrated below on **Figure 1-2** and will encompass:

- The building footprints of the new proposed development;
- Areas between the existing buildings and new proposed development;
- John Hopkins Drive and Lambie Dew Drive due to potential civil works for road realignment/ enhancements and service diversions;
- Gloucester House Drive due to potential civil works for new in-ground services/ services connections;
- Existing Building 89 which may be subject to vertical expansion and refurbishment works to some levels;
- New Mortuary drop off within the access lift between levels 1 and 2 of Building 89;
- Relocation of the existing roller shutter door on the eastern side of the Clinical Services Building; and
- Some departments within some levels of existing Buildings 63, 75, 94 and 95 which may be subject to refurbishment works



Figure 1-2 Proposed Development Zone – East Campus

The planning pathway for the project will involve the preparation of a State Significant Development Application (SSDA). The Early Works and Enabling Works will enable the preparation of a Review of Environmental Factors (REF) in accordance with Part 5 of the Environmental Planning and Assessment Act (EP&A Act). The concept design drawing provided to Cardno at the time of preparing this report is provided below in **Figure 1-3**.

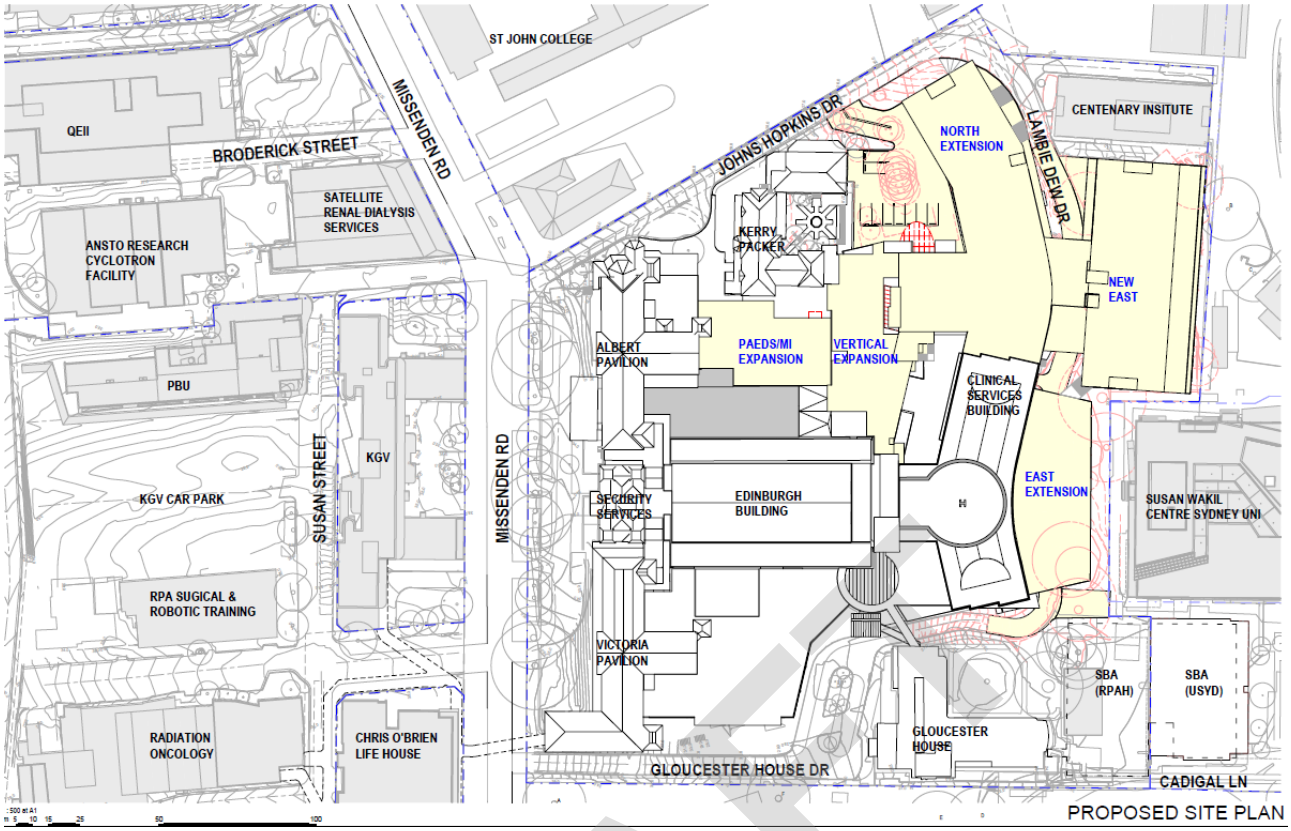


Figure 1-3 Concept Design for Stage 1 Redevelopment

1.2 Purpose and Objectives

The purpose of this assessment was to complete a targeted soil investigation within two areas of the site designated by Cardno as Area B and Area C (to simplify discussion) by means of soil sampling and laboratory analyses to assess for contamination potential within those areas.

Cardno's objectives during this assessment were to:

- Evaluate the potential for contamination to be present based on previous environmental investigations, anecdotal and documentary evidence of possible sources of contamination;
- Preliminarily Investigate the degree of potential contamination within the top metre of the soil profile through a targeted intrusive investigation and laboratory analysis of soil samples;
- Provide a preliminary and indicative waste classification for the soils encountered at discrete borehole locations; and
- Make recommendations for appropriate management should contamination be confirmed.

The investigation did not constitute a Detailed Site Investigation as defined in the NSW legislative framework.

1.3 Scope of Works

The scope of works carried out to meet the objectives (outlined above in **Section 1.2**) of this investigation is summarised below and a more detailed description of the fieldwork methodology is provided in **Section 7**:

- Preliminaries:
  - A review of dial-before-you-dig (DBYD) plans of existing underground services on site;
- Desktop Study:
  - A review of previous environmental investigation report completed by Cardno (2022);
- Fieldwork:
  - A kick-off toolbox meeting with sub-contractors and Cardno's environmental team, discussing works to be completed, risks and safety measures (as outlined in the SWMS);
  - Undertake a site walk-over to identify potential sources and indicators of contamination and potential

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environmental or human receptors;

- Drilling a total of nine (9) boreholes (BHs) across Area B (4 BHs) and Area C (5 BHs) in a systematic (triangular) grid pattern using a hand auger. Boreholes were advanced to maximum depth of 1m or refusal, whichever was first encountered;
- Collection of soil samples from both the fill and natural soil profiles from each borehole;
- Preliminary screening of the collected soil samples for volatile organic compounds (VOCs) using a calibrated Photo-ionisation Detector (PID) along with visual and olfactory observations;
- Logging of the soil profile by the environmental scientist supervising the drilling. The logging included a visual and olfactory assessment for indications of contamination such as sheen, staining, discolouration and odour;
- Collected soil samples were submitted to a National Associated Testing Authority (NATA) accredited laboratory for analysis of relevant analytical parameters determined by investigation findings. Specific contaminants and parameters are specified in **Section 7**;

> Reporting:

- Review of laboratory analytical results in consideration of the applicable criteria and guidelines made or approved by NSW EPA; and
- Preparation of a Target Soil Investigation Report, detailing the findings, conclusions and recommendations (if any) from the assessment.

1.4 Legislation and Guidelines

The scope of the assessment has been developed in accordance with the following guidelines and legislation:

> ASSMAC Acid Sulfate Soils Assessment Guidelines, Acid Sulfate Soils Management Advisory Committee, August 1998 (ASSMAC 1998);

> NEPC National Environment protection (Assessment of Site Contamination) Measure 1999. National Environmental Protection Council (NEPC 2013);

> NSW Department of Urban Affairs and Planning (1998) Managing Land Contamination: Planning Guidelines: SEPP 55 Remediation of Land, 1998 (SEPP 55);

> NSW EPA Consultants Reporting on Contaminated Land: Contaminated Land Guidelines. New South Wales Environment Protection Authority, April 2020, Updated May 2020 (NSW EPA 2020);

> NSW EPA Waste Classification Guidelines, Part 1: Classifying Waste (NSW EPA 2014); and

> NSW EPA Contaminated Sites Sampling Design Guidelines. New South Wales Environment Protection Authority (EPA), September 1995 (NSW EPA 1995).

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2 Area B and C Identification

2.1 Area B and C Details

Details related to the areas of investigation included in **Table 2-1**. An aerial view of each of the areas is presented in **Figure 2**, **Appendix A**.

Table 2-1 Area B and C Details

Details	Comments
Address	RPA Hospital – John Hopkins Drive and Lambie Dew Drive, Camperdown NSW
Applicable Lot and Deposited Plan	Lot 1000 DP 1159799
Area B current land use and total area	Landscaping. Total area: 490m^2. Area was based on TTW drawing titled *Early Works Ref 2 Proposed Change In Level*s Lambie Dew Drive South, dwg no. RPA-CIV-TTW-DRG-EW-XX-00, RevB, dated 4 March 2022; provided by the Client.
Area C current land use and total area	Landscaping and as a hospital patient drop off point. Area is predominantly paved with the landscaping area located in the central portion. Total area: 686m^2. Area was based on TTW drawing titled *Early Works Ref 2 Proposed Change In Level*s Lambie Dew Drive South, dwg no. RPA-CIV-TTW-DRG-EW-XX-00, RevB, dated 4 March 2022; provided by the Client.
Proposed land use	To Cardno's knowledge the land uses will remain consistent with those listed above.
Local Government Authority (LGA)	City of Sydney Local Government Area
Current zoning (Sydney Local Environmental Plan 2012)	SP2: Infrastructure
Site coordinates	-33.8893087,151.1831230

2.2 Surrounding Land Use

The land uses immediately surrounding each of the areas are summarised below in **Table 2-2**. The areas of investigation and surrounding land uses are shown in **Figure 2** in **Appendix A**.

Table 2-2 Surrounding Land Use

Direction	Area B Land Use or Activity	Area C Land Use or Activity
North	Lambie Drew Drive with hospital infrastructure further north	RPA hospital building with Lambie Drew Drive further north
East	Lambie Dew Drive with RPA Chapel to the north east and University of Sydney infrastructure further east	Gloucester House with the grounds of St Andrews College further east
South	RPA hospital building with the grounds of St Andrews College further south	Gloucester Drive with the grounds of St Andrews College further south
West	RPA hospital building with Missenden Road further west	RPA hospital building with Missenden Road further west

2.3 Regional and Overall Site Settings

Site setting information, as listed within publicly available data sets, is summarised in **Table 2-3**. Given that the areas of investigation form part of the overall RPA Hospital site, the information below is representative of Areas B and C.

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Table 2-3 Site Setting Information

Item	Details
Regional Soil Landscape	The NSW DPIE *eSPADE* v2.1 website indicated that the site overlies Blacktown (bt) residual soil landscape. Soils within the Blacktown landscape consisted of shallow to moderately deep (<100 cm) red and brown podzolic soils on crests, upper slopes and well drained areas, whilst deep yellow podzolic soils and soloths are evident on lower slopes and in poor drainage areas.
Regional Geology	The Sydney 1:100 000 Geological Map, Herbert C, 1983, illustrates that the subject site ins underlain by Ashfield Shale (Rwa) of Wianamatta Group from Middle Triassic period of Mesozoic era. The map shows the site is underlain by Ashfield Shale (Rwa) which is charactered as Black to dark-grey shale and laminite.
Regional Groundwater	The WaterNSW Real Time Water Data Portal was accessed on 16 February 2022 and registered groundwater bores within a 500 m radius of the site. The five nearest bores included: ▪ GW116424 – no further information available; ▪ GW116421 – no further information available; ▪ GW116422 – no further information available; ▪ GW109230 – installed as a private bore in 2008 with a final depth of 1.80m BGL. The listed intended purpose is as a monitoring bore; and ▪ GW109231 – installed as a private bore in 2008 with a final depth of 3.2m BGL. The listed intended purpose is as a monitoring bore.
Surface Water Bodies	The nearest surface water body is Johnstons Creek, which is located approximately 1.6 km north of the site and discharges to Jacksons Bay. The site and surrounds are mostly paved and surface water flows, and potentially groundwater migration, are inferred to flow north toward Johnstons Creek.
Acid Sulfate Soils	The NSW Government Planning Industry and Environment online mapping tool, eSPADE Version 2.1, indicates that the site is not mapped as being situated within or near an ASS risk area. The nearest mapped ASS risk area is approximately 600m north west in the vicinity of Johnstons Creek.
Salinity	The Soil Landscape Map accessed from the NSW Government Planning Industry and Environment online mapping tool, eSPADE Version 2.1, indicates that the site lies within the Blacktown Soil Landscape, which typically comprises of four dominant soil materials that overlie Wianamatta geology. 'Localised sodicity' and 'localised salinity' are listed as potential soil limitations of the Blacktown Soil Landscape within the four dominant soils comprising of clays and loams. In the absence of surface salting and obvious corrosion on nearby structures, the likelihood of saline soil existing to a level that could constrain future development is considered low.

2.4 Area B and C Description

During the soil investigation completed on the 10 June 2022, an inspection of Area B and Area C was undertaken by an experienced Environmental Scientist. Detailed observations made during the inspection are provided below in **Table 2-4**, whilst photographs taken during the inspection are provided in **Appendix B**.

Table 2-4 Inspection Details

Item	Area B Observations	Area C Observations
Weather Conditions	Overcast with temperatures ranging between 8°C to 18°C (Source: BOM, accessed via http://www.bom.gov.au/climate/dwo/IDCJDW2124.latest.shtml).	
Local slope and drainage features	Based on elevation contours shown on Mecone Mosaic, the ground surface is generally flat and sits at a Reduced Level elevation of approximately RL 24 m Australian Height Datum (AHD). No surface water bodies were observed.	Based on elevation contours shown on Mecone Mosaic, the ground surface generally flat and sits at a RL of approximately RL 28 m AHD. No surface water bodies were observed.
Site surface coverings	Garden beds and landscaped areas.	Garden beds and landscaped areas, comprised a small portion of the investigation footprint, the majority of surface coverings comprise of asphalt pavements.
Other observations	No suspicious odours, potential hazardous materials or underground petroleum storage systems (UPSS) were observed within the areas of investigations. Trees and garden beds generally appeared to be in good condition without evidence of plant stress.	

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3 Previous Report Review

3.1 Cardno now Stantec (2022a), Report on Contamination Assessment Report – Delineation Sampling Royal Prince Alfred Hospital, East Campus

Cardno was engaged by TSA Management to undertake a Contamination Assessment Report for the undercroft area of the Royal Prince Alfred Hospital (RPA) building, bound by John Hopkins Drive and Lambie Dew Drive, Camperdown, NSW (the site), which is situated within the East Campus. The investigation included drilling of nineteen (19) boreholes using a hand auger and crow bar to depths of up to 0.55 m; soil sampling and laboratory testing of selected soil samples.

Key Findings

- Elevated concentrations of benzo(α)pyrene TEQ appear to be limited predominantly to the northern portion of the under croft and correlate to elevated concentrations of heavy end fraction petroleum hydrocarbons, indicating that the likely source of contamination within shallow soil is spillages and/or uncontrolled releases of diesel fuel.
- Statistical analysis of the data gathered during the initial and supplementary soil assessments indicated that potential risk to human health from benzo(a)pyrene TEQ is limited to the location of HA01 and HA03 and the soils surrounding these point locations up to areas where the benzo(a)pyrene TEQ was found to be below the adopted SAC. At HA01 and HA03, the benzo(a)pyrene TEQ concentrations were greater than 250% of the applicable criteria for the current and proposed land use which is considered to be contamination in accordance with NEPC 2013.
- Friable asbestos in the form of asbestos loose fibre bundles (asbestos fines) was laboratory detected in a surface soil sample collected from soil bore HA16. A source of asbestos was not observed during the soil sampling or identified during the HAZMAT (2021) completed in the undercroft, however, several samples were described as containing plaster by Eurofins, which may be indicative of potential poor historical demolition within the undercroft. Asbestos was not detected or observed on any other soils inspected or sampled during the 2021 and 2022 assessments.
- A crystalline formation on the ground surface within the undercroft appeared to have formed from dripping of an overhead pipe. A preliminary assessment of the material indicates that the substance is a residue from high salt content, however, the origin of the liquid is currently unknown. The substance was tested for a broad suite of heavy metals which were not detected at concentrations above the applicable human health screening criteria, however, the source material is not understood and therefore all potential contaminants associated with the crystalline material are not known.

Key Recommendations

- Consistent with Clause 7 of the State Environmental Planning Policy No 55—Remediation of Land, Cardno recommended that a Remediation Action Plan (RAP) be prepared, and the land be remediated prior to the land being redeveloped and used for the intended purpose. The RAP should specify an appropriate remedial approach to address the elevated benzo(α)pyrene TEQ concentrations in shallow soil / rock at HA01 and HA03.
- Petroleum infrastructure associated with the RPA building, for example fuel lines and storage tanks associated with backup power generation, should be subjected to inspection and integrity testing (where systems are found to be inadequate) to ensure no uncontrolled releases of petroleum hydrocarbons are occurring.
- Due to the presence of friable asbestos, the location of soil bore HA16 and the surrounding area should be:
  - Isolated using fencing and signage to prevent interaction with potentially asbestos containing material. Individuals who work within or access the undercroft should also be advised of the exclusion zone;
  - Further investigated to delineate contamination and inform the requirement for remediation;
- Subjected to removal of asbestos contaminated materials following further investigation and delineation, at the earliest point in time, by a suitably SafeWork NSW licensed Class A asbestos removal contractor, followed by an Asbestos Clearance inspection by an independent Licensed Asbestos Assessor, and

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validation sampling by an environmental consultant. Works in and around the asbestos impacted area should conform to the Work Health and Safety Regulation 2017.

3.2 Cardno now Stantec (2022), Report on Preliminary Site Investigation Report Royal Prince Alfred Hospital, East Campus

Cardno was engaged by TSA Management to undertake a Preliminary Site Investigation for the northern and eastern periphery of the Royal Prince Alfred Hospital (RPA) building, bound by John Hopkins Drive and Lambie Dew Drive, Camperdown, NSW (the site), which is situated within the East Campus. The investigation included drilling of eight (8) boreholes using a track and ute mounted drill rig to depths of up to 15.21 m, installation of one groundwater monitoring well, well development of newly installed well and two existing monitoring bores; measurement of the groundwater levels within tall three wells and laboratory testing of selected soil and groundwater samples.

Review of Historical Reports

The investigation included a review of previous R*eport on Preliminary Site Investigation for Contamination* Geotechnical Investigation completed by Douglas Partners (DP, 2020). The overall conclusion of the report was that additional investigations would be required in areas where excavations are proposed to confirm potential impacts from historical land use and confirm the waste classification of materials to be disposed off-site.

During the DP (2020) investigation, it was noted that two boreholes (BH8 and BH10) were completed within Area B (Refer to **Figure 2.1**). Shallow fill soil samples (0.1m and 0.4m respectively) were collected at these two locations, and were tested for heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), Benzo(a)pyrene, total PAH, TRH C6-C10, TRH >C10-C16, TRH >C16-C34, TRH >C34-C40, phenols, BTEX, OCP, and PCB. The concentrations were within the applicable human health and ecological Tier 1 screening criteria, with the exception of lead concentration (670mg/kg) in BH10 which exceeded the HIL C criteria (600mg/kg); and zinc (350mg/kg) which was above the ecological criteria of 300mg/kg.

Desktop Review

- Based on the desktop review of available documentation, it was concluded that the documented site history and land use appeared to be limited to hospital services / medical health buildings and infrastructure. The grounds of the East Campus of the RPA hospital grounds were observed to have undergone significant alteration and refurbishment since operations commenced in 1873. Specific activities of relevance to potential contamination that appear to have occurred on site included demolition, filling, storage and handling of dangerous goods, construction, electrical substation infrastructure (substation), and issue of a NSW EPA licence to produce, store and handle hazardous, pathological and biological waste.
- At the time of the investigation the site was not subject to regulation by the NSW EPA and was found to be free of statutory notices and licencing agreements under both the CLM Act 1997 and PoEO Act 1997 and was not included on the List of NSW Contaminated Site.

Key Findings

- The Conceptual Site Model (CSM) developed for the site identified the potential for contamination resulting from site filling, commercial operations such as incinerations / burial of medical waste, weathering of exposed building materials, and leakage from parked motor vehicles and / or petroleum stored in the RPA building for backup power generation.
- Soils encountered across the site generally consisted of:
  - Asphaltic concrete / concrete paver, between 0.00 m and 0.40 m, overlying;
  - Fill consisting of Gravelly Sand, Silty/Sandy Clay, between 0.10 m and 3.30 m, overlying;
  - Possible residual soil, comprising of silty CLAY, between 0.15 m to 3.30 m, overlying;
  - Residual Silty CLAY, between 1.45 m to 7.00 m, overlying;
  - Bedrock, comprising of Siltstone / Laminite, between 4.10 m to 15.21 m.
- Two boreholes (BH305A and BH305B) were completed within Area B (Refer to **Figure 2.1**). Shallow fill soil samples (0.1m) and deeper soil samples (2.0m) were collected at BH305A, and were tested for heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRH, phenols, BTEX, OCP, OPP, PCB, sVOCs. The concentrations were within the applicable human health and ecological Tier 1 screening criteria..

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- Overall, a limited number of soil samples contained contaminant concentrations above the applicable human health and ecological Tier 1 screening criteria. Consistent with the Douglas Partners (2020) investigation, preliminarily it is inferred that elevated concentrations of PAH may be attributable to interference from asphaltic pavement materials rather than contamination in soil. Soil analytical results were representative of conditions at the specific locations from where samples were collected. Due to the preliminary nature of this investigation the number of samples was not sufficient to identify if the identification is statistically valid.
- Soils encountered and sampled during the investigation are not considered to be acid sulfate soils based on the preliminary observations and data gathered during the investigation.
- The soils encountered and sampled during the investigation are preliminarily classified as General Solid Waste (non-putrescible), however, we note that the level of investigation completed does not enable off-site disposal of materials.
- All groundwater concentrations of TRH, PAHs, BTEX, VOCs, and pesticides were below the adopted criteria, with exceedances limited to heavy metals. In the absence of elevated concentrations of metals in soil and the absence of an obvious source, it is considered that the metals may be attributable to naturally occurring concentrations in the local geological profile.

Key Recommendation

- The laboratory data and observations gathered during the preliminary investigation generally indicated the absence of contaminants in soil and groundwater that would constrain the future development. An extensive fill profile was encountered across the site. As the investigation of contamination was considered opportunistic and not statistically sufficient, further investigation of the fill profile should be undertaken in areas where earthworks are proposed and also to assess the potential contamination at each of the identified Areas of Environmental Concern.

3.3 Cardno now Stantec (2022c), Remediation Action Plan, Royal Prince Alfred Hospital, East Campus

Cardno (NSW/ACT) Pty Ltd, now Stantec was engaged by TSA Management (TSA) (“the Client”), on behalf of NSW Health Infrastructure, to prepare a Remediation Action Plan (RAP) for the ‘under croft area’ of the Mortuary Access within Building 89 at the East Campus of the Royal Prince Alfred Hospital (RPA), located at Missenden Avenue, Camperdown NSW (site). The RAP was prepared following the asbestos (friable) removal and validations works completed at the site within the vicinity of HA16, by sub-consultants. As such, the report outlined the required remedial works to remove the localised B(α)P TEQ contaminated soils exceeded human health soil criteria and that posed a potential risk to human health, ensuring the suitability of the site for the continued undercroft and hospital use.

3.4 Area B and Area C History Review

Given that Areas B and C form part of the site that was investigated in the Cardno (2022b) report, and the uses of the areas that have been investigated are that of landscaping and driving bay; it is considered that no additional searches were required. Based on the information provided in Cardno (2022b) report, the specific activities of relevance to potential contamination for areas of investigation include demolition, filling, possible pesticide spraying and leakage from parked motor vehicles.

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4 Conceptual Site Model

Outlined within NEPCM2013 *Schedule B2 – Guideline on Site Characterisation,* a Conceptual Site Model is required to aid the assessment of data collected for Area B and Area C.

4.1 Preliminary CSM

A preliminary conceptual site model (CSM) provides an assessment of the fate and transport of contaminants of potential concern within the context of site-specific subsurface conditions with regard to their potential risk to human health and the environment. Risk to human health and the environment is identified through complete Source – Pathway – Receptor (SPR) linkages. In order to identify SPR linkages the CSM considers site specific factors including:

- Source(s) of contamination;
- Identification of contaminants of concern associated with past (and present) source(s);
- Site specific information including soil type(s), depth to groundwater, effective porosity, groundwater flow velocity and surface water bodies and interactions;
- Locations of any identified sources relative to the proposed site development; and
- Actual or potential receptors considering both current and future land use both for the site, adjacent properties and any sensitive ecological receptors.

4.1.1 Identified Contamination Sources

Based on review of the historical and surrounding land uses and the walkover inspection of Areas B and C, Cardno have identified the following sources of contamination that may be encountered on the investigation areas:

- Imported fill material potentially used for filling or beneath structures;
- Potential low-level fuel leakage from parked vehicles (cars and trucks) both historically currently on site;
- Potential contamination associated with historical site use as a hospital including boiler ash, and poor demolition of historical structures;
- Potential spraying of pesticides within the landscaped areas;
- Weathering of exposed building structures including, painted surfaces, metallic objects and cement fibre sheeting (containing lead-based paint and/or asbestos etc.).

4.1.2 Identified Receptors

A high-level summary of potential receptors considered to be susceptible to site contamination include:

- Current site workers;
- Future site workers; and
- Neighbouring site users.
- Ecological receptors - the root zone of mature trees may potentially be within fill soil and/or shallow groundwater. In the absence of waterways or obvious areas of ecological significance no other receptors have been identified.

The preliminary CSM applicable for the site during this investigation, which is inclusive of a more detailed list of receptors, is summarised in **Table 4-1** and applies to the potential future land use settings.

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Table 4-1 Preliminary Conceptual Site Model

Contaminant Source	Impacted Media	Contaminants of Potential Concern	Potential Exposure Pathways	Receptors
Imported fill material	Surficial soils	▪ Metals ▪ TRH ▪ PAH ▪ BTEX ▪ OCP ▪ OPP ▪ PCB ▪ PFASs ▪ Asbestos ▪ Biological	▪ Direct Contact ▪ Incidental Inhalation ▪ Incidental Ingestion	**Human:** ▪ Current site users ▪ Future Site workers (including maintenance workers ▪ Neighbouring site users (including neighbouring basement users) **Ecological:** ▪ Existing and future plant-based biota within the site
Fuel storage for backup generator				
Use of pesticides				
Low-level leakage from parked vehicles				
Historical Site Use: potential for boiler ash, poor demolition				
Historical Site Use: boiler ash, poor demolition	▪ Soils at depth ▪ Groundwater	▪ TRH ▪ BTEX ▪ PAH ▪ Lead ▪ Phenols	▪ Incidental Inhalation ▪ Incidental Ingestion	
Weathering of exposed building structures	▪ Air ▪ Surficial Soils	▪ Asbestos ▪ Lead ▪ PCB ▪ Synthetic mineral fibres	▪ Direct Contact ▪ Incidental Inhalation ▪ Incidental Ingestion	
Hazardous building materials contained within former and existing site structures				

Notes:
Metals – Arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc (typical metals tested in urban/industrial Sydney)
TRH – Total recoverable hydrocarbons (generally petroleum hydrocarbons)
BTEXN – The monocyclic aromatic hydrocarbons benzene, toluene, ethyl-benzene, and xylenes, including the PAH naphthalene.
PAH – Polycyclic aromatic hydrocarbons (includes the carcinogenic compound benzo(a)pyrene)
PFASs - Per- and Polyfluoroalkyl Substances (short suite)
OC/OP Pesticides – Organochlorine and organophosphate pesticides
PCBs – Polychlorinated biphenyls

4.2 Data Gaps

Based on scope of works and the limitations of the investigations, the following data gaps were identified:

> The assessment of contamination was limited to the specific locations of each borehole.

> The location of each borehole was targeted sampling for environmental purposes.

> Some areas within the investigation footprint could not be accessed due to underground services.

> The inspection associated with this investigation was limited to the Area B and Area C and the immediate surrounds.

Based on the preliminary CSM (provided above in **Table 4-1**) and data gaps outlined above, a program of limited and targeted intrusive sampling and analysis was undertaken as detailed below.

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5 Data Quality Objectives

5.1 Data Quality Objective

The NEPC (2013) which is endorsed by the NSW EPA under s105 of the *Contaminated Land Management Act 1997*, requires that Data Quality Objectives (DQOs) are adopted for all assessment and remediation programs. The DQO process as adopted by the NSW EPA is described within the US EPA (2000) *Guidance for the Data Quality Objectives Process and Data Quality Objectives Process for Hazardous Waste Site Investigations.*

The DQOs for the assessment are summarised below in **Table 5-1**.

Table 5-1 Data Quality Objectives

DQO Step	Discussion
Step 1: State the Problem (Summarise the contamination problem that will require new environmental data, and identify the resources available to resolve the problem; develop a conceptual site model).	Available information indicates that the site has historically been occupied by hospital related buildings and infrastructure. This assessment was undertaken to: ▪ Preliminarily identify historical site uses and potential contamination sources; ▪ Preliminarily determine the presence of contaminated soils (if any); ▪ Preliminarily classify the soils waste classification; ▪ Preliminarily assess groundwater for potential contamination (if any); and ▪ Specify what further action is required (if any). A preliminary Conceptual Site Model (CSM) is presented in **Section 4.1**.
Step 2: Identify the decision / goal of the study (Identify the decisions that need to be made on the contamination problem and the new environmental data required to make them).	The decision / goals of the study are: 1. Has the nature, extent and source of any soil contamination onsite been preliminarily defined? 2. What impact do the site specific, geologic and hydrogeological conditions have on the fate and transport of any impacts that may be identified? 3. Does the level of impact coupled with the fate and transport of identified COPCs represent an unacceptable risk to identified human and/or environmental receptors on or offsite? 4. Does the collected data provide sufficient information to allow the selection and design of an appropriate remedial strategy, if necessary? 5. Are there CoPC detectable in the soil associated with historic activities at the site? Is there any existing data and is this data valid?
Step 3: Identify the information inputs (Identify the information needed to support any decision and specify which inputs require new environmental measurements).	Inputs to the decision-making process included: ▪ Guidelines made or approved by the NSW EPA under the Contaminated Land Management Act 1997; ▪ Client information provided; ▪ The current land use; ▪ The proposed land use; ▪ Available site historical information; ▪ Limited intrusive sampling program; ▪ Assessment of soil and groundwater analytical results in relation to the adopted human health and ecological criteria; and ▪ Visual observation and documentation (i.e. field notes, photographs) during site works. At the end of the assessment, conclusions will be made based on the preliminary contamination findings from site soils, and recommendations should be given regarding future land development.
Step 4: Define the boundaries of the study	The boundaries of the study are: ▪ Lateral – the intrusive investigation is limited to the borehole locations as shown in **Figure 2** in **Appendix A**;

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DQO Step	Discussion
(Specify the spatial and temporal aspects of the environmental media that the data must represent to support decision)	▪ Vertical – the intrusive investigation was limited to the depth of the boreholes (maximum of 1.1 mBGL) and the profile soil samples were collected from; and ▪ Temporal – Results are valid on the day of data / sample collection and remain valid as long as no changes occur on site or contamination (if present) does not migrate on site or on to the site from offsite sources.
Step 5: Develop the analytical approach (To define the parameter of interest, specify the action level, and integrate previous DQO outputs into a single statement that describes a logical basis for choosing from alternative actions).	Parameters of interest include the laboratory results of primary and quality control soil analytical testing. Decision rules for soil and criteria exceedance are outlined as follows: ▪ If the laboratory quality assurance/ quality control data are within the acceptable ranges, the data will be considered suitable for use. ▪ The Practical Quantitation Limit (PQL) for all analyses is at or below the adopted criteria level; ▪ Soil: The laboratory soil test results will be considered to have met the adopted soil criteria when the following occur: ▪ The laboratory reported result is below the investigation human health and ecological criteria for the site; or, ▪ The calculated 95% Upper Confidence Level of the arithmetic mean (95%UCL) contaminant concentration does not exist in soil samples at concentrations in excess of Tier 1 Assessment Criteria; and ▪ The standard deviation of the results is less than 50% of the relevant adopted criteria; and, ▪ No single analytical result for a COPC should exceed 250% of the relevant investigation level or screening level. ▪ The laboratory results and site observations associated with the assessment of asbestos in soil must meet the following criteria: ▪ No asbestos detected in laboratory results.
Step 6: Specify performance or acceptance criteria (Specify the decision-maker's acceptable limits on decision errors, which are used to establish performance goals for limiting uncertainties in the data).	Decision errors are incorrect decisions caused by using data that is not representative of site conditions due to sampling or analytical error. The two types of decision errors are: the sampling program does not detect the variability of a contaminant from point to point across the site; and errors made during sample collection, handling, preparation, analysis and data reduction. Decision errors will be minimised by the following: ▪ The field sampling design, frequency, and methodology, sample preservation techniques and laboratory analytical procedures will be conducted in accordance with accepted NSW EPA, NEPM (2013) and NATA accredited methodologies; ▪ A check of the field and laboratory works is to be made against the Data Quality Indicators for precision, accuracy, representativeness, completeness and comparability as outlined in NEPM (2013) Schedule B2, Site Characterisation and included in **Section 9**; ▪ A decision that soil is acceptable for the site land use is based on calculation of the 95% Upper Confidence Level of the arithmetic mean (95%UCL) and standard deviation for contaminant concentration and comparison with the adopted soil criteria. Therefore, the acceptable limit of a decision error is 5% that a conclusive statement may be a false positive or false negative. ▪ Sampling errors may occur when the sampling program does not adequately detect the variability of a contaminant from point to point across the site or is not representative. Some examples of this scenario include but are not limited to: – Restrictions in borehole depth due to drilling refusal. – Proposed samples are not collected due to access being restricted to a given location. Measurement errors can occur during sample collection, handling, preparation, analysis and data reduction. To address this the following measures are proposed:

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DQO Step	Discussion
	a. Field staff to follow a standard procedure when undertaking samples, including decontamination of tools, removal of adhered soil to avoid false positives in results, collection of representative samples and use of appropriate sample containers and preservation methods. b. Laboratories to follow a standard procedure when preparing samples for analysis and undertaking analysis. c. Laboratories to report quality assurance/ quality control data for comparison with the DQIs established for the project.
Step 7: Develop the plan for obtaining data (Identify the most resource-effective sampling and analysis design for general data that are expected to satisfy the DQOs).	The work plan is designed to meet the project objectives in **Section 1.2** and the DQOs outlined above. To ensure resource-effective sampling, analysis and data collection that satisfied the DQOs, the following actions are to be taken: ▪ Written instructions will be used to guide field personnel in the required fieldwork activities; ▪ Representative soil samples will be collected from the site and analysed for characterisation purposes; and ▪ Field works and analyses will be undertaken in accordance with Cardno Standard Operating Procedures.

5.2 Data Quality Indicators

To ensure that the investigation results were of an acceptable quality, the data set was assessed against the data quality indicators (DQIs) outlined in **Table 5-2**.

Table 5-2 Data Quality Indicators

QAQC Measure	Field Quality Indicator	Laboratory Quality Indicator
Precision: A quantitative measure of the variability (or reproducibility) of data.	SOPs are appropriate and complied with. Field duplicates and Blind field duplicates are collected and analysed at a rate of 5% (1 per 20 samples). Use of calibrated equipment.	Laboratory analyses of laboratory and inter-laboratory duplicates, field duplicates, laboratory prepared volatile trip spiles. Relative Percent Difference (RPD) calculation results: <30% Relative Percentage Difference (RPD). The RPD values are calculated using the following equation: $RPD = \frac{I C_O - C_R I}{[(C_O + C_R) / 2]} \times 100$ Where, C_O = Analyte concentration of the original sample C_R = Analyte concertation of the duplicate sample
Accuracy: A quantitative measure of the closeness of reported data to the "true" value.	SOPs are appropriate and complied with. Use of calibrated equipment. Field interlaboratory duplicates sampled and analysed at a rate of 1 per 20 samples. <30% Relative Percentage Difference (RPD) Analysis of rinsate sample collected at rate of 1 per day. Trip spike and trip blanks were used.	Laboratory holds NATA-accreditation for the analyses. Laboratory limit of reporting is below the adopted investigation level. Laboratory analysis of: field blanks, rinsate blank, reagent blank, method blank, matrix spike, matrix spike duplicate, surrogate spike, reference material, laboratory control sample, laboratory-prepared spikes. The nominal acceptance limits on laboratory control samples are: Laboratory spikes: 70-130% recovery for metals 60-140% for organics Laboratory duplicates. If contaminant concentration is: < 10 x PQL, no RPD limit 10-20 x PQL, RPD is 0% to 50%

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QAQC Measure	Field Quality Indicator	Laboratory Quality Indicator
		>20 x PQL, RPD is 0% to 20% Laboratory surrogates: 60-140% recovery. Laboratory blanks: <PQL Laboratory control samples, 70-130% recovery
Representativeness: The confidence (expressed qualitatively) that data are representative of each media present on site and the conditions encountered in the field	Appropriate media sampled. Preservation and storage of samples upon collection and during transport to the laboratory occurs. Sampling is undertaken by an experienced sampler.	Blank samples run in parallel with field samples to confirm there are no unacceptable instances of laboratory artefacts. Review of RPD values for field and laboratory duplicates to provide an indication that the samples are generally homogeneous, with no unacceptable instances of significant sample matrix heterogeneities The appropriateness of collection methodologies, handling, storage and preservation techniques will be assessed to ensure/confirm there was minimal opportunity for sample interference or degradation (i.e. volatile loss during transport due to incorrect preservation / transport methods). Rinsate samples used when sampling equipment is reused have analytical results <LOR.
Completeness: A measure of the amount of useable data from the data collected during the fieldwork program	All critical locations sampled. All samples collected (from grid and at depth). Standard operating practices (SOPs) appropriate and complied with. Sampling is undertaken by an experienced sampler. Suitable records of field work are documented. Completed laboratory sample chain-of-custody and documentation.	All critical samples are analysed according to the SAQP. All COPC are analysed. Appropriate methods and PQLs are implemented. Sample documentation is complete. Samples are analysed within holding times.
Comparability: The confidence (expressed qualitatively) that data may be considered to be equivalent for each sampling and analytical event	Same SOP is used on each field occasion. Climatic conditions are documented. Experienced sampler Sample type, preservation and handling are consistent at sampling events. Use of calibrated equipment.	Sample analytical methods used (including clean-up) Sample PQLs (justify/quantify if different) Same laboratories are used and justification is given where differences occur. Same analytical methods, Practical Quantification Limits (PQLs), and units of measurement are used.

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6 Assessment Criteria

The assessment of soils and groundwater has been undertaken in the framework of a Tier 1 risk assessment. A Tier 1 assessment is a risk-based analysis comparing site data with generic investigation levels and screening levels for various land uses to determine the need for further assessment or development of an appropriate management strategy. The application of investigation and screening levels is subject to a range of limitations.

The following sections detail the adopted Tier 1 Screening Criteria for the site.

6.1 Soil Contamination Assessment Criteria

In the context of this investigation, the human health investigation and screening levels adopted for the assessment are hereafter referred to as soil assessment criteria (SAC). The SAC is outlined in **Table 6-1**. The specific SAC values are presented along with analytical results in **Appendix F**.

Table 6-1 Soil Assessment Criteria

Value	Guideline	Criteria
Human Health	NEPC, 2013, Schedule B1, Section 6, Tables 1A(1) and 1A(3); For asbestos: Section 4, Table 7.	The criteria have been derived in consideration of the proposed end land use and associated development activities, which are hospital infrastructure upgrades confined to under building footprints. NEPC 2013, Schedule B7, Appendix C, Section 3.2.5.3 notes that *The HILs developed for the commercial/industrial land use scenario are not applicable to a site used frequently by more sensitive groups such as children (within childcare centres, hospitals and hotels) and the elderly (within hospitals, aged care facilities and hospices).* As the development areas consist of new building or building alterations within a hospital setting, the HIL-B exposure scenario, residential with minimal opportunities for soil access is considered appropriate given the potential for migration of soil, dust, vapours. For external landscaped areas, the HIL-C open space criteria (more sensitive than HIL-B) should be used. Where specific external areas are to be used for child-care or immuno-suppressed or immuno-compromised persons, more conservative criteria such as HIL-A or less should be considered on the basis of a further review of the construction design and purpose. The specific criteria to be used for building footprint areas are summarised below: ▪ Health Investigation Level (HIL) for '*Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments*' (HIL-B) ▪ Health Screening Level (HSL) for '*Low – high density residential*' (HSL-A&B) **For asbestos**: ▪ No visible asbestos for surface soils. ▪ HSL-B: for bonded ACM ▪ 0.001% w/w for friable asbestos in soil
Ecological	NEPC 2013, Schedule B1	Within the footprint of proposed buildings, buildings, and roadways, the ecological criteria for an industrial/commercial setting is considered appropriate. Outside of existing and proposed building footprint and roadways, the ecological criteria for urban residential and public open space is considered to be appropriate. **Within building footprint and roadways**: ▪ Ecological Screening Levels (ESL) for commercial / industrial, coarse soil, 0-2m. ▪ Ecological Investigation Levels (EIL) for commercial / industrial, aged, NSW setting, high traffic

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Value	Guideline	Criteria
		Within landscaped areas: ▪ Ecological Screening Levels (ESL) for urban residential and public open space, coarse soil, 0-2m. ▪ Ecological Investigation Levels (EIL) for urban residential and public open space, aged, NSW setting, high traffic.

In accordance with NEPC 2013, the EIL is calculated as the sum of the Added Contaminant Limit (ACL) and the Ambient Background Concentration (ABC) (i.e. EIL = ACL + ABC). ABCs have been based on the 25th percentile values for aged, urban settings, high traffic, NSW by Olszowy et al.

The derived EIL criteria for copper, nickel, chromium III, and zinc are based on high traffic volume and aged contamination (>2 years) and the inputs shown in **Table 6-2**:

Table 6-2 Soil Ecological Investigation Criteria

Soil Input Parameters (pH, CEC, TOC, % Clay)	Calculated EIL – Commercial / Industrial			
	Copper	**Chromium III**	**Nickel**	**Zinc**
▪ pH – 6 (estimated) ▪ Cation Exchange Capacity (CEC) – 10 cmolc/kg (estimated) ▪ Total Organic Carbon (toc) – 0.5% (estimated) ▪ % Clay – 10%	160 mg/kg	680 mg/kg	290 mg/kg	750 mg/kg

6.1.2 Preliminary Waste Classification

The preliminary waste classification for in-situ soils sampled and analysed during the investigation were compared against the NSW EPA (2014) Waste Classification Guidelines Part 1: Classifying waste.

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7 Methodology

7.1 Site Investigation Program

Fieldwork was undertaken by an environmental scientist, with all works completed in accordance with the agreed scope of works outlined in **Section 1.3**. The records and observations made during fieldwork are presented in **Table 2-4** and shown in photographs provided in **Appendix B** with geological logs presented in **Appendix D**.

The Quality Assurance / Quality Control (QA/QC) program is discussed in **Table 5-1**. Copies of NATA-accredited laboratory reports and chain of custody documentation is provided in **Appendix E**.

Table 7-1 Investigation Activity Summary

Activity	Details
Dates of Field Activity	Service locating and drilling was undertaken on 10 June 2022.
Service Location	A Telstra accredited service locater was engaged to locate and mark underground services in the vicinity of each borehole location and to avoid damage to subsurface utilities. The environmental engineer supervised the service locator.
Drilling locations	Drilling of nine (9) boreholes using hand auger. Four (4) boreholes were drilled up to a depth of 1.1m BGL and five (5) boreholes were drilled up to 0.7m BGL. The location of each borehole is shown on **Figure 2.1 and Figure 2.2** of **Appendix A**. Two areas were targeted during this investigation, however for environmental purposes the locations were proposed to be evenly distributed in a grid patter across each of the areas of investigation. During investigation the grid pattern could not be achieved due to infrastructure, access issues and underground services. Refusal was encountered in road base gravel in two (2) out of the five (5) boreholes completed within Area C.
Soil Logging	Soils encountered during the investigation were described and logged in accordance with Australian Standard AS 1726:2017 – Geotechnical site investigations.
Soil Sampling	Soil samples were placed into laboratory-supplied 250 mL glass jars and zip-lock bags. Samples of 'clean material' (with no residual soil) were collected directly off the auger, using a new dedicated, unused pair of nitrile gloves per sample. For the QA/QC samples, the material was carefully mixed and distributed evenly between sampling containers.
Soil Sample Collection	Soil samples collected during the investigation are summarised below: ▪ Soil samples were collected from four (4) boreholes drilled within Area B, specifically BH317, BH318, BH319, BH320; ▪ Soil samples were collected from five (5) boreholes drilled within Area C, specifically BH322, BH323, BH324, BH325, BH326. ▪ A total of thirteen (13) primary soil samples were collected during the drilling and submitted for laboratory analysis; ▪ One (1) intra-laboratory soil duplicate sample (QA100) and one (1) inter-laboratory soil duplicate sample (QA200) were used for QA/QC purposes; and ▪ One (1) soil trip blank and trip spike was submitted with the samples for QA/QC purposes. All primary and duplicate samples were submitted to Eurofins Environmental Testing, inter-laboratory duplicate samples were to Envirolab Services. Both laboratories are NATA accredited for the analysis completed, with a summary of samples and analytes provided in **Appendix E**.
Soil Sample Analysis Selection	Generally, soil samples were selected for analysis based on contaminant indicators such as odours, staining or anthropogenic materials mixed through the fill / natural soil profile. In the absence of contaminant indicators, samples were selected to provide site characterisation to a level appropriate for the limitations of the assessment.
Borehole Reinstatement	The boreholes were backfilled with the soil removed during drilling and reinstated and levelled to ground surface.

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Activity	Details
Decontamination Procedure	Soil: ▪ Sampling Equipment – nitrile gloves were disposed of and replaced between each sampling location. ▪ Drilling Equipment – the drill rod (hand auger) was cleared of residual soil waste between each test location.
Sample Preservation and Transport	Soil: Following collection, soil samples, were placed directly in laboratory-supplied glass jars, PFAS free HDPE jars and/or zip-lock bags.
Laboratory Analysis	Soil samples were submitted for analysis for the following contaminants: ▪ Total Recoverable Hydrocarbons (TRH); ▪ Benzene, Toluene, Ethylbenzene, Xylenes (BTEX); ▪ Total metals (arsenic, cadmium, copper, chromium, lead, mercury, nickel and zinc); ▪ Polycyclic Aromatic Hydrocarbons (PAH); ▪ Phenol; ▪ Organochlorinated Pesticides (OCP) and Organophosphate Pesticides (OPP); ▪ Polychlorinated Biphenyls (PCB); ▪ Per- and Polyfluoroalkyl Substances (PFAS); ▪ Asbestos (presence / absence).

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8 Results

8.1 Soil Observations

The ground conditions across the subject site were relatively uniform. The subsurface profiles encountered across Area B and Area C were typically as follows:

Area B

> Fill consisting of Silty Clay, and Clay between 0.0 m and 1.0 m (maximum depth of borehole), overlying;

> Possible residual soil, comprising of silty CLAY, between 0.8 m to 1.1 m (maximum depth of borehole).

Area C

> Asphaltic concrete / concrete paver and roadbase gravel, between 0.00 m and 0.45 m;

> Fill consisting of Silty Sand, between 0.0 m and 0.7 m.

The subsurface profile is summarised in **Table 8-1** below, and presented in graphical borehole logs attached in **Appendix G**.

Table 8-1 Subsurface Conditions Summary

BH ID	Soil Description / Depth (m) BSL				
	Asphaltic Concrete / Roadbase Gravel	Fill (Silty Clay/ Clay)	Fill (Silty Sand)	Residual CLAY	Depth
Area B					
BH317	-	0.0-1.0	-	-	1.0(TD)
BH318	-	0.0-1.1	-	-	1.1(TD)
BH319	-	0.0-1.0	-	-	1.0(TD)
BH320	-	0.0-0.8	-	0.8-1.1	1.1(TD)
Area C					
BH322	0.0-0.45	-	-	-	0.45(R)
BH323	-	-	0.0-0.7	-	0.7(R)
BH324	0.0-0.45	-	-	-	0.45(R)
BH325	-	-	0.0-0.7	-	0.7(R)
BH326	-	-	0.0-0.3	-	0.3(R)

Notes:
1. All depths measured in metres below ground surface level at the time of the investigation.
2. Soil Classification follows United Soil Classification system (USCS).
3. TD = Termination Depth.
4. R = Auger Refusal Depth
5. BSL = Below Surface Level

All examined soil samples were evaluated on a qualitative basis for odour and visual signs of contamination (e.g. hydrocarbon odours, oil staining, petrochemical filming, asbestos fragments, ash, slag) and the following observations were noted:

> Fill material was identified to a maximum depth of 1.1m BGL. Anthropogenic materials in fill were not observed with the exception of roadbase underlying pavement.

> No visual or olfactory evidence of contamination was observed within any soils inspected; and all PID readings were recorded <0.1 parts per million (ppm)

> Indicators of acid sulfate soils and salinity were not observed within excavated soils.

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8.2 Soil Laboratory Analysis

8.2.1 Contamination

The soil laboratory analytical results obtained during Cardno's investigation are presented in the laboratory summary tables provided in **Appendix C**, along with the adopted assessment criteria. These results for Area B and Area C have been further summarised below in **Table 8-2**.

Table 8-2 Summary of Soil Analytical Results

Number of Samples	Analytes		Area B Concentrations (mg/kg)		Area B Exceedances	Area C Concentrations (mg/kg)		Area C Exceedances
			Minimum	Maximum		Minimum	Maximum	
15	**Metals**	Arsenic	<2	42	None	2.9	10	None
15		Cadmium	<0.4	0.5	None	<0.4	<0.4	None
15		Chromium	13	23	None	8.7	19	None
15		Copper	6.3	460	BH320_0.0-0.2 (460 mg/kg) exceeded ESL-URPOS (120 mg/kg) and ESL- I/C (160 mg/kg).	14	99	None
15		Lead	6.5	730	None	14	210	None
15		Mercury	<0.1	1.0	None	<0.1	0.5	None
15		Nickel	<5	94	None	<5	32	None
15		Zinc	8.4	290	None	9.3	270	None
15	**BTEX**	Benzene	<0.1	<0.1	None	<0.1	<0.1	None
15		Toluene	<0.1	<0.1	None	<0.1	<0.1	None
15		Ethylbenzene	<0.1	<0.1	None	<0.1	<0.1	None
15		Total Xylenes	<0.3	<0.3	None	<0.3	0.6	None
15	**PAHs**	Naphthalene	<0.5	<0.5	None	<0.5	<0.5	None
15		Benzo(α)pyrene	<0.5	1.5	BH318_0.5-0.7 (1.5 mg/kg); and BH320_0.0-0.2 (1.0 mg/kg) exceeded ESL-URPOS (0.7 mg/kg) and ESL- I/C (1.4 mg/kg).	<0.5	3.2	BH325_0.6-0.8 (3.2 mg/kg) exceeded ESL-URPOS (0.7 mg/kg) and ESL- I/C (1.4 mg/kg).

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Number of Samples	Analytes		Area B Concentrations (mg/kg)		Area B Exceedances	Area C Concentrations (mg/kg)		Area C Exceedances
			Minimum	Maximum		Minimum	Maximum	
15		Carcinogenic PAHs (as B(α)P TEQ)	0.6	2.2	None	0.6	4.6	BH325_0.6-0.8 (4.6 mg/kg) exceeded HIL B (4 mg/kg) and HIL C (3 mg/kg) criteria.
15		Total PAHs	<0.5	13	None	<0.5	30	None
15	**TRHs**	F1	<20	<20	None	<20	<20	None
15		F2	<50	<50	None	<50	<50	None
15		F3	<100	170	None	<100	270	None
15		F4	<100	130	None	<100	110	None
15		C6 – C9	<20	<20	None	<20	<20	None
15		C10 – C36	<50	146	None	<50	216	None
14	**PCBs**	Total PCBs	<0.1	<0.1	None	<0.1	<0.1	None
14	**Phenol**	Halogenated phenol	<1	<1	None	<1	<1	None
10	**Pesticides**	OCPs (dieldrin)	<0.1	<0.1	None	<0.1	<0.1	None
10		OPPs	<0.2	<0.2	None	<0.2	<0.2	None
11	**PFASs**	Sum (PFHxS + PFOS)	<0.005	0.006	None	<0.005	0.0082	None
11		Perfluorooctanoic acid (PFOA)	<0.005	<0.005	None	<0.005	<0.005	None
10	**Asbestos**	Asbestos (presence / absence)	non-detect	non-detect	None	non-detect	non-detect	None

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Based on review of **Table 8-2** above and the data summary tables in **Appendix C**, concentrations for BTEX, TRH, PCB, halogenated phenols, OCP/OPP and PFAS were all below the applicable laboratory LOR and/ or the adopted NEPM Tier 1 Human Health and Ecological Criteria. Asbestos was also not detected in any of the tested samples across the two areas of investigation.

However, the following samples exceeded the adopted Tier 1 Human Health Investigation Levels (HILs):

- Sample BH325_0.6-0.8 exceeded HIL-B and HIL-C criteria for carcinogenic PAHs (as B(α)P TEQ) (4 mg/kg and 3 mg/kg respectively) with a concentration of 4.6 mg/kg;

Furthermore, as outlined in **Table 8-2**, one sample from Area B (BH320_0.0-0.2) exceeded the ecological investigation level criteria for copper; and a limited number of samples across both areas exceeded the ecological investigation levels (EIL) and/ or ecological screening levels (ESL) criteria for Benzo(α)Pyrene. It is noted that for Area C, the samples (BH322 and BH324) were collected from the road gravel that is used as bedding material for pavements.

8.2.2 Preliminary Waste Classification Assessment

The soil laboratory analytical results obtained during Cardno's investigation are presented in the laboratory summary tables provided in **Appendix C**, along with the adopted waste classification criteria. These results have been further summarised below:

- Exceedances of the General Solid Waste Contaminant Threshold 1 (CT1) criteria were limited to the following:
  - Lead concentrations were above the CT1 criteria of 100 mg/kg in samples:
    - Area B - BH317_0.0-0.2 (110 mg/kg), BH318_0.0-0.2 (140 mg/kg) and BH320_0-0.2 (730 mg/kg); and
    - Area C - BH324_0.0.3-0.45 (210 mg/kg).
  - Nickel concentrations were above the CT1 criteria of 40 mg/kg in Area B sample BH319_0.0-0.2 (94 mg/kg).
  - Benzo(a)pyrene concentrations were above the CT1 criteria of 0.8 mg/kg in samples:
    - Area B - BH318_0.5-0.7 (1.5 mg/kg) and BH320_0.0-0.2 (1.0 mg/kg); and
    - Area C - BH325_0.6-0.8 (3.2 mg/kg).

Subsequent Toxicity Characteristic Leaching Procedure (TCLP) testing was undertaken on selected samples that exceeded the CT1 criteria, which are presented in the summary tables provided in **Appendix F**, along with the adopted waste classification criteria. These results indicated that all concentrations were below the General Solid Waste TCLP1/SCC1 criteria. This preliminary waste classification is not considered to be suitable documentation and/or adequate frequency of testing for waste disposal purposes.

8.3 Data Quality Assessment

An assessment of the data quality was undertaken in accordance with the Data Quality Indicators for the field work and the laboratory. Details of this assessment are provided in **Appendix F**.

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9 Site Characterisation

9.1 Soil Contamination

The following key observations were noted during the assessment:

Area B – Landscape and Loading Dock

- The fill encountered across the area of investigation comprised of silty clay FILL, overlying residual soil. The maximum depth of the fill was equal to the maximum depth of borehole advancement (i.e. 1.0m BGL).
- Anthropogenic materials were identified in the fill profile during drilling at the site, which included gravels and organic matter. Asbestos was not observed within excavated soils during the current investigation.
- Concentrations of metals, BTEX, TRH, PCB, phenols, PAHs, OPP and PFAS in the collected samples of both fill and natural soils were all either below the applicable laboratory LOR or below the adopted NEPC 2013 Tier 1 human health screening criteria. Traces of OCPs (DDE and DDT) were detected in fill sample BH320_0.0-0.2 (0.08 mg/kg and 0.06 mg/kg respectively), but concentrations were below the adopted NEPC 2013 Tier 1 human health screening criteria. Asbestos was not detected in any soil samples submitted for laboratory testing.
- Visual and olfactory indicators of contamination such as staining and odour were not observed during the investigation; and all PID readings were <1.0 ppm.
- The ecological ESL criteria for copper for a commercial / industrial setting, and urban residential / public open space criteria was exceeded in one fill soil sample analysed in Area B (BH320).
- The ecological ESL criteria for benzo(α)pyrene for a commercial / industrial setting, and urban residential / public open space criteria was exceeded in two fill soil samples analysed in Area B (BH318 and BH320).
- The exceedances of the ecological criteria were found to be localised and indicate that some shallow fill soils in Area B may be unsuitable for planting should further landscaping be required in this area.

Area C – Gloucester House Plaza

- The fill encountered across Area C comprised of asphalt concrete/ concrete paver and roadbase gravel, overlying silty sand FILL. The maximum depth of the fill was equal to the maximum depth of borehole advancement (i.e. 0.7m BGL).
- Anthropogenic materials were identified in the fill profile during drilling at the site, which included gravels and organic matter. Asbestos was not observed within excavated soils during the current investigation. However, Cardno note that asbestos was found within the undercroft area located to the west of Area C (Cardno, 2022a).
- Visual and olfactory indicators of contamination such as staining and odour were not observed during the investigation, and all PID readings were <1.0 ppm.
- Concentrations of metals, BTEX, TRH, PCB, phenols, OCP/OPP and PFAS in the collected samples of both fill and natural soils were all either below the applicable laboratory LOR or below the adopted NEPC 2013 Tier 1 human health screening criteria. Asbestos was not detected in any soil samples submitted for laboratory testing.
- Exceedances of the adopted human health criteria were limited to one fill sample collected from borehole BH325, which contained a benzo(α)pyrene TEQ concentration marginally above the HIL-B and HIL-C criteria. The sample exceeding the criteria was collected from deeper fill layer (0.6-0.8m BGL) and the concentration of benzo(α)pyrene TEQ shallow fill sample (0.0-0.2 m BGL) collected at this location was below laboratory LOR. Therefore, the exceedance may have been attributable to the anthropogenic nature and poor quality of the fill.
- The ecological ESL criteria for benzo(α)pyrene for a commercial / industrial setting, and urban residential / public open space criteria was exceeded in one sample collected from Area C (BH325). This exceedance of the ecological criteria was found to be localised.

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9.2 Preliminary Waste Classification Assessment

The preliminary waste classification of in-situ soils indicated that the material is preliminarily classified as General Solid Waste (non-putrescible). Multiple exceedances of the CT1 guideline values were reported, however, leachability testing indicated leachability of the samples were below leachability criteria.

Cardno note that this preliminary classification does not act as a standalone waste classification and does not enable off-site disposal or re-use of soil within the site. The data obtained during this assessment may be considered during future classification.

Should site soils be subject to offsite disposal during future development, then further sampling and testing of the soils would be required prior to offsite disposal in accordance with the NSW EPA (2014) Waste Classification Guidelines. Furthermore, waste classification reports will need to be prepared accordingly for the material to be disposed offsite, which confirms the classification type of the waste at the time of off-site disposal. All waste needs to be disposed of at appropriately licenced facilities, with all disposal and waste tracking documentation retained for validation purposes.

9.3 Conceptual Site Model Review

Based on the assessment findings, the preliminary CSM discussed in **Section 4** was considered to appropriately identify contamination sources, migration mechanisms and exposure pathways, as well as potential onsite and offsite receptors. Given the nature of the investigation which was targeted to the soils within Area B and Area C and the results from the investigation, the revised CSM applicable to each of the areas is presented in **Table 9-1** and **Table 9-2** below.

Table 9-1 Revised Conceptual Site Model – Area B (Landscape and Loading Dock)

Potential Contaminant Source	Impacted Media	Contaminants of Potential Concern	Potential Exposure Pathways	Receptors
Imported fill material Fuel storage for backup generator Use of pesticides Low-level leakage from parked vehicles Historical Site Use: potential for boiler ash, poor demolition Historical Site Use: boiler ash, poor demolition	Fill soils	▪ Metals ▪ TRH ▪ PAH ▪ OCP ▪ Asbestos	▪ Direct Contact ▪ Incidental Inhalation ▪ Incidental Ingestion	**Human:** ▪ Current site users ▪ Future Site workers (including maintenance workers ▪ Neighbouring site users (including neighbouring basement users) **Ecological:** ▪ Existing and future plant-based biota within the site
Weathering of exposed building structures Hazardous building materials contained within former and existing site structures	▪ Air ▪ Surficial Soils	▪ Asbestos ▪ Lead ▪ PCB ▪ Synthetic mineral fibres	▪ Direct Contact ▪ Incidental Inhalation ▪ Incidental Ingestion	

Notes:
Metals – Arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc (typical metals tested in urban/industrial Sydney)
TRH – Total recoverable hydrocarbons (generally petroleum hydrocarbons)
PAH – Polycyclic aromatic hydrocarbons (includes the carcinogenic compound benzo(a)pyrene)
OC Pesticides – Organochlorine pesticides
PCBs – Polychlorinated biphenyls

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Table 9-2 Revised Conceptual Site Model – Area C (Gloucester House Plaza)

Contaminant Source	Impacted Media	Contaminants of Potential Concern	Potential Exposure Pathways	Receptors
Imported fill material	Fill soils	▪ Metals ▪ TRH ▪ PAH ▪ Asbestos	▪ Direct Contact ▪ Incidental Inhalation ▪ Incidental Ingestion	**Human:** ▪ Current site users ▪ Future Site workers (including maintenance workers ▪ Neighbouring site users (including neighbouring basement users) **Ecological:** ▪ Existing and future plant-based biota within the site
Fuel storage for backup generator				
Use of pesticides				
Low-level leakage from parked vehicles				
Historical Site Use: potential for boiler ash, poor demolition				
Historical Site Use: boiler ash, poor demolition				
Weathering of exposed building structures	▪ Air ▪ Surficial Soils	▪ Asbestos ▪ Lead ▪ PCB ▪ Synthetic mineral fibres	▪ Direct Contact ▪ Incidental Inhalation ▪ Incidental Ingestion	
Hazardous building materials contained within former and existing site structures				

Notes:
Metals – Arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc (typical metals tested in urban/industrial Sydney)
TRH – Total recoverable hydrocarbons (generally petroleum hydrocarbons)
PAH – Polycyclic aromatic hydrocarbons (includes the carcinogenic compound benzo(a)pyrene)
PCBs – Polychlorinated biphenyls

9.4 Data Gaps and Uncertainties

Based on the findings of this investigation, the following data gap exists:

> The location of potential contamination sources based on historic activities is not known. Although current features were visible, the historic activities were not readily evident in the documentation reviewed.

> Complete extent of impacts and contamination identified is not known.

> Waste classification for offsite disposal or onsite reuse of material is not known.

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10 Conclusions and Recommendations

Cardno has completed a Targeted Soil Investigation Report for the for the landscaped area east of Royal Prince Alfred Hospital (RPA) loading dock (Area B) and Gloucester House Plaza (Area C); both of which are located within the East Campus of the RPA building, Camperdown, NSW ("the site"). The investigation was considered limited to the areas investigated (Area B and C) and as such constitute as a Targeted Detailed Site Investigation as defined in the NSW legislative framework.

Based on the findings of this assessment, the following conclusions were made:

Area B and Area C

- Area B and Area C are proposed for various forms of development. This investigation was undertaken to preliminarily identify contamination within the top 1m of soil profile and identify potential environmental contamination constraints to the development. At the time of preparing this report Cardno understood that construction activities requiring ground disturbance were limited to the shallow fill (~1 m BGL) within Areas B and C.
- The investigation followed on from various previous investigation completed by Cardno (2022a, 2022b and 2022c). The investigation which contributed the most information to this investigation was the Preliminary Site Investigation report (Cardno, 2022b), which comprised of desktop searches of the East Campus of the RPA building and soil sampling along the northern and eastern boundary of the East Campus.

  Given that Areas B and C form part of "the site" that was investigated in the Cardno (2022b) report, and the uses of the areas that have been investigated are that of landscaping and driving bay; it was considered that no additional desktop searches were required. Based on the information provided in Cardno (2022b) report, the specific activities of relevance to potential contamination for the areas of investigation include demolition, filling, possible pesticide spraying and leakage from parked motor vehicles.
- Soil samples were collected from ten boreholes that were drilled using a hand auger. The boreholes were advanced to a maximum depth of 1m BGL or refusal, whichever one was encountered first. Fill material was identified to extend to the maximum depth of drilling (1.1 mBGL). Anthropogenic materials in fill were not observed with the exception of roadbase underlying concrete and organic matter such as roots.
- The soils encountered and sampled during the investigation are preliminarily classified as General Solid Waste (non-putrescible), however, we note that the level of investigation completed does not enable off-site disposal of materials.

Area B - Landscape and Loading Dock

- Soils encountered across Area B generally consisted of:
  - Fill consisting of Silty Clay, and Clay between 0.0 m and 1.0 m (maximum depth of borehole), overlying;
  - Possible residual soil, comprising of silty CLAY, between 0.8 m to 1.1 m (maximum depth of borehole).
- A limited number (3) of soil samples at two (2) locations contained contaminant concentrations above the applicable ecological Tier 1 guideline values for copper and benzo(α)pyrene; the exceedances were considered localised and not wide spread. These exceedances were not considered to be a cause of significant environmental concern. As such the soil within the top 1m profile of the tested area (Area B) is suitable to remain onsite and/or reused under hardstand flooring. Where these soils are to be used in landscaped areas there may be some residual impacts to plantings.
- Traces of OCPs (DDE and DDT) were detected in fill sample BH320_0.0-0.2 (0.08 mg/kg and 0.06 mg/kg respectively), but concentrations were below the adopted NEPC 2013 Tier 1 human health screening criteria. These detections indicate historic use of pesticides at the site.
- All soil samples were below the adopted NEPC 2013 Tier 1 human health screening criteria for the analytes tested. Asbestos was not detected in any soil samples submitted for laboratory testing. Soil analytical results were representative of conditions at the specific locations where samples were collected.

Area C - Gloucester House Plaza

- Soils encountered across Area C generally consisted of:
  - Asphaltic concrete / concrete paver and roadbase gravel, between 0.00 m and 0.45 m;
  - Fill consisting of Silty Sand, between 0.0 m and 0.7 m.

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- Exceedances of the adopted human health criteria were limited to one fill sample collected from borehole BH325, which contained a benzo(α)pyrene TEQ concentration marginally above the HIL-B and HIL-C criteria. Based on all the soil analysis this is not considered to be wide spread.
- No other exceedances of the adopted NEPC 2013 Tier 1 human health screening criteria were observed and asbestos was not detected in any soil samples submitted for laboratory testing. However, Cardno note that asbestos has been previously found within the undercroft area located to the west of Area C (Cardno, 2022a).
- One soil sample contained contaminant concentrations above the applicable ecological Tier 1 guideline value for benzo(α)pyrene. The exceedance of the ecological criteria was found to be localised and not a cause for environmental concern.

10.1 Recommendations

Based on the findings of this assessment and with reference to the purpose and objectives of this investigation, the following recommendations were made:

Area B - Landscape and Loading Dock

- Whilst the laboratory data and observations gathered during the preliminary investigation generally indicated the absence of contaminants in soil that would constrain the future development, an extensive fill profile was encountered across Area B and presence of contamination including asbestos cannot be ruled out. As such, it is recommended that excavation works are conducted in accordance with a Construction Environmental Management Plan and an Unexpected Finds Protocol.
- It is recommended that the soils located within the vicinity of boreholes BH318 and BH320, which exceeded the ecological criteria; are used beneath hardstand areas.
- Any material being removed from site (including virgin excavated natural materials or VENM) must be classified for off-site disposal in accordance the EPA (2014) Waste Classification Guidelines.

Area C – Gloucester House Plaza

- The vertical and lateral extent of the benzo(α)pyrene TEQ and benzo(α)pyrene human health and ecological contamination detected at BH325 (Area C) should be further assessed to confirm the volume of contaminated soil and determine the management strategy for the soil. Additional testing could also be used to apply statistical analysis to confirm the contamination.
- It is recommended that excavation works are conducted in accordance with a Construction Environmental Management Plan and an Unexpected Finds Protocol.
- Any material being removed from site (including virgin excavated natural materials or VENM) must be classified for off-site disposal in accordance the EPA (2014) Waste Classification Guidelines.

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11 References

Australian Standard 4482.1-2005: Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil.

Cardno (2022a). *Contamination Assessment Report – Delineation Sampling, Royal Prince Alfred Hospital*, Job Reference 80022026_R002_Undercroft Delineation, Revision 0, dated 23 February 2022;

Cardno (2022b). *Preliminary Site Investigation Report, Royal Prince Alfred Hospital, East Campus*, Job Reference 80022026, Revision A, dated 3 March 2022.

Cardno (2022c). *Remediation Action Plan, Royal Prince Alfred Hospital, East Campus*, Job Reference 80022026 R004 Undercroft, Revision 0, dated 14 April 2022.

Guideline on the Investigation Levels for Soil and Groundwater' of the *National Environment Protection (Assessment of Site Contamination) Measure* (NEPM) *1999* (NEPC, 1999) as varied May 2013 (the 'NEPM 2013'); Standards Australia (2005).

NSW DPIE (2021) *eSPADE v2.1,* NSW Department of Planning Industry and Environments (DPIE), Retrieved from: https://www.environment.nsw.gov.au/eSpade2Webapp.

NSW EPA (2015) *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*. NSW Environment Protection Authority, Sydney. September 2015.

NSW EPA (2017) *Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd edition).* NSW Environment Protection Authority, Sydney. October 2017.

NSW EPA (2020) *Consultants Reporting on Contaminated Land*, Contaminated Land Guidelines, NSW Environment Protection Authority, Sydney, April 2020.

NSW Government (2021) *MinView*, Mining, Exploration and Geoscience, NSW Government, Regional NSW, Retrieved from: https://minview.geoscience.nsw.gov.au/#/?lon=148.9143&lat=-32.65607&z=6&bm=bm1&l=.

Office of Environment and Heritage (OEH) (2017) *Acid Sulfate Soils*. NSW Government, November 2017.

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12 Limitations

This assessment has been undertaken in general accordance with the current "industry standards" for a Contamination Assessment for the purpose and objectives and scope identified in this report. These standards are set out in:

- National Environment Protection (Assessment of Site Contamination) Measure (NEPM) *1999* (NEPC, 1999) as varied May 2013 (the 'NEPM 2013').
- AS4482.1- 2005: Guide to the sampling and investigation of potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds. Standards Australia (2005).

The agreed scope of this assessment has been limited for the current purposes of the Client. The assessment may not identify contamination occurring in all areas of the site, or occurring after sampling was conducted. Subsurface conditions may vary considerably away from the sample locations where information has been obtained.

This Document has been provided by Cardno subject to the following limitations:

- This Document has been prepared for the particular purpose outlined in Cardno's proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.
- The scope and the period of Cardno's services are as described in Cardno's proposal, and are subject to restrictions and limitations. Cardno did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Cardno in regards to it.
- Conditions may exist which were undetectable given the limited nature of the enquiry Cardno was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.
- In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Cardno's opinions are based upon information that existed at the time of the production of the Document. It is understood that the services provided allowed Cardno to form no more than an opinion of the actual conditions of the site at the time this Document was prepared and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.
- Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.
- Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Cardno for incomplete or inaccurate data supplied by others.
- Cardno may have retained sub consultants affiliated with Cardno to provide services for the benefit of Cardno. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any direct legal recourse to, and waives any claim, demand, or cause of action against, Cardno's affiliated companies, and their employees, officers and directors.

This assessment report is not any of the following:

- A Detailed Site Investigation (DSI) as stipulated in the NSW EPA *Consultants reporting on contaminated land* (2020)
- A Site Audit Report or Site Audit Statement as defined under the *Contaminated Land Management Act, 1997*.

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- A Detailed ESA or Environmental Site Investigation sufficient for an Environmental Auditor to be able to conclude a Site Audit Report and Site Audit Statement.
- A geotechnical report and the bore logs or test pit logs may not be sufficient as the basis for geotechnical advice.
- A detailed hydrogeological assessment in conformance with NSW DEC (2007) Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination.
- An assessment of groundwater contaminants potentially arising from other sites or sources nearby.

A total assessment of the site to determine suitability of the entire parcel of land at the site for one or more beneficial uses of land.

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APPENDIX

A

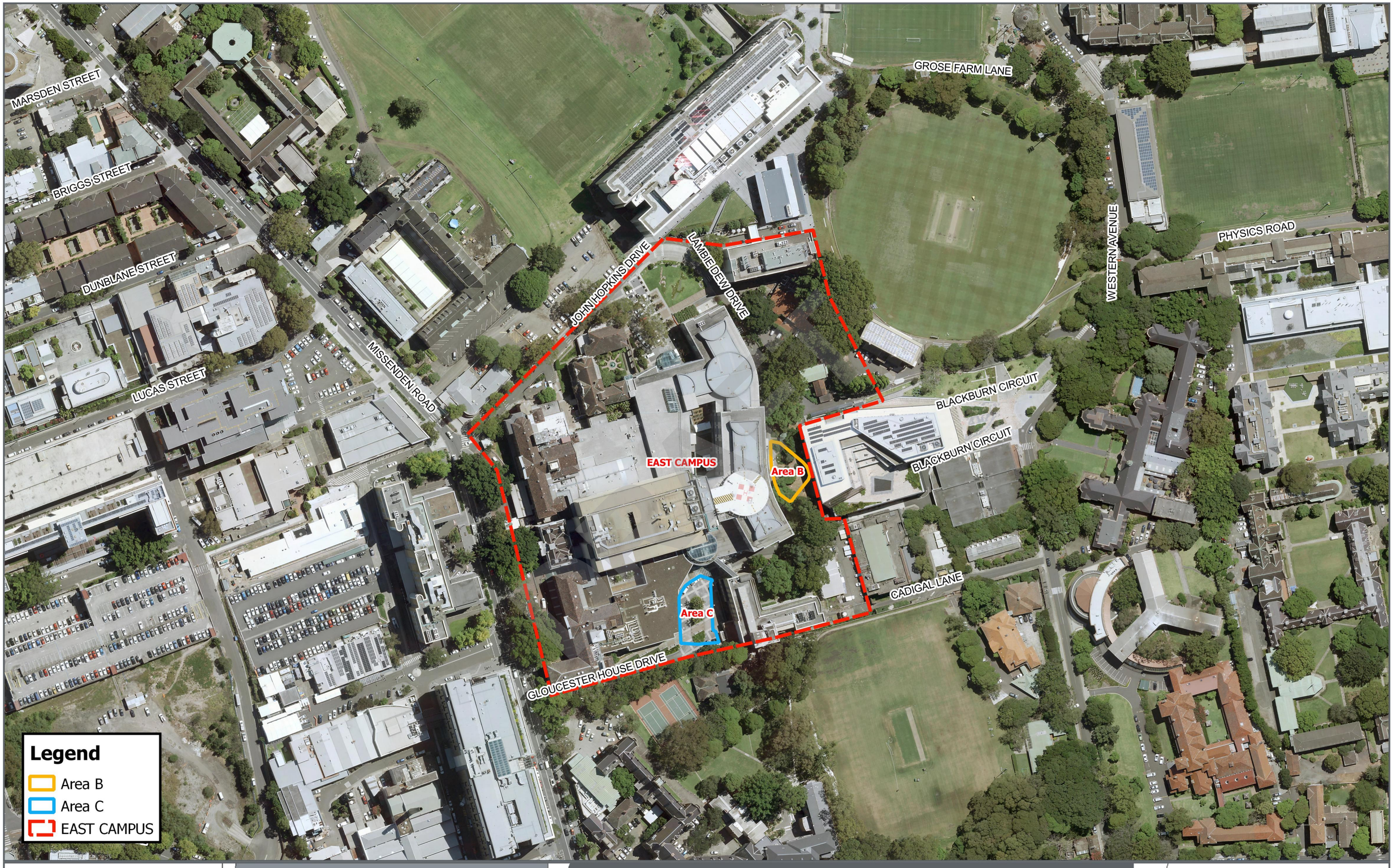
FIGURES

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NSW GOVERNMENT Health Infrastructure

FIGURE 1

1:2000 Scale at A3

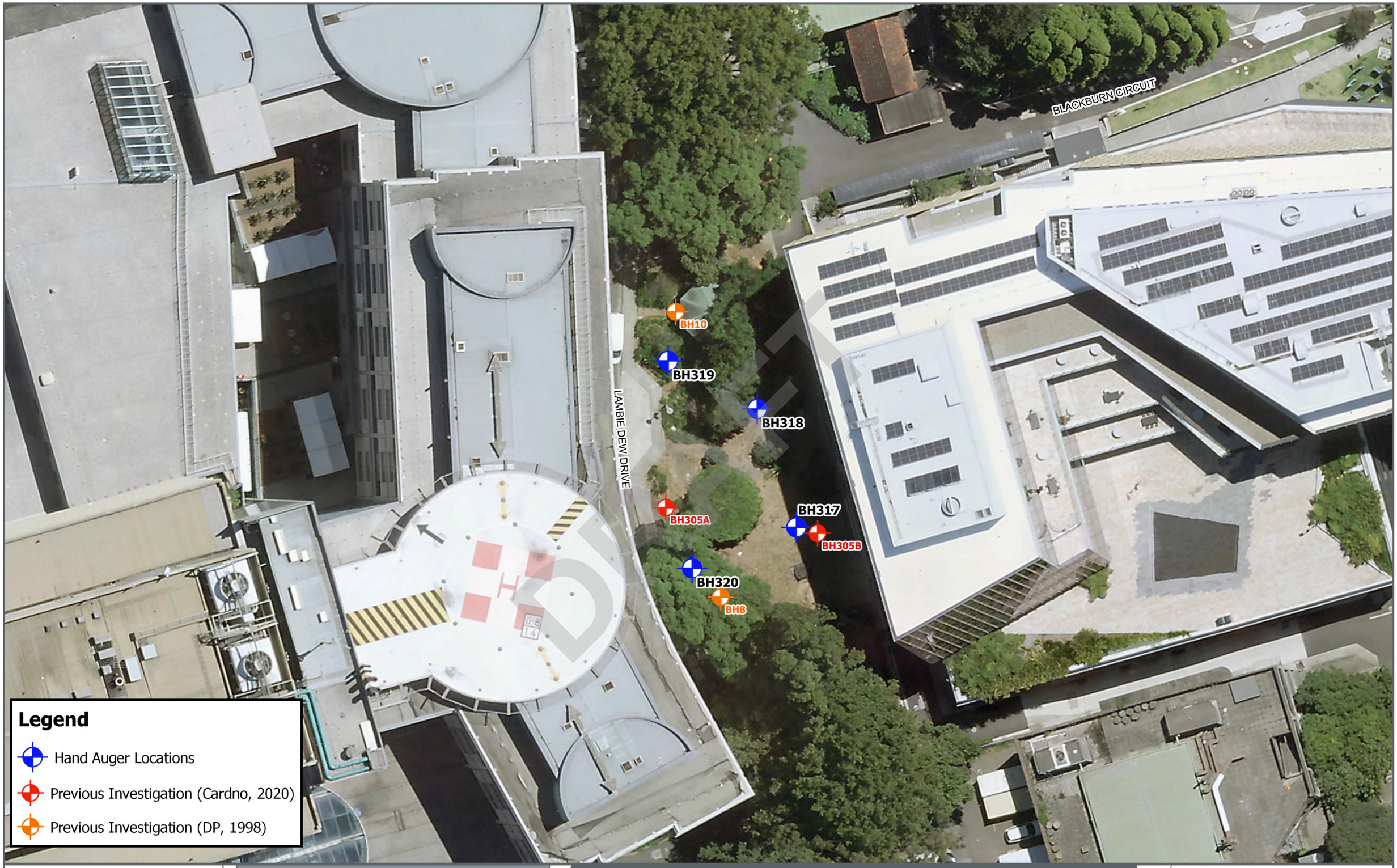
0 40 80 120 160 m

Royal Prince Alfred Hospital - East Campus

Area B and Area C - Site Investigation Plan

Cardno now Stantec

Map Produced by Cardno NSW/ACT Pty Ltd (SYD)
Date: 2022-6-22| Project: 80022026
Coordinate System: MGA Zone 56
Aerial imagery supplied by Metromap (2022)



NSW GOVERNMENT Health Infrastructure

FIGURE 2.1

1:400 Scale at A3

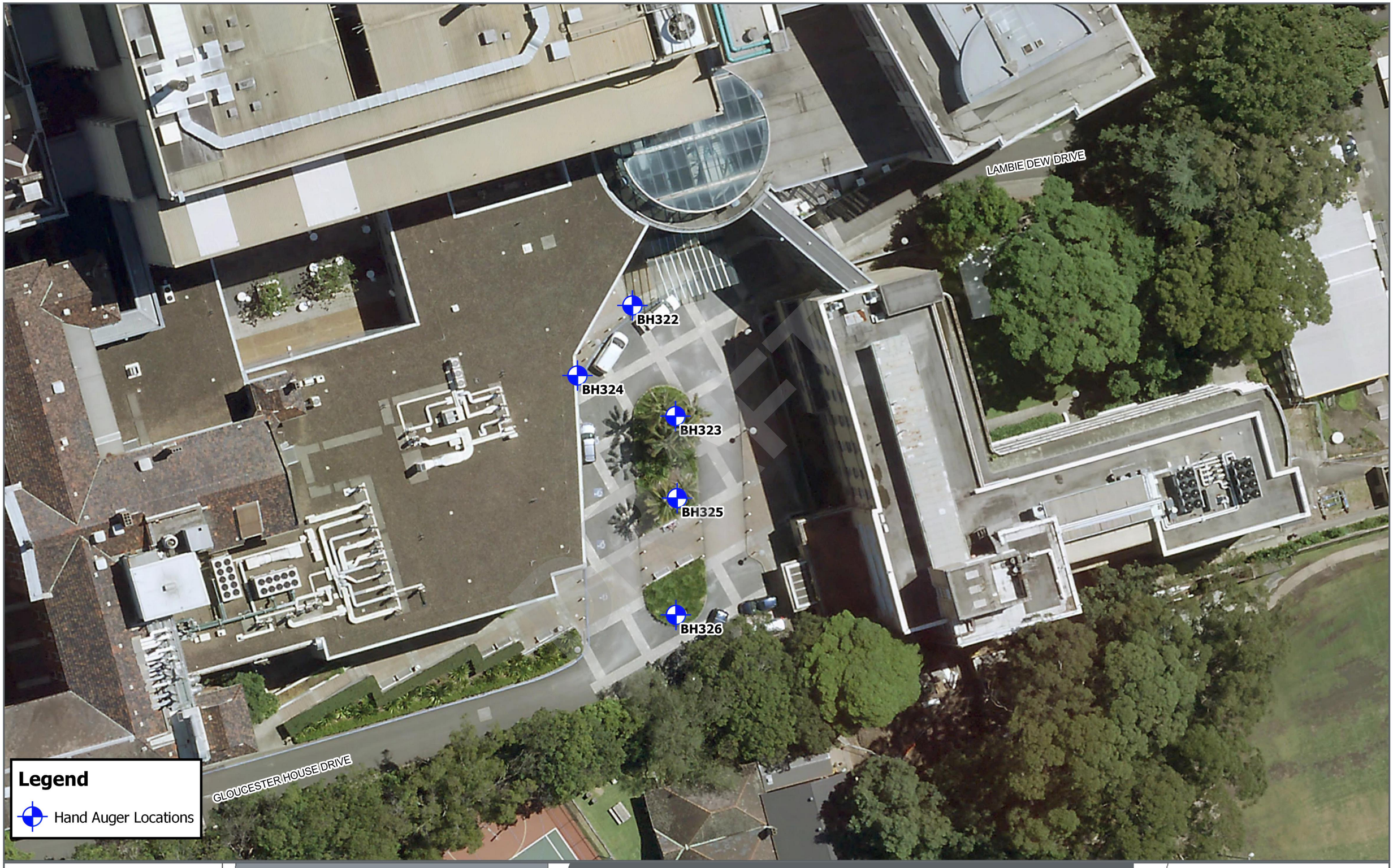
0 8 16 24 32 m

Royal Prince Alfred Hospital - East Campus

Area B - Site Investigation Plan

Cardno now Stantec

Map Produced by Cardno NSW/ACT Pty Ltd (SYD)
Date: 2022-6-21| Project: 80022026
Coordinate System: MGA Zone 56
Aerial imagery supplied by Metromap (2022)



NSW GOVERNMENT Health Infrastructure

FIGURE 2.2

1:400 Scale at A3

0 8 16 24 32 m

Royal Prince Alfred Hospital - East Campus

Area C - Site Investigation Plan

Cardno now Stantec

Map Produced by Cardno NSW/ACT Pty Ltd (SYD)
Date: 2022-6-21| Project: 80022026
Coordinate System: MGA Zone 56
Aerial imagery supplied by Metromap (2022)

APPENDIX

B

PHOTOGRAPHIC LOG

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Photograph 1: Area B (landscaped area east of RPA loading dock), view towards to north east



Photograph 2: Representative image of the shallow fill soil encountered at borehole BH319



Photograph 3: Representative image of the residual soil encountered at borehole BH320



Photograph 4: Area C (Gloucester House Plaza), view towards the south west/Gloucester Drive

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Photograph 5: Representative image of the asphalt/concrete surface layer encountered at borehole BH322



Photograph 6: Representative image of the fill soil material encountered within Area C

APPENDIX

C

DATA SUMMARY TABLES

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			BTEX								TPH					CRC Care TPH Fractions								PAH															
			Vic EPA IWRG 621 Other OCP (Total)*	Naphthalene (VOC)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	C6-C10	C10-C16	C16-C34	C34-C40	C10 - C40 (Sum of total)	F1: C6-C10 less BTEX	F2: >C10-C16 less Naphthalene	Benzo(a)pyrene TEQ (half LOR)_	Benzo(a)pyrene TEQ (upper bound) *	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	BaP TEQ (zero)	Benzo(a)pyrene	Benzo(b+j)fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene
			MG/KG	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR			0.1	0.5	0.1	0.1	0.1	0.2	0.1	0.3	20	20	50	50	50	20	50	100	100	100	20	50	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
NEPM 2013 EIL UR/POS, low pH, CEC, clay content - fresh																																						
0-2m																																						
NEPM 2013 EIL Comm./Ind., low pH, CEC, clay content - fresh																																						
0-2m																																						
NSW 2014 General Solid Waste CT1 (No Leaching)					10	288	600			1000	650				10000														0.8									
NSW 2014 General Solid Waste SCC1 (with leached)					18	518	1080			1800	650|6500				10000														10									
NSW 2014 Restricted Solid Waste CT2 (No Leaching)					40	1152	2400			4000	2600				40000														3.2									
NSW 2014 Restricted Solid Waste SCC2 (with leached)					72	2073	4320			7200	2600				40000														23									
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial																																						
PFAS NEMP 2.0 Table 2 Health Residential min soil access																																						
PFAS NEMP 2.0 Table 3 Ecological Direct Exposure - All Land Uses																																						
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses																																						
NEPM 2013 ESL Comm./Ind., Fine Soil																																						
0-2m					95	135	185			95		170[#4]						2500	6600		215	170								1.4[#5]								
NEPM 2013 HIL, Recreational C																							3[#7]															
NEPM 2013 HIL, Residential B																							4[#7]															
NEPM 2013 Soil HSL Residential A&B, for Vapour Intrusion, Sand																																						
0-1m					0.5	160	55			40											45	110																
1-2m					0.5	220	NL[#13]			60											70	240																
NEPM 2013 Management Limits, C/I, Fine Soil											800[#4]	1000[#4]				800	1000	5000	10000																		
NEPM 2013 Management Limits, R/P&POS, Fine Soil											800[#4]	1000[#4]				800	1000	3500	10000																		

Field_ID	Sample Depth Range	Sampled Date																																					
BH305A_0.1	0.1	30/11/2021	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	23	170	200	393	<20	<50	290	170	460	<20	<50	0.6	1.2	<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
BH305A_2.0	2	30/11/2021	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	0.6	1.2	<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
BH317_0.0-0.2	0-0.2	10/06/2022	<0.1	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	31	58	57	146	<20	<50	120	130	250	<20	<50	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5
BH317_1.0-1.1	1-1.1	10/06/2022	-	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	0.6	1.2	<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
BH318_0.0-0.2	0-0.2	10/06/2022	<0.1	<0.5	<0.1	<0.1	<0.1	0.4	0.2	0.6	<20	<20	100	<50	100	<20	<50	170	<100	170	<20	<50	1.3	1.6	<0.5	<0.5	<1	0.6	1	0.8	<0.5	0.8	<0.5	1.1	<0.5	1.8	<0.5
BH318_0.5-0.7	0.5-0.7	10/06/2022	<0.1	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	93	<50	93	<20	<50	150	<100	150	<20	<50	2.2	2.5	<0.5	<0.5	<0.5	1	2	1.5	0.9	1.9	1	1.7	<0.5	2	<0.5
BH319_0.0-0.2	0-0.2	10/06/2022	<0.1	<0.5	<0.1	<0.1	<0.1	0.2	0.2	0.4	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	0.6	1.2	<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
BH319_1.0-1.1	1-1.1	10/06/2022	-	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	0.6	1.2	<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
BH320_0-0.2	0-0.2	10/06/2022	<0.1	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	1.5	1.8	<0.5	<0.5	<0.5	0.7	1.3	1	0.5	0.7	0.6	0.8	<0.5	0.6	<0.5
BH320_1.0-1.1	1-1.1	10/06/2022	-	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	0.6	1.2	<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
BH322_0.3-0.45	0.3-0.45	10/06/2022	<0.1	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	70	<50	70	<20	<50	130	<100	130	<20	<50	0.6	1.2	<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
BH323_0.0-0.2	0-0.2	10/06/2022	<0.1	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	0.6	1.2	<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
BH323_0.4-0.6	0.4-0.6	10/06/2022	-	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	0.6	1.2	<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
BH324_0.3-0.45	0.3-0.45	10/06/2022	<0.1	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	83	<50	83	<20	<50	150	<100	150	<20	<50	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5
BH325_0.0-0.2	0-0.2	10/06/2022	<0.1	<0.5	<0.1	<0.1	<0.1	<0.2	0.2	<0.3	<20	27	110	53	190	<20	<50	200	<100	200	<20	<50	0.6	1.2	<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
BH325_0.6-0.8	0.6-0.8	10/06/2022	-	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	170	<50	170	<20	<50	270	<100	270	<20	<50	4.6	4.8	<0.5	<0.5	<2	2.2	4.3	3.2	2.1	4.7	1.7	4.8	<0.5	4.4	<0.5
BH326_0.0-0.2	0-0.2	10/06/2022	<0.1	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	35	120	61	216	<20	<50	220	110	330	<20	<50	0.6	1.2	<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
Statistical Summary																																						
Number of Results			12	15	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Number of Detects			0	0	0	0	0	2	3	2	0	4	9	4	9	0	0	9	3	9	0	0	17	17	0	0	0	4	4	4	3	4	3	4	0	6	0
Minimum Concentration			<0.1	<0.5	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<20	<20	<50	<50	<50	<20	<50	<100	<100	<100	<20	<50	0.6	1.2	<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
Minimum Detect			ND	ND	ND	ND	ND	0.2	0.2	0.4	ND	23	58	53	70	ND	ND	120	110	130	ND	ND	0.6	1.2	ND	ND	ND	0.6	1	0.8	0.5	0.7	0.6	0.8	ND	0.6	ND
Maximum Concentration			<0.1	<0.5	<0.1	<0.1	<0.1	0.4	0.2	0.6	<20	35	170	200	393	<20	<50	290	170	460	<20	<50	4.6	4.8	<0.5	<0.5	<2	2.2	4.3	3.2	2.1	4.7	1.7	4.8	<0.5	4.4	<0.5
Maximum Detect			ND	ND	ND	ND	ND	0.4	0.2	0.6	ND	35	170	200	393	ND	ND	290	170	460	ND	ND	4.6	4.8	ND	ND	ND	2.2	4.3	3.2	2.1	4.7	1.7	4.8	ND	4.4	ND
Average Concentration			0.05	0.25	0.05	0.05	0.05	0.12	0.076	0.19	10	14	69	41	98	10	25	124	65	148	10	25	1	1.5	0.25	0.25	0.31	0.46	0.7	0.57	0.41	0.67	0.4	0.69	0.25	0.75	0.25
Median Concentration			0.05	0.25	0.05	0.05	0.05	0.1	0.05	0.15	10	10	58	25	70	10	25	120	50	130	10	25	0.6	1.2	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Standard Deviation			0	0	0	0	0	0.075	0.059	0.12	0	8.6	51	43	100	0	0	83	36	121	0	0	1	0.91	0	0	0.19	0.5	1.1	0.76	0.47	1.1	0.39	1.1	0	1.1	0
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	1	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	1	0	0	0	0	0	0	4	0	0	0	0	0	0	0

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								Asbestos																	
			Indeno(1,2,3-c,d)pyrene	Naphthalene	PAHs (Sum of total)	Phenanthrene	Pyrene	Approximate Sample Mass	FA- Comment	Synthetic Fibres - Comment	ACM - Comment	Asbestos from ACM in Soil	Asbestos from FA & AF in Soil	Asbestos Reported Result	AF - Comment	Organic Fibres - Comment	Mass ACM	Mass AF	Mass Asbestos in AF	Mass Asbestos in FA & AF	Mass Asbestos in ACM	Mass Asbestos in FA	Mass FA
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	g	Comment	Comment	Comment	%w/w	%w/w	Comment	Comment	Comment	g	g	g	g	g	g	g
LOR			0.5	0.5	0.5	0.5	0.5																		
NEPM 2013 EIL UR/POS, low pH, CEC, clay content - fresh																									
0-2m				170[#1]																					
NEPM 2013 EIL Comm./Ind., low pH, CEC, clay content - fresh																									
0-2m				370																					
NSW 2014 General Solid Waste CT1 (No Leaching)					200																				
NSW 2014 General Solid Waste SCC1 (with leached)																									
NSW 2014 Restricted Solid Waste CT2 (No Leaching)																									
NSW 2014 Restricted Solid Waste SCC2 (with leached)																									
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial																									
PFAS NEMP 2.0 Table 2 Health Residential min soil access																									
PFAS NEMP 2.0 Table 3 Ecological Direct Exposure - All Land Uses																									
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses																									
NEPM 2013 ESL Comm./Ind., Fine Soil																									
0-2m																									
NEPM 2013 HIL, Recreational C					300[#8]																				
NEPM 2013 HIL, Residential B					400[#8]																				
NEPM 2013 Soil HSL Residential A&B, for Vapour Intrusion, Sand																									
0-1m				3																					
1-2m				NL[#13]																					
NEPM 2013 Management Limits, C/I, Fine Soil																									
NEPM 2013 Management Limits, R/P&POS, Fine Soil																									
Field_ID	**Sample Depth Range**	**Sampled Date**																							
BH305A_0.1	0.1	30/11/2021	<0.5	<0.5	<0.5	<0.5	<0.5	101	Nil	Nil	Nil	0	0	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected	Nil	Organic fibres detected	0	0	0	0	0	0	0
BH305A_2.0	2	30/11/2021	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH317_0.0-0.2	0-0.2	10/06/2022	<0.5	<0.5	0.6	<0.5	<0.5	97	Nil	Nil	Nil	0	0	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected	Nil	Organic fibres detected	0	0	0	0	0	0	0
BH317_1.0-1.1	1-1.1	10/06/2022	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH318_0.0-0.2	0-0.2	10/06/2022	<0.5	<0.5	6.9	<1	1.8	49	Nil	Nil	Nil	0	0	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected	Nil	Organic fibres detected	0	0	0	0	0	0	0
BH318_0.5-0.7	0.5-0.7	10/06/2022	0.7	<0.5	13	<1	2.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH319_0.0-0.2	0-0.2	10/06/2022	<0.5	<0.5	<0.5	<0.5	<0.5	122	Nil	Nil	Nil	0	0	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected	Nil	Organic fibres detected	0	0	0	0	0	0	0
BH319_1.0-1.1	1-1.1	10/06/2022	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH320_0-0.2	0-0.2	10/06/2022	0.5	<0.5	7.3	0.5	1.4	127	Nil	Nil	Nil	0	0	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected	Nil	Organic fibres detected	0	0	0	0	0	0	0
BH320_1.0-1.1	1-1.1	10/06/2022	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH322_0.3-0.45	0.3-0.45	10/06/2022	<0.5	<0.5	<0.5	<0.5	<0.5	74	Nil	Nil	Nil	0	0	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected	Nil	Organic fibres detected	0	0	0	0	0	0	0
BH323_0.0-0.2	0-0.2	10/06/2022	<0.5	<0.5	<0.5	<0.5	<0.5	122	Nil	Nil	Nil	0	0	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected	Nil	Organic fibres detected	0	0	0	0	0	0	0
BH323_0.4-0.6	0.4-0.6	10/06/2022	<0.5	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH324_0.3-0.45	0.3-0.45	10/06/2022	<0.5	<0.5	1.1	<0.5	0.5	92	Nil	Nil	Nil	0	0	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected	Nil	Organic fibres detected	0	0	0	0	0	0	0
BH325_0.0-0.2	0-0.2	10/06/2022	<0.5	<0.5	<0.5	<0.5	<0.5	98	Nil	Nil	Nil	0	0	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected	Nil	Organic fibres detected	0	0	0	0	0	0	0
BH325_0.6-0.8	0.6-0.8	10/06/2022	1.5	<0.5	30	<2	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH326_0.0-0.2	0-0.2	10/06/2022	<0.5	<0.5	<0.5	<0.5	<0.5	41	Nil	Nil	Nil	0	0	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected	Nil	Organic fibres detected	0	0	0	0	0	0	0
Statistical Summary																									
Number of Results			17	17	17	17	17	10	0	0	0	10	10	10	0	0	10	10	10	10	10	10	10		
Number of Detects			3	0	6	1	5	10	0	0	0	10	10	10	0	0	10	10	10	10	10	10	10		
Minimum Concentration			<0.5	<0.5	<0.5	<0.5	<0.5	41	99999	99999	99999	0	0	0.01	99999	99999	0	0	0	0	0	0	0		
Minimum Detect			0.5	ND	0.6	0.5	0.5	41	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Maximum Concentration			1.5	<0.5	30	<2	5.2	127	0	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0		
Maximum Detect			1.5	ND	30	0.5	5.2	127	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Average Concentration			0.36	0.25	3.6	0.34	0.82	92				0	0	0.01			0	0	0	0	0	0	0		
Median Concentration			0.25	0.25	0.25	0.25	0.25	98				0	0	0.01			0	0	0	0	0	0	0		
Standard Deviation			0.32	0	7.7	0.2	1.3	30				0	0	0			0	0	0	0	0	0	0		
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

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				Metals								Inorganics	SVOCs	Phenols												Halogenated Phenols								
				Respirable Fibres - Comment	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Moisture Content (dried @ 103°C)	EPN	3/4-Methylphenol (m/p-cresol)	2,4-dimethylphenol	2,4-dinitrophenol	2-methylphenol	2-nitrophenol	3-&4-methylphenol	4,6-Dinitro-2-methylphenol	4,6-Dinitro-o-cyclohexyl phenol	4-chloro-3-methylphenol	4-nitrophenol	Cresol (Total)	Phenol	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,6-dichlorophenol	2-chlorophenol	Pentachlorophenol	tetrachlorophenols	Vic EPA IWRG 621 OCP (Total)*
		Comment	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	MG/KG
LOR			2	0.4	5	5	5	0.1	5	5	1	0.2	0.4	0.5	5	0.2	1	0.4	5	20	1	5	0.5	0.5	1	1	0.5	0.5	0.5	1	10	0.1
NEPM 2013 EIL UR/POS, low pH, CEC, clay content - fresh																																	
0-2m			100[#2]		410	170	1100[#2]		170	520																							
NEPM 2013 EIL Comm./Ind., low pH, CEC, clay content - fresh																																	
0-2m			160		680	160	1800		290	750																							
NSW 2014 General Solid Waste CT1 (No Leaching)			100	20	100		100	4	40							4000								4000		8000	40						
NSW 2014 General Solid Waste SCC1 (with leached)			500	100	1900		1500	50	1050							7200								200	518	14400	72						
NSW 2014 Restricted Solid Waste CT2 (No Leaching)			400	80	400		400	16	160							16000								16000		32000	160						
NSW 2014 Restricted Solid Waste SCC2 (with leached)			2000	400	7600		6000	200	4200							28800								28800	2073	57600	288						
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial																																	
PFAS NEMP 2.0 Table 2 Health Residential min soil access																																	
PFAS NEMP 2.0 Table 3 Ecological Direct Exposure - All Land Uses																																	
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses																																	
NEPM 2013 ESL Comm./Ind., Fine Soil																																	
0-2m																																	
NEPM 2013 HIL, Recreational C			300[#9]	90		17000	600[#10]	80[#11]	1200	30000														4000	40000						120		
NEPM 2013 HIL, Residential B			500[#9]	150		30000	1200[#10]	120[#11]	1200	60000														4700	45000						130		
NEPM 2013 Soil HSL Residential A&B, for Vapour Intrusion, Sand																																	
0-1m																																	
1-2m																																	
NEPM 2013 Management Limits, C/I, Fine Soil																																	
NEPM 2013 Management Limits, R/P&POS, Fine Soil																																	

Field_ID	Sample Depth Range	Sampled Date																																
BH305A_0.1	0.1	30/11/2021	0	4.1	<0.4	14	71	39	0.2	9.7	110	24	<0.2	-	<0.5	<5	<0.2	<1	<0.4	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.1
BH305A_2.0	2	30/11/2021	-	8.1	<0.4	36	7.2	36	<0.1	10	17	20	<0.2	-	<0.5	<5	<0.2	<1	<0.4	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.1
BH317_0.0-0.2	0-0.2	10/06/2022	No trace asbestos detected	6.5	<0.4	13	53	110	0.2	9.4	130	17	<0.2	<0.4	<0.5	<5	<0.2	<1	-	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.1
BH317_1.0-1.1	1-1.1	10/06/2022	-	7.6	<0.4	23	13	60	0.1	5.5	32	22	-	<0.4	<0.5	<5	<0.2	<1	-	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	-
BH318_0.0-0.2	0-0.2	10/06/2022	No trace asbestos detected	11	<0.4	16	75	140	0.4	11	190	29	<0.2	<0.4	<0.5	<5	<0.2	<1	-	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.1
BH318_0.5-0.7	0.5-0.7	10/06/2022	-	9.6	<0.4	23	15	97	0.4	5.2	61	19	<0.2	<0.4	<0.5	<5	<0.2	<1	-	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.1
BH319_0.0-0.2	0-0.2	10/06/2022	No trace asbestos detected	<2	<0.4	21	50	6.5	<0.1	94	59	7.1	<0.2	<0.4	<0.5	<5	<0.2	<1	-	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.1
BH319_1.0-1.1	1-1.1	10/06/2022	-	8.1	<0.4	19	6.3	39	<0.1	<5	8.4	21	-	<0.4	<0.5	<5	<0.2	<1	-	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	-
BH320_0-0.2	0-0.2	10/06/2022	0	42	0.5	17	460	730	1	10	290	20	<0.2	<0.4	<0.5	<5	<0.2	<1	-	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	0.14
BH320_1.0-1.1	1-1.1	10/06/2022	-	7.7	<0.4	25	<5	35	<0.1	<5	5	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH322_0.3-0.45	0.3-0.45	10/06/2022	No trace asbestos detected	2.9	<0.4	18	48	32	0.2	32	120	13	<0.2	<0.4	<0.5	<5	<0.2	<1	-	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.1
BH323_0.0-0.2	0-0.2	10/06/2022	No trace asbestos detected	5.6	<0.4	16	30	22	<0.1	16	69	14	<0.2	<0.4	<0.5	<5	<0.2	<1	-	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.1
BH323_0.4-0.6	0.4-0.6	10/06/2022	-	2.9	<0.4	8.7	14	30	<0.1	<5	9.3	12	-	<0.4	<0.5	<5	<0.2	<1	-	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	-
BH324_0.3-0.45	0.3-0.45	10/06/2022	No trace asbestos detected	10	<0.4	19	99	210	0.5	21	270	16	<0.2	<0.4	<0.5	<5	<0.2	<1	-	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.1
BH325_0.0-0.2	0-0.2	10/06/2022	No trace asbestos detected	4.1	<0.4	13	26	14	<0.1	8.8	56	19	<0.2	<0.4	<0.5	<5	0.3	<1	-	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.1
BH325_0.6-0.8	0.6-0.8	10/06/2022	-	6.9	<0.4	17	38	68	0.4	14	84	13	-	<0.4	<0.5	<5	<0.2	<1	-	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	-
BH326_0.0-0.2	0-0.2	10/06/2022	No trace asbestos detected	5.7	<0.4	18	54	26	0.1	13	110	43	<0.2	<0.4	<0.5	<5	<0.2	<1	-	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.1
Statistical Summary																																		
Number of Results			2	17	17	17	17	17	17	17	17	17	12	14	16	16	16	16	2	16	16	16	16	16	16	16	16	16	16	16	16	16	16	12
Number of Detects			2	16	1	17	16	17	10	14	17	17	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Minimum Concentration			0	<2	<0.4	8.7	<5	6.5	<0.1	<5	5	7.1	<0.2	<0.4	<0.5	<5	<0.2	<1	<0.4	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	<0.1
Minimum Detect			ND	2.9	0.5	8.7	6.3	6.5	0.1	5.2	5	7.1	ND	ND	ND	ND	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.14
Maximum Concentration			0	42	0.5	36	460	730	1	94	290	43	<0.2	<0.4	<0.5	<5	0.3	<1	<0.4	<5	<20	<1	<5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<10	0.14
Maximum Detect			ND	42	0.5	36	460	730	1	94	290	43	ND	ND	ND	ND	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.14
Average Concentration				8.5	0.22	19	62	100	0.23	16	95	20	0.1	0.2	0.25	2.5	0.11	0.5		2.5	10	0.5	2.5	0.25	0.25	0.5	0.5	0.25	0.25	0.25	0.5	5	0.058
Median Concentration			0	6.9	0.2	18	38	39	0.1	10	69	19	0.1	0.2	0.25	2.5	0.1	0.5	0.2	2.5	10	0.5	2.5	0.25	0.25	0.5	0.5	0.25	0.25	0.25	0.5	5	0.05
Standard Deviation				9.1	0.073	6.1	106	171	0.25	21	86	8	0	0	0	0	0.05	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.026
Number of Guideline Exceedances			0	0	0	0	3	4	0	2	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	3	4	0	2	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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			Organochlorine Pesticides																																					
			4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor	Toxaphene	Tokuthion	Azinophos methyl	Bolstar (Sulprofos)	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Demeton-O	Demeton-S	Diazinon	Dichlorvos	Dimethoate	Disulfoton
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR			0.05	0.05	0.05	0.05	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
NEPM 2013 EIL UR/POS, low pH, CEC, clay content - fresh											180[#1]																													
0-2m																																								
NEPM 2013 EIL Comm./Ind., low pH, CEC, clay content - fresh											640																													
0-2m																																								
NSW 2014 General Solid Waste CT1 (No Leaching)														60[#3]	60[#3]	60[#3]														4									
NSW 2014 General Solid Waste SCC1 (with leached)														108	108	108														7.5									
NSW 2014 Restricted Solid Waste CT2 (No Leaching)														240[#3]	240[#3]	240[#3]														16									
NSW 2014 Restricted Solid Waste SCC2 (with leached)														432	432	432														30									
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial																																								
PFAS NEMP 2.0 Table 2 Health Residential min soil access																																								
PFAS NEMP 2.0 Table 3 Ecological Direct Exposure - All Land Uses																																								
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses																																								
NEPM 2013 ESL Comm./Ind., Fine Soil																																								
0-2m																																								
NEPM 2013 HIL, Recreational C						10		70				400					20				10		10	400	30					250									
NEPM 2013 HIL, Residential B						10		90				600					20				10		15	500	30					340									
NEPM 2013 Soil HSL Residential A&B, for Vapour Intrusion, Sand																																								
0-1m																																								
1-2m																																								
NEPM 2013 Management Limits, C/I, Fine Soil																																								
NEPM 2013 Management Limits, R/P&POS, Fine Soil																																								
Field_ID	**Sample Depth Range**	**Sampled Date**																																						
BH305A_0.1	0.1	30/11/2021	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH305A_2.0	2	30/11/2021	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH317_0.0-0.2	0-0.2	10/06/2022	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH317_1.0-1.1	1-1.1	10/06/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH318_0.0-0.2	0-0.2	10/06/2022	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH318_0.5-0.7	0.5-0.7	10/06/2022	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH319_0.0-0.2	0-0.2	10/06/2022	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH319_1.0-1.1	1-1.1	10/06/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH320_0-0.2	0-0.2	10/06/2022	0.08	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	0.06	0.14	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH320_1.0-1.1	1-1.1	10/06/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH322_0.3-0.45	0.3-0.45	10/06/2022	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH323_0.0-0.2	0-0.2	10/06/2022	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH323_0.4-0.6	0.4-0.6	10/06/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH324_0.3-0.45	0.3-0.45	10/06/2022	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH325_0.0-0.2	0-0.2	10/06/2022	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
BH325_0.6-0.8	0.6-0.8	10/06/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH326_0.0-0.2	0-0.2	10/06/2022	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Statistical Summary																																							
Number of Results			12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Number of Detects			1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration			<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Minimum Detect			0.08	ND	ND	ND	ND	ND	ND	ND	0.06	0.14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration			0.08	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	0.06	0.14	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Maximum Detect			0.08	ND	ND	ND	ND	ND	ND	ND	0.06	0.14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration			0.03	0.025	0.025	0.025	0.025	0.05	0.025	0.025	0.028	0.035	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.25	0.1	0.1	0.1	0.1	0.1	0.1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Median Concentration			0.025	0.025	0.025	0.025	0.025	0.05	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.25	0.1	0.1	0.1	0.1	0.1	0.1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Standard Deviation			0.016	0	0	0	0	0	0	0	0.01	0.033	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

DRAFT

			Organophosphorous Pesticides																		Herbicides	Pesticides		Perfluorocarbons							Polychlorinated Biph				
			Ethion	Ethoprop	Fenitrothion	Fensulfothion	Fenthion	Malathion	Merphos	Methyl parathion	Mevinphos (Phosdrin)	Monocrotophos	Naled (Dibrom)	Omethoate	Phorate	Pyrazophos	Ronnel	Terbufos	Trichloronate	Tetrachlorvinphos	Dinoseb	Parathion	Pirimiphos-methyl	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoate (PFOA)	6:2 Fluorotelomer Sulfonate (6:2 FtS)	Sum of PFHxS and PFOS	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR			0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2	0.2	2	0.2	0.2	0.2	0.2	0.2	0.2	20	0.2	0.2	0.005	0.005	0.005	0.01	0.005	0.005	0.005	0.1	0.1	0.1	0.1	0.1
NEPM 2013 EIL UR/POS, low pH, CEC, clay content - fresh																																			
0-2m																																			
NEPM 2013 EIL Comm./Ind., low pH, CEC, clay content - fresh																																			
0-2m																																			
NSW 2014 General Solid Waste CT1 (No Leaching)																																			
NSW 2014 General Solid Waste SCC1 (with leached)																																			
NSW 2014 Restricted Solid Waste CT2 (No Leaching)																																			
NSW 2014 Restricted Solid Waste SCC2 (with leached)																								7.2	7.2	72									
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial																								20	20	50		20							
PFAS NEMP 2.0 Table 2 Health Residential min soil access																								2	2	20		2							
PFAS NEMP 2.0 Table 3 Ecological Direct Exposure - All Land Uses																									1	10									
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses																									0.01										
NEPM 2013 ESL Comm./Ind., Fine Soil																																			
0-2m																																			
NEPM 2013 HIL, Recreational C																																			
NEPM 2013 HIL, Residential B																																			
NEPM 2013 Soil HSL Residential A&B, for Vapour Intrusion, Sand																																			
0-1m																																			
1-2m																																			
NEPM 2013 Management Limits, C/I, Fine Soil																																			
NEPM 2013 Management Limits, R/P&POS, Fine Soil																																			
Field_ID	**Sample Depth Range**	**Sampled Date**																																	
BH305A_0.1	0.1	30/11/2021	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<20	<0.2	<0.2	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
BH305A_2.0	2	30/11/2021	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<20	<0.2	<0.2	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
BH317_0.0-0.2	0-0.2	10/06/2022	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<20	<0.2	<0.2	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.1	<0.1	<0.1	<0.1	<0.1
BH317_1.0-1.1	1-1.1	10/06/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH318_0.0-0.2	0-0.2	10/06/2022	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<20	<0.2	<0.2	<0.005	0.006	<0.005	<0.01	0.006	0.006	0.006	<0.1	<0.1	<0.1	<0.1	<0.1
BH318_0.5-0.7	0.5-0.7	10/06/2022	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<20	<0.2	<0.2	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
BH319_0.0-0.2	0-0.2	10/06/2022	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<20	<0.2	<0.2	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.1	<0.1	<0.1	<0.1	<0.1
BH319_1.0-1.1	1-1.1	10/06/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH320_0-0.2	0-0.2	10/06/2022	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<20	<0.2	<0.2	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.1	<0.1	<0.1	<0.1	<0.1
BH320_1.0-1.1	1-1.1	10/06/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH322_0.3-0.45	0.3-0.45	10/06/2022	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<20	<0.2	<0.2	<0.005	0.0082[#1]	<0.005	<0.01	0.0082	0.0082	0.0082	<0.1	<0.1	<0.1	<0.1	<0.1
BH323_0.0-0.2	0-0.2	10/06/2022	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<20	<0.2	<0.2	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.1	<0.1	<0.1	<0.1	<0.1
BH323_0.4-0.6	0.4-0.6	10/06/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH324_0.3-0.45	0.3-0.45	10/06/2022	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<20	<0.2	<0.2	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.1	<0.1	<0.1	<0.1	<0.1
BH325_0.0-0.2	0-0.2	10/06/2022	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<20	<0.2	<0.2	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.1	<0.1	<0.1	<0.1	<0.1
BH325_0.6-0.8	0.6-0.8	10/06/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH326_0.0-0.2	0-0.2	10/06/2022	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<20	<0.2	<0.2	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.1	<0.1	<0.1	<0.1	<0.1
Statistical Summary																																			
Number of Results			12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	16	12	12	9	9	9	9	9	9	9	12	12	12	12	12
Number of Detects			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2	2	0	0	0	0	0
Minimum Concentration			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<20	<0.2	<0.2	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.1	<0.1	<0.1	<0.1	<0.1
Minimum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.006	ND	ND	0.006	0.006	0.006	ND	ND	ND	ND	ND
Maximum Concentration			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<20	<0.2	<0.2	<0.005	0.0082	<0.005	<0.01	0.0082	0.0082	0.0082	<0.1	<0.1	<0.1	<0.1	<0.1
Maximum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0082	ND	ND	0.0082	0.0082	0.0082	ND	ND	ND	ND	ND
Average Concentration			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	0.1	1	0.1	0.1	0.1	0.1	0.1	0.1	10	0.1	0.1	0.0025	0.0035	0.0025	0.005	0.0035	0.0035	0.0035	0.05	0.05	0.05	0.05	0.05
Median Concentration			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1	0.1	1	0.1	0.1	0.1	0.1	0.1	0.1	10	0.1	0.1	0.0025	0.0025	0.0025	0.005	0.0025	0.0025	0.0025	0.05	0.05	0.05	0.05	0.05
Standard Deviation			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0021	0	0	0.0021	0.0021	0.0021	0	0	0	0	0
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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			enyls			Acid Sulphate Soils			
			Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	pH (F)	Analysed Material	pH (Fox)	Reaction Rate_
			mg/kg	mg/kg	mg/kg	pH Unit	%	pH Unit	-
LOR			0.1	0.1	0.1	0.1	0.1	0.1	0
NEPM 2013 EIL UR/POS, low pH, CEC, clay content - fresh									
0-2m									
NEPM 2013 EIL Comm./Ind., low pH, CEC, clay content - fresh									
0-2m									
NSW 2014 General Solid Waste CT1 (No Leaching)					<50				
NSW 2014 General Solid Waste SCC1 (with leached)					<50				
NSW 2014 Restricted Solid Waste CT2 (No Leaching)					<50				
NSW 2014 Restricted Solid Waste SCC2 (with leached)					<50				
PFAS NEMP 2.0 Table 2 Health Industrial/Commercial									
PFAS NEMP 2.0 Table 2 Health Residential min soil access									
PFAS NEMP 2.0 Table 3 Ecological Direct Exposure - All Land Uses									
PFAS NEMP 2.0 Table 3 Ecological Indirect Exposure - All Land Uses									
NEPM 2013 ESL Comm./Ind., Fine Soil									
0-2m									
NEPM 2013 HIL, Recreational C									
NEPM 2013 HIL, Residential B									
NEPM 2013 Soil HSL Residential A&B, for Vapour Intrusion, Sand									
0-1m									
1-2m									
NEPM 2013 Management Limits, C/I, Fine Soil									
NEPM 2013 Management Limits, R/P&POS, Fine Soil									
Field_ID	**Sample Depth Range**	**Sampled Date**							
BH305A_0.1	0.1	30/11/2021	<0.1	<0.1	<0.1	-	-	-	-
BH305A_2.0	2	30/11/2021	<0.1	<0.1	<0.1	-	-	-	-
BH317_0.0-0.2	0-0.2	10/06/2022	<0.1	<0.1	<0.1	-	-	-	-
BH317_1.0-1.1	1-1.1	10/06/2022	-	-	-	7.7	-	6	3
BH318_0.0-0.2	0-0.2	10/06/2022	<0.1	<0.1	<0.1	-	-	-	-
BH318_0.5-0.7	0.5-0.7	10/06/2022	<0.1	<0.1	<0.1	-	-	-	-
BH319_0.0-0.2	0-0.2	10/06/2022	<0.1	<0.1	<0.1	-	-	-	-
BH319_1.0-1.1	1-1.1	10/06/2022	-	-	-	5.2	-	4.1	2
BH320_0-0.2	0-0.2	10/06/2022	<0.1	<0.1	<0.1	-	-	-	-
BH320_1.0-1.1	1-1.1	10/06/2022	-	-	-	-	-	-	-
BH322_0.3-0.45	0.3-0.45	10/06/2022	<0.1	<0.1	<0.1	-	-	-	-
BH323_0.0-0.2	0-0.2	10/06/2022	<0.1	<0.1	<0.1	-	-	-	-
BH323_0.4-0.6	0.4-0.6	10/06/2022	-	-	-	-	-	-	-
BH324_0.3-0.45	0.3-0.45	10/06/2022	<0.1	<0.1	<0.1	-	-	-	-
BH325_0.0-0.2	0-0.2	10/06/2022	<0.1	<0.1	<0.1	-	-	-	-
BH325_0.6-0.8	0.6-0.8	10/06/2022	-	-	-	-	-	-	-
BH326_0.0-0.2	0-0.2	10/06/2022	<0.1	<0.1	<0.1	-	-	-	-
Statistical Summary									
Number of Results			12	12	12	2	0	2	2
Number of Detects			0	0	0	2	0	2	2
Minimum Concentration			<0.1	<0.1	<0.1	5.2	99999	4.1	2
Minimum Detect			ND	ND	ND	5.2	ND	4.1	2
Maximum Concentration			<0.1	<0.1	<0.1	7.7	0	6	3
Maximum Detect			ND	ND	ND	7.7	ND	6	3
Average Concentration			0.05	0.05	0.05				
Median Concentration			0.05	0.05	0.05	6.45		5.05	2.5
Standard Deviation			0	0	0				
Number of Guideline Exceedances			0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0

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			PAH	Metals		Inorganics		
			Benzo(a)pyrene	Lead	Nickel	pH (Final)	pH (Initial)	pH (after HCL)
			µg/L	mg/L	mg/L	pH Unit	pH_Units	pH_Units
LOR			1	0.01	0.01	0.1	0.1	0.1
NSW 2014 General Solid Waste TCLP1 (leached)			40	5	2			
NSW 2014 Restricted Solid Waste TCLP2 (leached)			160	20	8			
Field_ID	**Sample_Depth_Range**	**Sampled_Date_Time**						
BH310_0.0-0.2	0-0.2	10/06/2022	-	0.02	-	5.1	7.7	2.2
BH311_0.1 - 0.2	0.1-0.2	10/06/2022	-	-	0.06	5.2	8.3	2.2
BH315_0.3-0.4	0.3-0.4	10/06/2022	<1	-	-	5.7	8.5	2.1
BH315_0.6-0.7	0.6-0.7	10/06/2022	-	0.03	-	5.3	7.8	2.1
BH318_0.0-0.2	0-0.2	10/06/2022	-	0.02	-	5.2	7.5	2.4
BH318_0.5-0.7	0.5-0.7	10/06/2022	<1	-	-	5.2	7.3	2.2
BH319_0.0-0.2	0-0.2	10/06/2022	-	-	0.05	5.1	6.3	2.2
BH320_0-0.2	0-0.2	10/06/2022	-	0.09	-	5.1	7.5	2
BH324_0.3-0.45	0.3-0.45	10/06/2022	-	<0.01	-	8.5	9.8	2.1
BH325_0.6-0.8	0.6-0.8	10/06/2022	<1	-	-	6	8.5	2.4
Statistical Summary								
Number of Results			3	5	2	10	10	10
Number of Detects			0	4	2	10	10	10
Minimum Concentration			<1	<0.01	0.05	5.1	6.3	2
Minimum Detect			ND	0.02	0.05	5.1	6.3	2
Maximum Concentration			<1	0.09	0.06	8.5	9.8	2.4
Maximum Detect			ND	0.09	0.06	8.5	9.8	2.4
Average Concentration			0.5	0.033		5.6	7.9	2.2
Median Concentration			0.5	0.02	0.055	5.2	7.75	2.2
Standard Deviation			0	0.033		1	0.93	0.13
Number of Guideline Exceedances			0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0

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APPENDIX

D

BOREHOLE LOGS AND PID CALIBRATION CERTIFICATE

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Explanatory Notes

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. Material descriptions are deduced from field observation or engineering examination, and may be appended or confirmed by in situ or laboratory testing. The information is dependent on the scope of investigation, the extent of sampling and testing, and the inherent variability of the conditions encountered.

Subsurface investigation may be conducted by one or a combination of the following methods.

Method	
Test Pitting: excavation/trench	
BH	Backhoe bucket
EX	Excavator bucket
R	Ripper
H	Hydraulic Hammer
X	Existing excavation
N	Natural exposure
Manual drilling: hand operated tools	
HA	Hand Auger
Continuous sample drilling	
PT	Push tube
PS	Percussion sampling
SON	Sonic drilling
Hammer drilling	
AH	Air hammer
AT	Air track
Spiral flight auger drilling	
AS	Auger screwing
AD/V	Continuous flight auger: V-bit
AD/T	Continuous spiral flight auger: TC-Bit
HFA	Continuous hollow flight auger
Rotary non-core drilling	
WB	Washbore drilling
RR	Rock roller
Rotary core drilling	
PQ	85mm core (wire line core barrel)
HQ	63.5mm core (wire line core barrel)
NMLC	51.94mm core (conventional core barrel)
NQ	47.6mm core (wire line core barrel)
DT	Diatube (concrete coring)

Sampling is conducted to facilitate further assessment of selected materials encountered.

Sampling method	
Soil sampling	
B	Bulk disturbed sample
D	Disturbed sample
C	Core sample
ES	Environmental soil sample
SPT	Standard Penetration Test sample
U	Thin wall tube 'undisturbed' sample
Water sampling	
WS	Environmental water sample

Field testing may be conducted as a means of assessment of the in situ conditions of materials.

Field testing	
SPT	Standard Penetration Test
HP/PP	Hand/Pocket Penetrometer
Dynamic Penetrometers (blows per noted increment)	
DCP	Dynamic Cone Penetrometer
PSP	Perth Sand Penetrometer
MC	Moisture Content
VS	Vane Shear
PBT	Plate Bearing Test
IMP	Borehole Impression Test
PID	Photo Ionization Detector

If encountered, refusal (R), virtual refusal (VR) or hammer bouncing (HB) of penetrometers may be noted.

The quality of the rock can be assessed by the degree of natural defects/fractures and the following.

Rock quality description	
TCR	Total Core Recovery (%) (length of core recovered divided by the length of core run)
RQD	Rock Quality Designation (%) (sum of axial lengths of core greater than 100mm long divided by the length of core run)

Notes on groundwater conditions encountered may include.

Groundwater	
Not Encountered	Excavation is dry in the short term
Not Observed	Water level observation not possible
Seepage	Water seeping into hole
Inflow	Water flowing/flooding into hole

Perched groundwater may result in a misleading indication of the depth to the true water table. Groundwater levels are also likely to fluctuate with variations in climatic and site conditions.

Notes on the stability of excavations may include.

Excavation conditions	
Stable	No obvious/gross short term instability noted
Spalling	Material falling into excavation (minor/major)
Unstable	Collapse of the majority, or one or more face of the excavation

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Explanatory Notes: General Soil Description

The methods of description and classification of soils used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. In practice, a material is described as a soil if it can be remoulded by hand in its field condition or in water. The dominant component is shown in upper case, with secondary components in lower case. In general descriptions cover: soil type, plasticity or particle size/shape, colour, strength or density, moisture and inclusions.

In general, soil types are classified according to the dominant particle on the basis of the following particle sizes.

Soil Classification		Particle Size (mm)
CLAY		< 0.002
SILT		0.002 0.075
SAND	fine	0.075 to 0.21
	medium	0.21 to 0.6
	coarse	0.6 to 2.36
GRAVEL	fine	2.36 to 6.7
	medium	6.7 to 19
	coarse	19 to 63
COBBLES		63 to 200
BOULDERS		> 200

Soil types may be qualified by the presence of minor components on the basis of field examination methods and/or the soil grading.

Terminology	In coarse grained soils		In fine soils
	% fines	% coarse	% coarse
Trace	≤5	≤15	≤15
With	>5, ≤12	>15, ≤30	>15, ≤30

The strength of cohesive soils is classified by engineering assessment or field/lab testing as follows.

Strength	Symbol	Undrained shear strength
Very Soft	VS	≤12kPa
Soft	S	12kPa to ≤25kPa
Firm	F	25kPa to ≤50kPa
Stiff	St	50kPa to ≤100kPa
Very Stiff	VSt	100kPa to ≤200kPa
Hard	H	>200kPa

Cohesionless soils are classified on the basis of relative density as follows.

Relative Density	Symbol	Density Index
Very Loose	VL	<15%
Loose	L	15% to ≤35%
Medium Dense	MD	35% to ≤65%
Dense	D	65% to ≤85%
Very Dense	VD	>85%

The plasticity of cohesive soils is defined by the Liquid Limit (LL) as follows.

Plasticity	Silt LL	Clay LL
Low plasticity	≤ 35%	≤ 35%
Medium plasticity	N/A	> 35% ≤ 50%
High plasticity	> 50%	> 50%

The moisture condition of soil (*w*) is described by appearance and feel and may be described in relation to the Plastic Limit (PL), Liquid Limit (LL) or Optimum Moisture Content (OMC).

Moisture condition and description	
Dry	Cohesive soils: hard, friable, dry of plastic limit. Granular soils: cohesionless and free-running
Moist	Cool feel and darkened colour: Cohesive soils can be moulded. Granular soils tend to cohere
Wet	Cool feel and darkened colour: Cohesive soils usually weakened and free water forms when handling. Granular soils tend to cohere

The structure of the soil may be described as follows.

Zoning	Description
Layer	Continuous across exposure or sample
Lens	Discontinuous layer (lenticular shape)
Pocket	Irregular inclusion of different material

The structure of soil layers may include: defects such as softened zones, fissures, cracks, joints and root-holes; and coarse grained soils may be described as strongly or weakly cemented.

The soil origin may also be noted if possible to deduce.

Soil origin and description	
Fill	Anthropogenic deposits or disturbed material
Topsoil	Zone of soil affected by roots and root fibres
Peat	Significantly organic soils
Colluvial	Transported down slopes by gravity/water
Aeolian	Transported and deposited by wind
Alluvial	Deposited by rivers
Estuarine	Deposited in coastal estuaries
Lacustrine	Deposited in freshwater lakes
Marine	Deposits in marine environments
Residual soil	Soil formed by in situ weathering of rock, with no structure/fabric of parent rock evident
Extremely weathered material	Formed by in situ weathering of geological formations, with the structure/fabric of parent rock intact but with soil strength properties

The origin of the soil generally cannot be deduced solely on the appearance of the material and the inference may be supplemented by further geological evidence or other field observation. Where there is doubt, the terms ‘possibly’ or ‘probably’ may be used

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Explanatory Notes: General Rock Description

The methods of description and classification of rocks used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. In practice, if a material cannot be remoulded by hand in its field condition or in water, it is described as a rock. In general, descriptions cover: rock type, grain size, structure, colour, degree of weathering, strength, minor components or inclusions, and where applicable, the defect types, shape, roughness and coating/infill.

Rock types are generally described according to the predominant grain or crystal size, and in groups for each rock type as follows.

Rock type	Groups
Sedimentary	Deposited, carbonate (porous or non), volcanic ejection
Igneous	Felsic (much quartz, pale), Intermediate, or mafic (little quartz, dark)
Metamorphic	Foliated or non-foliated
Duricrust	Cementing minerology (iron oxides or hydroxides, silica, calcium carbonate, gypsum)

Reference should be made to AS1726 for details of the rock types and methods of classification.

The classification of rock weathering is described based on definitions in AS1726 and summarised as follows.

Term and symbol		Definition
Residual Soil	RS	Soil developed on rock with the mass structure and substance of the parent rock no longer evident
Extremely weathered	XW	Weathered to such an extent that the rock has 'soil-like' properties. Mass structure and substance still evident
Distinctly weathered	DW	The strength is usually changed and may be highly discoloured. Porosity may be increased by leaching, or decreased due to deposition in pores. May be distinguished into MW (Moderately Weathered) and HW (Highly Weathered).
Slightly weathered	SW	Slightly discoloured; little or no change of strength from fresh rock
Fresh Rock	FR	The rock shows no sign of decomposition or staining

The rock material strength can be defined based on the point load index as follows.

Term and symbol		Point Load Index I_s50 (MPa)
Very Low	VL	0.03 to 0.1
Low	L	0.1 to 0.3
Medium	M	0.3 to 1.0
High	H	1.0 to 3
Very High	VH	3 to 10
Extremely High	EH	> 10

It is important to note that the rock material strength as above is distinct from the rock mass strength which can be significantly weaker due to the effect of defects.

A preliminary assessment of rock strength may be made using the field guide detailed in AS1726, and this is conducted in the absence of point load testing.

The defect spacing measured normal to defects of the same set or bedding, is described as follows.

Definition	Defect Spacing (mm)
Thinly laminated	< 6
Laminated	6 to 20
Very thinly bedded	20 to 60
Thinly bedded	60 to 200
Medium bedded	200 to 600
Thickly bedded	600 to 2000
Very thickly bedded	> 2000

Terms for describing rock and defects are as follows.

Defect Terms			
Joint	JT	Sheared zone	SZ
Bedding Parting	BP	Seam	SM
Foliation	FL	Vein	VN
Cleavage	CL	Drill Lift	DL
Crushed Seam	CS	Handling Break	HB
Fracture Zone	FZ	Drilling Break	DB

The shape and roughness of defects in the rock mass are described using the following terms.

Planarity		Roughness	
Planar	PR	Very Rough	VR
Curved	CU	Rough	RF
Undulose	UN	Smooth	S
Irregular	IR	Slickensided	SL
Stepped	ST	Polished	POL
Discontinuous	DIS		

The coating or infill associated with defects in the rock mass are described as follows.

Infill and Coating		
Clean	CN	
Stained	SN	
Carbonaceous	X	
Minerals	MU	Unidentified mineral
	MS	Secondary mineral
	KT	Chlorite
	CA	Calcite
	Fe	Iron Oxide
	Qz	Quartz
Veneer	VNR	Thin or patchy coating
Coating	CT	Infill up to 1mm

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Graphic Symbols Index

CLAY	SILT	SAND	GRAVEL
Silty CLAY	Clayey SILT	Clayey SAND	Clayey GRAVEL
Sandy CLAY	Sandy SILT	Silty SAND	Silty GRAVEL
Gravelly CLAY	Gravelly SILT	Gravelly SAND	Sandy GRAVEL
Silty Gravelly CLAY	Clayey Sandy SILT	Clayey Silty SAND	Clayey Silty GRAVEL
Silty Sandy CLAY	Clayey Gravelly SILT	Clayey Gravelly SAND	Clayey Sandy GRAVEL
Sandy Gravelly CLAY	Sandy Gravelly SILT	Silty Gravelly SAND	Silty Sandy GRAVEL

COBBLES & BOULDERS	Sedimentary rock: fine, mostly clay (CLAYSTONE)	Igneous rock: Felsic, fine (RHYOLITE)
PEAT, highly organic soil	Sedimentary rock: fine, mostly silt (SILTSTONE)	Igneous rock: Felsic, coarse (GRANITE)
TOPSOIL	Sedimentary rock: fine, silt and clay (MUDSTONE, SHALE, LAMINITE)	Igneous rock: Mafic, fine to medium (BASALT, DOLERITE)
FILL	Sedimentary rock: medium (SANDSTONE, GREYWACKE)	Igneous rock: Mafic, coarse (GABBRO)
FILL: Asphalt or Bituminous Seal	Sedimentary rock: fine to coarse, angular (BRECCIA)	Metamorphic rock: Foliated, fine to medium (SLATE, PHYLLITE, SHIST)
FILL: Ballast	Sedimentary rock: coarse, rounded (CONGLOMERATE)	Metamorphic rock: Foliated, coarse (GNEISS)
FILL: Concrete	Sedimentary rock: Organic (COAL)	Metamorphic rock: Non-foliated (QUARTZITE, HORNFELS, MARBLE)
FILL: Roadbase	Sedimentary rock: Carbonate (LIMESTONE, DOLOMITE)	
	Sedimentary rock: Volcanic (TUFF, VOLCANIC BRECCIA, AGGLOMERATE)	

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REPORT OF BOREHOLE: BH317

SHEET: 1 OF 1

CLIENT: TSA Management c/o NSW Health
DRILL RIG: Hand Auger

PROJECT: Royal Prince Alfred Hospital Investigation Works
CONTRACTOR:

LOCATION: Area B
INCLINATION: -90°
LOGGED: MB
DATE: 10/6/22

JOB NO: 80022026
HOLE DEPTH: 1.00 m
CHECKED: AB
DATE: 22/6/22

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	PID (ppm) / Contam Ranking	CONSTRUCTION
HA		0.0		E1 0.00-0.20 m			Fill: Silty CLAY low to medium plasticity, dark brown, trace organic	<0.5	
							Fill: CLAY low to medium plasticity, dark brown, mottled grey, soft		
		0.5		E2 0.50-0.60 m				<0.5	
		1.0	1.00	E3 1.00-1.10 m			END OF AUGER HOLE @ 1.00 m STABLE TARGET DEPTH	<0.5	
		1.5							
		2.0							

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This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP 8_03 LIB_26 SEPT 2012_ICD - EDITED.GLB Log GAP WELL RPA HOSPITAL INVESTIGATION_ENVIRO.GPJ <<DrawingFile>> 16/06/2022 14:35 10.0.000

REPORT OF BOREHOLE: BH318

SHEET: 1 OF 1

CLIENT: TSA Management c/o NSW Health
DRILL RIG: Hand Auger

PROJECT: Royal Prince Alfred Hospital Investigation Works
CONTRACTOR:

LOCATION: Area B
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JOB NO: 80022026
HOLE DEPTH: 1.00 m
CHECKED: AB
DATE: 22/6/22

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	PID (ppm) / Contam Ranking	CONSTRUCTION
HA		0.0		E1 0.00-0.20 m			Fill: Silty CLAY low to medium plasticity, dark brown, trace organic	<0.5	
							Fill: CLAY low to medium plasticity, dark brown, mottled grey, soft		
		0.5		E2 0.50-0.70 m				<0.5	
		1.0	1.00	E3 1.00-1.10 m			END OF AUGER HOLE @ 1.00 m STABLE TARGET DEPTH	<0.5	
		1.5							
		2.0							

DRAFT

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GAP 8_03.LIB 26 SEPT 2012_ICD - EDITED.GLB Log GAP WELL RPA HOSPITAL INVESTIGATION_ENVIRO.GPJ <<DrawingFile>> 16/06/2022 14:35 10.0.000

REPORT OF BOREHOLE: BH319

SHEET: 1 OF 1

CLIENT: TSA Management c/o NSW Health
DRILL RIG: Hand Auger

PROJECT: Royal Prince Alfred Hospital Investigation Works
CONTRACTOR:

LOCATION: Area B
INCLINATION: -90°
LOGGED: MB
DATE: 10/6/22

JOB NO: 80022026
HOLE DEPTH: 1.00 m
CHECKED: AB
DATE: 22/6/22

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	PID (ppm) / Contam Ranking	CONSTRUCTION
HA		0.0		E1 0.00-0.20 m			Fill: Silty CLAY low to medium plasticity, dark brown, trace organic	<0.5	
							Fill: CLAY low to medium plasticity, dark brown, mottled grey, soft		
		0.5		E2 0.50-0.70 m				<0.5	
		1.0	1.00	E3 1.00-1.10 m			END OF AUGER HOLE @ 1.00 m STABLE TARGET DEPTH	<0.5	
		1.5							
		2.0							

DRAFT

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GAP gINT FN. F05
RL3

GAP 8_03 LIB_26 SEPT 2012_ICD - EDITED.GLB Log GAP WELL RPA HOSPITAL INVESTIGATION_ENVIRO.GPJ <<DrawingFile>> 16/06/2022 14:35 10.0.000

REPORT OF BOREHOLE: BH320

SHEET: 1 OF 1

CLIENT: TSA Management c/o NSW Health
DRILL RIG: Hand Auger

PROJECT: Royal Prince Alfred Hospital Investigation Works
CONTRACTOR:

LOCATION: Area B
INCLINATION: -90°
LOGGED: MB
DATE: 10/6/22

JOB NO: 80022026
HOLE DEPTH: 1.10 m
CHECKED: AB
DATE: 22/6/22

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	PID (ppm) / Contam Ranking	CONSTRUCTION
HA		0.0					Fill: Silty CLAY low to medium plasticity, dark brown, trace organic		
		0.5					Fill: CLAY low to medium plasticity, dark brown, pale grey, soft	<1.0	
		1.0	1.10				CLAY high plasticity, dark brown-red, stiff		
		1.5					END OF AUGER HOLE @ 1.10 m STABLE TARGET DEPTH		
		2.0							

DRAFT

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GAP 8_03.LIB 26 SEPT 2012_ICD - EDITED.GLB Log GAP WELL RPA HOSPITAL INVESTIGATION_ENVIRO.GPJ <<DrawingFile>> 16/06/2022 14:35 10.0.000

REPORT OF BOREHOLE: BH322

SHEET: 1 OF 1

CLIENT: TSA Management c/o NSW Health
DRILL RIG: Hand Auger

PROJECT: Royal Prince Alfred Hospital Investigation Works
CONTRACTOR:

LOCATION: Area C
INCLINATION: -90°
LOGGED: MB
DATE: 10/6/22

JOB NO: 80022026
HOLE DEPTH: 0.45 m
CHECKED: AB
DATE: 22/6/22

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	PID (ppm) / Contam Ranking	CONSTRUCTION
		0.0					ASPHALT		
HA							CONCRETE		
				E1 0.30-0.45 m			DGB very hard (stabilised roadbase)	<0.5	
			0.45				END OF AUGER HOLE @ 0.45 m STABLE REFUSAL		
		0.5							
		1.0							
		1.5							
		2.0							

DRAFT

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GAP 8_03 LIB_26 SEPT 2012_ICD - EDITED.GLB Log GAP WELL RPA HOSPITAL INVESTIGATION_ENVIRO.GPJ <<DrawingFile>> 22/06/2022 14:07 10.0.000

REPORT OF BOREHOLE: BH323

SHEET: 1 OF 1

CLIENT: TSA Management c/o NSW Health
DRILL RIG: Hand Auger

PROJECT: Royal Prince Alfred Hospital Investigation Works
CONTRACTOR:

LOCATION: Area C
INCLINATION: -90°
LOGGED: MB
DATE: 10/6/22

JOB NO: 80022026
HOLE DEPTH: 0.70 m
CHECKED: AB
DATE: 22/6/22

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	PID (ppm) / Contam Ranking	CONSTRUCTION
HA		0.0		E1 0.00-0.20 m			Fill: Silty SAND fine to medium grained, dark brown, trace organic, trace rootlets, loose, dry to moist	<1.0	
				E2 0.40-0.60 m			Fill: Silty SAND fine to medium grained, dark brown, trace fine to medium grained gravel, loose, moist	<1.0	
		0.5							
			0.70				END OF AUGER HOLE @ 0.70 m STABLE REFUSAL		
		1.0							
		1.5							
		2.0							

DRAFT

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GAP 8_03 LIB_26 SEPT 2012_ICD - EDITED.GLB Log GAP WELL RPA HOSPITAL INVESTIGATION_ENVIRO.GPJ <<DrawingFile>> 16/06/2022 14:36 10.0.000

REPORT OF BOREHOLE: BH324

SHEET: 1 OF 1
DRILL RIG: Hand Auger
CONTRACTOR:

CLIENT: TSA Management c/o NSW Health
PROJECT: Royal Prince Alfred Hospital Investigation Works
LOCATION: Area C
JOB NO: 80022026

INCLINATION: -90°
HOLE DEPTH: 0.45 m

LOGGED: MB DATE: 10/6/22
CHECKED: AB DATE: 22/6/22

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	PID (ppm) / Contam Ranking	CONSTRUCTION
		0.0					ASPHALT		
HA							CONCRETE		
				E1 0.30-0.45 m			DGB very hard (stabilised roadbase)	<0.5	
			0.45				END OF AUGER HOLE @ 0.45 m STABLE REFUSAL		
		0.5							
		1.0							
		1.5							
		2.0							

DRAFT

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GAP 8_03 LIB_26 SEPT 2012_ICD - EDITED.GLB Log GAP WELL RPA HOSPITAL INVESTIGATION_ENVIRO.GPJ <<DrawingFile>> 22/06/2022 14:07 10.0.000

REPORT OF BOREHOLE: BH325

SHEET: 1 OF 1

CLIENT: TSA Management c/o NSW Health
DRILL RIG: Hand Auger

PROJECT: Royal Prince Alfred Hospital Investigation Works
CONTRACTOR:

LOCATION: Area C
INCLINATION: -90°
LOGGED: MB
DATE: 10/6/22

JOB NO: 80022026
HOLE DEPTH: 0.70 m
CHECKED: AB
DATE: 22/6/22

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	PID (ppm) / Contam Ranking	CONSTRUCTION
HA		0.0		E1 0.00-0.20 m			Fill: Silty SAND fine to medium grained, dark brown, trace organic, trace rootlets, loose, dry to moist	<1.0	
		0.5		E2 0.60-0.80 m			Fill: Silty SAND fine to medium grained, dark brown, trace fine to medium grained gravel, loose, moist	<1.0	
			0.70				END OF AUGER HOLE @ 0.70 m STABLE REFUSAL		
		1.0							
		1.5							
		2.0							

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GAP 8_03 LIB_26 SEPT 2012_ICD - EDITED.GLB Log GAP WELL RPA HOSPITAL INVESTIGATION_ENVIRO.GPJ <<DrawingFile>> 16/06/2022 14:36 10.0.000

REPORT OF BOREHOLE: BH326

SHEET: 1 OF 1

CLIENT: TSA Management c/o NSW Health
DRILL RIG: Hand Auger

PROJECT: Royal Prince Alfred Hospital Investigation Works
CONTRACTOR:

LOCATION: Area C
INCLINATION: -90°
LOGGED: MB
DATE: 10/6/22

JOB NO: 80022026
HOLE DEPTH: 0.30 m
CHECKED: AB
DATE: 22/6/22

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	PID (ppm) / Contam Ranking	CONSTRUCTION
HA		0.0		E1 0.00-0.20 m			Fill: Silty SAND fine to coarse grained, dark brown, trace fine to medium grained gravel, trace organic		
			0.30				END OF AUGER HOLE @ 0.30 m STABLE REFUSAL		
		0.5							
		1.0							
		1.5							
		2.0							

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GAP 8_03 LIB_26 SEPT 2012_ICD - EDITED.GLB Log GAP WELL RPA HOSPITAL INVESTIGATION_ENVIRO.GPJ <<DrawingFile>> 16/06/2022 14:36 10.0.000

AirMet Scientific P/L
Level 3, 18-26 Dickson Avenue
Artarmon
NSW 2064, Australia
Tel: 02 8425 8300
Fax: 02 8425 8399

Calibration Certificate

This document certifies that the instrument detailed has been calibrated to the parameters

Certificate Print Date: 3-Jun-2022
Calibration Date: 03-Jun-2022
Next Calibration Due: 3-Jun-2023

Call ID / Order No: 256449
Job No / Pack No: S2564490001

Customer: Sydney Environmental Group-ID 204172 Serial No: 592-930527
Description: MiniRAE 3000+, 10.6 eV lamp 1/2′′, Rechargeab

Calibration Summary

Frequency: 365 Days Temp: 22°C As Found: In Tolerance Result: Pass
Humidity: 45% Certificate: S2564490001

Desc	As Found Actual	As Found Result	As Left (Cal Status) Actual	As Left (Cal Status) Result
ISOBUTYLENE 100ppm	102.5	Pass	100.0	Pass

Standard Used

Equip ID	Description	Valid Until	Cert
SY485	AIR ZERO 20.9%vol, THC< 1 PPM	26-07-2024	O01579
SY484	ISOBUTYLENE 100PPM AIR Balance	15-08-2024	400300170

Completed By: Jason Cheng

Signed:

DRAFT

APPENDIX

E

LABORATORY CERTIFICATES

DRAFT

Cardno

now

Stantec

CHAIN OF CUSTODY AND ANALYSIS REQUEST

Page of

Contact	Michael Koerner	Project Name:	Royal Prine Alfred
Telephone Number:	0478 978 773	Project Number:	80022026
Alternative Contact:	Mitch Blencowe	PO No.:	
Telephone Number:	0476 354 778	Project Specific Quote No. :	
Sampler:	Michael Koerner	Turnaround Requirements:	24 HOUR TAT
Email Address (results and invoice):	michael.koerner@cardno.com.au; mitch.blencowe.com.au	Lab:	Eurofins | Unit F3, Building F, 16 Mars Rd, Lane Cove West NSW2066
Address:	Level 9 - The Forum, 203 Pacific Highway, St Leonards, New South Wales 2065 Australia	Attn:	Sample Receipt

Sample Information						Analysis Required											Comments
Cardno Sample ID	Laboratory Sample ID	No. Containers	Preservation	Date sampled	Matrix	B7A - TRH, BTEXN, PAH, Phenols, Metals (As, Cd, Cr, Co, Ni, Pb, Zn, Hg)	B15 - OCP, OPP, PCB	Asbestos (presence/absence)	Per-and Polyfluorinated Alkyl Substances (PFAS) - Short Suite	pH(Field)/pH(FOX)	BTEX						
BH310_0.0-0.2			ICE	10/06/2022	SOIL	X	X	X	X								
BH310_0.3-0.5			ICE	10/06/2022	SOIL					X							
BH311_0.1 - 0.2			ICE	10/06/2022	SOIL	X	X	X	X								
BH311_0.3-0.5			ICE	10/06/2022	SOIL					X							
BH312_0.-0.2			ICE	10/06/2022	SOIL												
BH312_0.3-0.5			ICE	10/06/2022	SOIL	X	X		X								
BH313_0.1-0.2			ICE	10/06/2022	SOIL	X	X	X	X								
BH313_0.5-0.6			ICE	10/06/2022	SOIL												
BH314_0.0-0.2			ICE	10/06/2022	SOIL												
BH314_0.5-0.6			ICE	10/06/2022	SOIL					X							
BH315_0.3-0.4			ICE	10/06/2022	SOIL	X	X	X	X								
BH315_0.6-0.7			ICE	10/06/2022	SOIL	X				X							
BH316_0.4-0.5			ICE	10/06/2022	SOIL	X	X	X	X								
BH316_0.8-1.0			ICE	10/06/2022	SOIL					X							
BH309_0.0-0.2			ICE	10/06/2022	SOIL	X	X	X	X								
BH309_0.5-0.6			ICE	10/06/2022	SOIL												
BH309_1.1-1.2			ICE	10/06/2022	SOIL	X				X							
BH323_0.0-0.2			ICE	10/06/2022	SOIL	X	X	X	X								
BH323_0.4-0.6			ICE	10/06/2022	SOIL	X											
BH325_0.0-0.2			ICE	10/06/2022	SOIL	X	X	X	X								
BH325_0.6-0.8			ICE	10/06/2022	SOIL	X											
BH326_0.0-0.2			ICE	10/06/2022	SOIL	X	X	X	X								
BH324_0.3-0.45			ICE	10/06/2022	SOIL	X	X	X	X								
BH322_0.3-0.45			ICE	10/06/2022	SOIL	X	X	X	X								
BH317_0.0-0.2			ICE	10/06/2022	SOIL	X	X	X	X								
BH317_0.5-0.6			ICE	10/06/2022	SOIL												
BH317_1.0-1.1			ICE	10/06/2022	SOIL	X				X							
BH318_0.0-0.2			ICE	10/06/2022	SOIL	X	X	X	X								
BH318_0.5-0.7			ICE	10/06/2022	SOIL	X											
BH318_1.0-1.1			ICE	10/06/2022	SOIL												
BH319_0.0-0.2			ICE	10/06/2022	SOIL	X	X	X	X								
BH319_0.5-0.7			ICE	10/06/2022	SOIL												
BH319_1.0-1.1			ICE	10/06/2022	SOIL	X				X							
Trip Blank			ICE	10/06/2022	SOIL						X						
Trip Spike			ICE	10/06/2022	SOIL						X						
QA100						X	X	X	X								Please split sample from BH317_0.0-0.2
QA200																	Please split sample from BH317_0.0-0.2. Please forward to Envirolab

DRAFT

Relinquished (name / company)	Michael Koerner Cardno ACT/NSW Pty Ltd	Received by: (name / company)		Relinquished by: (name / company)		Received by: (name / company)		Relinquished by: (name / company)			
Date & Time:	8/10/2022 18:44	Date & Time:		Date & Time:		Date & Time:		Date & Time:			
Signature:	MK	Signature:		Signature:		Signature:		Signature:			
Received by: (name / company)		Relinquished by: (name / company)		Received by: (name / company)		Relinquished by: (name / company)		Lab use:			
Date & Time:		Date & Time:		Date & Time:		Date & Time:		Samples Received: Cool or Ambient (circle one)			
Signature:		Signature:		Signature:		Signature:		Temperature Received at: (if applicable)			
								Transported by: Hand delivered / courier			

Courier
Chilled
7.4°C

896934
Adam B.
6:40 PM 10/6/22

CHAIN OF CUSTODY RECORD

Sydney Laboratory
Unit F3 Bld.F, 16 Mars Rd, Lane Cove West, NSW 2066
02 9900 8400 : EnviroSampleNSW@eurofins.com

Brisbane Laboratory
Unit 1, 21 Smallwood Pl , Murarrie, QLD 4172
07 3902 4600 : EnviroSampleQLD@eurofins.com

Melbourne Laboratory
2 Kingston Town Close, Oakleigh, VIC 3166
03 8564 5000 : EnviroSampleVic@eurofins.com

Company	Cardno (C/-SEA)	Project No	TBC
Address		Project Name	RPA HOSPITAL
Contact Name	MITCH BLENCOWE	Project Manager	TBC
Phone No	Cardno.	EDD Format (ESdat, EQuIS, Custom)	
Special Directions		Sampler(s)	PB.
Purchase Order		Handed over by	PB.
Quote ID No		Primary Email	enviro@sydneyenvironmental.com.au
		Secondary Email	patrick@sydneyenvironmental.com.au

Analytes

HOLD

No	Client Sample ID	Sampled Date (dd/mm/yy)	Matrix (Solid (S) Water (W))	Containers	Turnaround Time (TAT) Requirements	Sample Comments / Dangerous Goods Hazard Warning
1	BH310-0.1-0.2	10/6/22	Soil	X		
2	BH310-0.3-0.5					
3	BH311-0.1-0.2					
4	BH311-0.3-0.5					
5	BH312-0.1-0.2					
6	BH312-0.3-0.5					
7	BH313-0.1-0.2					
8	BH313-0.5-0.6					
9	BH314-0.0-0.2					
10	BH314-0.5-0.6					
11	BH315-0.3-0.4.					
12	~~BH315~~					
13	BH315-0.6-0.7					
14	BH316-0.4-0.5					
15	BH316-0.8-1.0.					
16	BH309-0-0.2					
17	BH309-0.5-0.6					
18	BH309-1.1-1.2					
19	BH323-0-0.2.					
20	BH323-0.4-0.6.					

	1L Plastic	250mL Plastic	125ml Plastic	250mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Refer to AS4464 WA Guidelines)
Total Counts								

Method of Shipment

Eurofins | mgt Laboratory Use Only	Received By		Signature		Date	Time	Temperature
	Received By		Signature		Date	Time	Report No

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request.

DRAFT

8/6/22

By 1/2

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

Sydney Laboratory
Unit F3 Bld F, 16 Mars Rd, Lane Cove West, NSW 2066
02 9900 8400 EnviroSampleNSW@eurofins.com

Brisbane Laboratory
Unit 1, 21 Smallwood Pl, Murarrie QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

Melbourne Laboratory
2 Kingston Town Close, Oakleigh, VIC 3166
03 8564 5000 EnviroSampleVic@eurofins.com

Company	Cardno (4-SEA)	Project Nr	TBC
Address		Project Name	RPA HOSPITAL
Contact Name	~~Michael~~ Mitch Blencowe	Project Manager	TBC
Phone Nr		EDD Format (ESdat, EQuIS, Custom)	
Special Directions	Cardno	Sampler(s)	PB,
Purchase Order		Relinquished by	PB
Quote ID Nr		Primary Email	enviro@sydneyenvironmental.com.au
		Secondary Email	patrick@sydneyenvironmental.com.au

Analytes (Note: Where results are required above limit of reporting (LOR), please state the required limit)

HOLD

Containers

Nr	Client Sample ID	Sampled Date (dd/mm/yy)	Matrix (Soil (S) Water (W))	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos ASB/FA, WA Oakdene)	Sample Comments / Dangerous Goods Hazard Warning
1	BH325-0-0.2	10/6/22	Soil					X				
2	BH325-0.6-0.8											
3	BH326-0-0.2											
4	~~BH326 0.6-0.8~~											
5	BH324-0.3-0.45											
6	BH322-0.3-0.45											
7	BH317-0-0.2											
8	BH317-0.5-0.6											
9	BH317-1.0-1.1											
10	BH318-0-0.2											
11	BH318-0.5-0.7											
12	BH318-1-1.1											
13	BH319-0-0.2											
14	BH319-0.5-0.7											
15	BH319-1.0-1.1											
16	TRIP BLANK											
17	TRIP SPIKE											
18												
19												
20												
	Total Counts											

TBC

Method of Shipment

Eurofins | mgt Laboratory Use Only	Received By		VTS / SMC / MEL / PER / ADL	Signature		Date		Time		Temperature	
	Accepted By		SYD / BNE / MEL / PER / ADL	Signature		Date		Time		Report No	

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request.

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Inbound Courier Samples

Patrick Brown <patrick@sydneyenvironmental.com.au>

Fri 2022-06-10 5:58 PM

To: #AU04_Enviro_Sample_NSW <EnviroSampleNSW@eurofins.com>

CAUTION: EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins.

Do not click on links or open attachments unless you recognise the sender and are certain that the content is safe.

Further to that last email, can you please please please add a soil trip blank / spike to those eskies as I didn't have one today.....

Much appreciated!

Kind Regards,

Patrick Brown Project Manager / Environmental Consultant

B.Sc.Adv.Hons. (Chemistry), NSW LAA (LAA001490)

Sydney Environmental Group

E: patrick@sydneyenvironmental.com.au
W: http://www.sydneyenvironmental.com.au
M: 0435 552 296
P: 1300 884 164

Sydney Environmental Group acknowledges the Traditional Owners of the land upon which we live and work and pay our respects to their Elders past, present and emerging.

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Sydney Environmental Group's management systems are certified to ISO9001:2015 (Quality), ISO45001:2015 (OH&S) and ISO14001:2015 (Environment).

Climate Active Carbon Neutral ORGANISATION

JAS-ANZ WWW.JAS-ANZ.ORG/REGISTER

Please consider the environment before printing this email.

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eurofins | Environment Testing

www.eurofins.com.au EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261 Site # 1254

Sydney
179 Magowar Road
Girraween NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 6253 4444
NATA # 2377 Site # 2370

Eurofins Environment Testing NZ Limited
NZBN: 9429046024954

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Sample Receipt Advice

Company name:	Cardno (NSW/ACT) Pty Ltd PLEASE USE STANTEC AUST
Contact name:	Michael Koerner
Project name:	ROYAL PRINCE ALFRED
Project ID:	80022026
Turnaround time:	1 Day
Date/Time received	Jun 10, 2022 6:50 PM
Eurofins reference	896934

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✗	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
✗	Split sample sent to requested external lab.
✗	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

No PFAS tub received for sample BH316_0.4-0.5, PFASshort has been cancelled. QA200 forwarded to Envirolab.
Samples received by the laboratory after 5.30pm are deemed to have been received the following working day.

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Hannah Mawbey on phone : or by email: HannahMawbey@eurofins.com

Results will be delivered electronically via email to Michael Koerner - michael.koerner@cardno.com.au.

Note: A copy of these results will also be delivered to the general Cardno (NSW/ACT) Pty Ltd PLEASE USE STANTEC AUST email address.

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Company Name: Cardno (NSW/ACT) Pty Ltd PLEASE USE STANTEC
Address: Level 9, 203 Pacific Highway
St Leonards
NSW 2065

Project Name: ROYAL PRINCE ALFRED
Project ID: 80022026

Order No.:
Report #: 896934
Phone: 0294967700
Fax: 02 9499 3902

Received: Jun 10, 2022 6:50 PM
Due: Jun 16, 2022
Priority: 2 Day
Contact Name: Michael Koerner

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Asbestos - AS4964	HOLD	Acid Sulfate Soils Field pH Test	BTEX	Eurofins Suite B15	Moisture Set	Eurofins Suite B7A	Per- and Polyfluoroalkyl Substances (PFASs) - Short	BTEX
Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**									
1	BH310_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027601	X				X	X	X	X	
2	BH310_0.3-0.5	Jun 10, 2022		Soil	S22-Jn0027602			X						
3	BH311_0.1 - 0.2	Jun 10, 2022		Soil	S22-Jn0027603	X				X	X	X	X	
4	BH311_0.3-0.5	Jun 10, 2022		Soil	S22-Jn0027604			X						
5	BH312_0.3-0.5	Jun 10, 2022		Soil	S22-Jn0027605					X	X	X	X	
6	BH313_0.1-0.2	Jun 10, 2022		Soil	S22-	X				X	X	X	X	

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Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
					Jn0027606									
7	BH314_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027607			X						
8	BH315_0.3-0.4	Jun 10, 2022		Soil	S22-Jn0027608	X				X	X	X	X	
9	BH315_0.6-0.7	Jun 10, 2022		Soil	S22-Jn0027609			X			X	X		
10	BH316_0.4-0.5	Jun 10, 2022		Soil	S22-Jn0027610	X				X	X	X		
11	BH309_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027611	X				X	X	X	X	
12	BH309_1.1-1.2	Jun 10, 2022		Soil	S22-Jn0027612			X			X	X		

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Eurofins Analytical Services Manager : Hannah Mawbey

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Sample Detail						Asbestos - AS4964	HOLD	Acid Sulfate Soils Field pH Test	BTEX	Eurofins Suite B15	Moisture Set	Eurofins Suite B7A	Per- and Polyfluoroalkyl Substances (PFASs) - Short	BTEX
Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
13	BH323_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027613	X				X	X	X	X	
14	BH323_0.4-0.6	Jun 10, 2022		Soil	S22-Jn0027614						X	X		
15	BH325_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027615	X				X	X	X	X	
16	BH325_0.6-0.8	Jun 10, 2022		Soil	S22-Jn0027616						X	X		
17	BH326_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027617	X				X	X	X	X	
18	BH324_0.3-0.45	Jun 10, 2022		Soil	S22-Jn0027618	X				X	X	X	X	
19	BH322_0.3-	Jun 10, 2022		Soil	S22-	X				X	X	X	X	

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Eurofins Analytical Services Manager : Hannah Mawbey

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Sample Detail						Asbestos - AS4964	HOLD	Acid Sulfate Soils Field pH Test	BTEX	Eurofins Suite B15	Moisture Set	Eurofins Suite B7A	Per- and Polyfluoroalkyl Substances (PFASs) - Short	BTEX
Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
	0.45				Jn0027619									
20	BH317_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027620	X				X	X	X	X	
21	BH317_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0027621			X			X	X		
22	BH318_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027622	X				X	X	X	X	
23	BH318_0.5-0.7	Jun 10, 2022		Soil	S22-Jn0027623					X	X	X		
24	BH319_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027624	X				X	X	X	X	
25	BH319_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0027625			X			X	X		

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Sample Detail						Asbestos - AS4964	HOLD	Acid Sulfate Soils Field pH Test	BTEX	Eurofins Suite B15	Moisture Set	Eurofins Suite B7A	Per- and Polyfluoroalkyl Substances (PFASs) - Short	BTEX
Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
26	Trip Blank	Jun 10, 2022		Soil	S22-Jn0027626				X					
27	Trip Spike	Jun 10, 2022		Soil	S22-Jn0027627									X
28	QA100	Jun 10, 2022		Soil	S22-Jn0027628	X				X	X	X	X	
29	BH312_0.-0.2	Jun 10, 2022		Soil	S22-Jn0027630		X							
30	BH313_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027631		X							
31	BH314_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027632		X							
32	BH316_0.8-1.0	Jun 10, 2022		Soil	S22-			X						

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Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
					Jn0027633									
33	BH309_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027634		X							
34	BH317_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027635		X							
35	BH318_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0027636		X							
36	BH319_0.5-0.7	Jun 10, 2022		Soil	S22-Jn0027637		X							
37	BH320_0-0.2	Jun 10, 2022		Soil	S22-Jn0027638		X							
38	BH320_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027639		X							

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Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
39	BH320_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0027640		X							
40	BH326_0-0.2	Jun 10, 2022		Soil	S22-Jn0027641		X							
Test Counts						15	11	8	1	17	23	23	15	1

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NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025–Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Stantec Australia Pty Ltd
Level 22, 570 Bourke Street
Melbourne
VIC 3000

Attention:	- ALL INVOICES
Report	896934-AID-V2
Project Name	ROYAL PRINCE ALFRED
Project ID	80022026
Received Date	Jun 10, 2022
Date Reported	Jun 17, 2022

Methodology:

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

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Project Name ROYAL PRINCE ALFRED
Project ID 80022026
Date Sampled Jun 10, 2022
Report 896934-AID-V2

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
BH310_0.0-0.2	22-Jn0027601	Jun 10, 2022	Approximate Sample 228g Sample consisted of: Brown coarse-grained sandy soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH311_0.1 - 0.2	22-Jn0027603	Jun 10, 2022	Approximate Sample 88g Sample consisted of: Brown coarse-grained sandy soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH313_0.1-0.2	22-Jn0027606	Jun 10, 2022	Approximate Sample 111g Sample consisted of: Brown coarse-grained sandy soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH315_0.3-0.4	22-Jn0027608	Jun 10, 2022	Approximate Sample 139g Sample consisted of: Brown coarse-grained sandy soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH316_0.4-0.5	22-Jn0027610	Jun 10, 2022	Approximate Sample 139g Sample consisted of: Brown coarse-grained sandy soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH309_0.0-0.2	22-Jn0027611	Jun 10, 2022	Approximate Sample 102g Sample consisted of: Brown coarse-grained sandy soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH323_0.0-0.2	22-Jn0027613	Jun 10, 2022	Approximate Sample 122g Sample consisted of: Brown coarse-grained sandy soil, organic debris and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH325_0.0-0.2	22-Jn0027615	Jun 10, 2022	Approximate Sample 98g Sample consisted of: Brown coarse-grained sandy soil, organic debris and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
BH326_0.0-0.2	22-Jn0027617	Jun 10, 2022	Approximate Sample 41g Sample consisted of: Brown coarse-grained sandy soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH324_0.3-0.45	22-Jn0027618	Jun 10, 2022	Approximate Sample 92g Sample consisted of: Brown coarse-grained sandy soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH322_0.3-0.45	22-Jn0027619	Jun 10, 2022	Approximate Sample 74g Sample consisted of: Brown coarse-grained sandy soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH317_0.0-0.2	22-Jn0027620	Jun 10, 2022	Approximate Sample 97g Sample consisted of: Brown coarse-grained sandy soil, organic debris and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH318_0.0-0.2	22-Jn0027622	Jun 10, 2022	Approximate Sample 49g Sample consisted of: Brown coarse-grained sandy soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
BH319_0.0-0.2	22-Jn0027624	Jun 10, 2022	Approximate Sample 122g Sample consisted of: Brown coarse-grained sandy soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
QA100	22-Jn0027628	Jun 10, 2022	Approximate Sample 21g Sample consisted of: Brown coarse-grained sandy soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.

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Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Sydney	Jun 14, 2022	Indefinite

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Project Name: ROYAL PRINCE ALFRED
Project ID: 80022026

Order No.:
Report #: 896934
Phone:
Fax:

Received: Jun 10, 2022 6:50 PM
Due: Jun 16, 2022
Priority: 2 Day
Contact Name: Michael Koerner

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Asbestos - AS4964	HOLD	Acid Sulfate Soils Field pH Test	BTEX	Eurofins Suite B15	Moisture Set	Eurofins Suite B7A	Per- and Polyfluoroalkyl Substances (PFASs) - Short	BTEX
Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**									
1	BH310_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027601	X				X	X	X	X	
2	BH310_0.3-0.5	Jun 10, 2022		Soil	S22-Jn0027602			X						
3	BH311_0.1 - 0.2	Jun 10, 2022		Soil	S22-Jn0027603	X				X	X	X	X	
4	BH311_0.3-0.5	Jun 10, 2022		Soil	S22-Jn0027604			X						
5	BH312_0.3-0.5	Jun 10, 2022		Soil	S22-Jn0027605					X	X	X	X	
6	BH313_0.1-0.2	Jun 10, 2022		Soil	S22-	X				X	X	X	X	

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Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
					Jn0027606									
7	BH314_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027607			X						
8	BH315_0.3-0.4	Jun 10, 2022		Soil	S22-Jn0027608	X				X	X	X	X	
9	BH315_0.6-0.7	Jun 10, 2022		Soil	S22-Jn0027609			X			X	X		
10	BH316_0.4-0.5	Jun 10, 2022		Soil	S22-Jn0027610	X				X	X	X		
11	BH309_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027611	X				X	X	X	X	
12	BH309_1.1-1.2	Jun 10, 2022		Soil	S22-Jn0027612			X			X	X		

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Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
13	BH323_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027613	X				X	X	X	X	
14	BH323_0.4-0.6	Jun 10, 2022		Soil	S22-Jn0027614						X	X		
15	BH325_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027615	X				X	X	X	X	
16	BH325_0.6-0.8	Jun 10, 2022		Soil	S22-Jn0027616						X	X		
17	BH326_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027617	X				X	X	X	X	
18	BH324_0.3-0.45	Jun 10, 2022		Soil	S22-Jn0027618	X				X	X	X	X	
19	BH322_0.3-	Jun 10, 2022		Soil	S22-	X				X	X	X	X	

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Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
	0.45				Jn0027619									
20	BH317_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027620	X				X	X	X	X	
21	BH317_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0027621			X			X	X		
22	BH318_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027622	X				X	X	X	X	
23	BH318_0.5-0.7	Jun 10, 2022		Soil	S22-Jn0027623					X	X	X		
24	BH319_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027624	X				X	X	X	X	
25	BH319_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0027625			X			X	X		

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Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
26	Trip Blank	Jun 10, 2022		Soil	S22-Jn0027626				X					
27	Trip Spike	Jun 10, 2022		Soil	S22-Jn0027627									X
28	QA100	Jun 10, 2022		Soil	S22-Jn0027628	X				X	X	X	X	
29	BH312_0.-0.2	Jun 10, 2022		Soil	S22-Jn0027630		X							
30	BH313_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027631		X							
31	BH314_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027632		X							
32	BH316_0.8-1.0	Jun 10, 2022		Soil	S22-			X						

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Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
					Jn0027633									
33	BH309_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027634		X							
34	BH317_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027635		X							
35	BH318_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0027636		X							
36	BH319_0.5-0.7	Jun 10, 2022		Soil	S22-Jn0027637		X							
37	BH320_0-0.2	Jun 10, 2022		Soil	S22-Jn0027638		X							
38	BH320_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027639		X							

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Project ID: 80022026

Order No.:
Report #: 896934
Phone:
Fax:

Received: Jun 10, 2022 6:50 PM
Due: Jun 16, 2022
Priority: 2 Day
Contact Name: Michael Koerner

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Asbestos - AS4964	HOLD	Acid Sulfate Soils Field pH Test	BTEX	Eurofins Suite B15	Moisture Set	Eurofins Suite B7A	Per- and Polyfluoroalkyl Substances (PFASs) - Short	BTEX
Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
39	BH320_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0027640		X							
40	BH326_0-0.2	Jun 10, 2022		Soil	S22-Jn0027641		X							
Test Counts						15	11	8	1	17	23	23	15	1

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Internal Quality Control Review and Glossary General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. Information identified on this report with the colour **blue** indicates data provided by customer that may have an impact on the results.
5. Information identified on this report with the colour **orange** indicates sections of the report not covered by the laboratory's scope of NATA accreditation.
6. This report replaces any interim results previously issued.

Holding Times

Please refer to the most recent version of the 'Sample Preservation and Container Guide' for holding times (QS3001).
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

% w/w:	Percentage weight-for-weight basis, e.g. of asbestos in asbestos-containing finds in soil samples (**% w/w**)
F/fld	Airborne fibre filter loading as Fibres (**N**) per Fields counted (**n**)
F/mL	Airborne fibre reported concentration as Fibres per millilitre of air drawn over the sampler membrane (**C**)
g, kg	Mass, e.g. of whole sample (**M**) or asbestos-containing find within the sample (**m**)
g/kg	Concentration in grams per kilogram
L, mL	Volume, e.g. of air as measured in AFM (**V** = **r** x **t**)
L/min	Airborne fibre sampling Flowrate as litres per minute of air drawn over the sampler membrane (**r**)
min	Time (**t**), e.g. of air sample collection period

Calculations

Airborne Fibre Concentration: $C = \left(\frac{A}{a}\right) \times \left(\frac{N}{n}\right) \times \left(\frac{1}{r}\right) \times \left(\frac{1}{t}\right) = K \times \left(\frac{N}{n}\right) \times \left(\frac{1}{V}\right)$

Asbestos Content (as asbestos): $\%\, w/w = \frac{(m \times P_A)}{M}$

Weighted Average (of asbestos): $\%_{WA} = \sum \frac{(m \times P_A)_x}{x}$

Terms

%asbestos	Estimated percentage of asbestos in a given matrix. May be derived from knowledge or experience of the material, informed by HSG264 *Appendix 2*, else assumed to be 15% in accordance with WA DOH *Appendix 2* (**P_A**).
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded (non-friable) condition. For the purposes of the NEPM and WA DOH, ACM corresponds to material larger than 7 mm x 7 mm.
AF	Asbestos Fines. Asbestos contamination within a soil sample, as defined by WA DOH. Includes loose fibre bundles and small pieces of friable and non-friable material such as asbestos cement fragments mixed with soil. Considered under the NEPM as equivalent to "non-bonded / friable".
AFM	Airborne Fibre Monitoring, e.g. by the MFM.
Amosite	Amosite Asbestos Detected. Amosite may also refer to Fibrous Grunerite or Brown Asbestos. Identified in accordance with AS 4964-2004.
AS	Australian Standard.
Asbestos Content (as asbestos)	Total % w/w asbestos content in asbestos-containing finds in a soil sample (**% w/w**).
Chrysotile	Chrysotile Asbestos Detected. Chrysotile may also refer to Fibrous Serpentine or White Asbestos. Identified in accordance with AS 4964-2004.
COC	Chain of Custody.
Crocidolite	Crocidolite Asbestos Detected. Crocidolite may also refer to Fibrous Riebeckite or Blue Asbestos. Identified in accordance with AS 4964-2004.
Dry	Sample is dried by heating prior to analysis.
DS	Dispersion Staining. Technique required for Unequivocal Identification of asbestos fibres by PLM.
FA	Fibrous Asbestos. Asbestos containing material that is wholly or in part friable, including materials with higher asbestos content with a propensity to become friable with handling, and any material that was previously non-friable and in a severely degraded condition. For the purposes of the NEPM and WA DOH, FA generally corresponds to material larger than 7 mm x 7 mm, although FA may be more difficult to visibly distinguish and may be assessed as AF.
Fibre Count	Total of all fibres (whether asbestos or not) meeting the counting criteria set out in the NOHSC:3003
Fibre ID	Fibre Identification. Unequivocal identification of asbestos fibres according to AS 4964-2004. Includes Chrysotile, Amosite (Grunerite) or Crocidolite asbestos.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory's remit to assess degree of friability.
HSG248	UK HSE HSG248, *Asbestos: The Analysts Guide*, 2nd Edition (2021).
HSG264	UK HSE HSG264, *Asbestos: The Survey Guide* (2012).
ISO (also ISO/IEC)	International Organization for Standardization / International Electrotechnical Commission.
K Factor	Microscope constant (**K**) as derived from the effective filter area of the given AFM membrane used for collecting the sample (**A**) and the projected eyepiece graticule area of the specific microscope used for the analysis (**a**).
LOR	Limit of Reporting.
MFM (also NOHSC:3003)	Membrane Filter Method. As described by the Australian Government National Occupational Health and Safety Commission, *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres*, 2nd Edition [NOHSC:3003(2005)].
NEPM (also ASC NEPM)	National Environment Protection (Assessment of Site Contamination) Measure, (2013, as amended).
Organic	Organic Fibres Detected. Organic may refer to Natural or Man-Made Polymeric Fibres. Identified in accordance with AS 4964-2004.
PCM	Phase Contrast Microscopy. As used for Fibre Counting according to the MFM.
PLM	Polarised Light Microscopy. As used for Fibre Identification and Trace Analysis according to AS 4964-2004.
SMF	Synthetic Mineral Fibre Detected. SMF may also refer to Man Made Vitreous Fibres. Identified in accordance with AS 4964-2004.
SRA	Sample Receipt Advice.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres (particularly asbestos) in a given sample matrix.
UK HSE HSG	United Kingdom, Health and Safety Executive, Health and Safety Guidance, publication.
UMF	Unidentified Mineral Fibre Detected. Fibrous minerals that are detected but have not been unequivocally identified by PLM with DS according the AS 4964-2004. May include (but not limited to) Actinolite, Anthophyllite or Tremolite asbestos.
WA DOH	Reference document for the NEPM. Government of Western Australia, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (updated 2021), including Appendix Four: *Laboratory analysis*
Weighted Average	Combined average % w/w asbestos content of all asbestos-containing finds in the given aliquot or total soil sample (**$\%_{WA}$**).

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Comments

22-Jn0027628:The sample received was not collected in an approved asbestos bag and was therefore sub-sampled from the 250mL glass jar. Valid sub-sampling procedures were applied so as to ensure that the sub-sample to be analysed accurately represented the sample received.

Sample Integrity

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

Asbestos Counter/Identifier:

Sayeed Abu	Senior Analyst-Asbestos

Authorised by:

Chamath JHM Annakkage	Senior Analyst-Asbestos



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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Melbourne
VIC 3000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **- ALL INVOICES**

Report **896934-S-V2**
Project name ROYAL PRINCE ALFRED
Project ID 80022026
Received Date Jun 10, 2022

Client Sample ID			**BH310_0.0-0.2**	**BH310_0.3-0.5**	**BH311_0.1 - 0.2**	**BH311_0.3-0.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S22-Jn0027601**	**S22-Jn0027602**	**S22-Jn0027603**	**S22-Jn0027604**
Date Sampled			**Jun 10, 2022**	**Jun 10, 2022**	**Jun 10, 2022**	**Jun 10, 2022**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	-	< 20	-
TRH C10-C14	20	mg/kg	< 20	-	< 20	-
TRH C15-C28	50	mg/kg	< 50	-	< 50	-
TRH C29-C36	50	mg/kg	< 50	-	< 50	-
TRH C10-C36 (Total)	50	mg/kg	< 50	-	< 50	-
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	< 0.5	-
TRH C6-C10	20	mg/kg	< 20	-	< 20	-
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	< 20	-
TRH >C10-C16	50	mg/kg	< 50	-	< 50	-
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	< 50	-
TRH >C16-C34	100	mg/kg	< 100	-	< 100	-
TRH >C34-C40	100	mg/kg	< 100	-	< 100	-
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	< 100	-
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	< 0.1	-
Toluene	0.1	mg/kg	< 0.1	-	< 0.1	-
Ethylbenzene	0.1	mg/kg	< 0.1	-	< 0.1	-
m&p-Xylenes	0.2	mg/kg	< 0.2	-	< 0.2	-
o-Xylene	0.1	mg/kg	< 0.1	-	< 0.1	-
Xylenes - Total*	0.3	mg/kg	< 0.3	-	< 0.3	-
4-Bromofluorobenzene (surr.)	1	%	139	-	90	-
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	-	0.6	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	-	1.2	-
Acenaphthene	0.5	mg/kg	< 0.5	-	< 0.5	-
Acenaphthylene	0.5	mg/kg	< 0.5	-	< 0.5	-
Anthracene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	-	< 0.5	-
Chrysene	0.5	mg/kg	< 0.5	-	< 0.5	-
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	-	< 0.5	-

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Client Sample ID			BH310_0.0-0.2	BH310_0.3-0.5	BH311_0.1 - 0.2	BH311_0.3-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027601	S22-Jn0027602	S22-Jn0027603	S22-Jn0027604
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Fluoranthene	0.5	mg/kg	< 0.5	-	< 0.5	-
Fluorene	0.5	mg/kg	< 0.5	-	< 0.5	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Naphthalene	0.5	mg/kg	< 0.5	-	< 0.5	-
Phenanthrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Pyrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Total PAH*	0.5	mg/kg	< 0.5	-	< 0.5	-
2-Fluorobiphenyl (surr.)	1	%	50	-	82	-
p-Terphenyl-d14 (surr.)	1	%	84	-	84	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	-	< 0.1	-
4.4'-DDD	0.05	mg/kg	< 0.05	-	< 0.05	-
4.4'-DDE	0.05	mg/kg	< 0.05	-	< 0.05	-
4.4'-DDT	0.05	mg/kg	< 0.05	-	< 0.05	-
a-HCH	0.05	mg/kg	< 0.05	-	< 0.05	-
Aldrin	0.05	mg/kg	< 0.05	-	< 0.05	-
b-HCH	0.05	mg/kg	< 0.05	-	< 0.05	-
d-HCH	0.05	mg/kg	< 0.05	-	< 0.05	-
Dieldrin	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan I	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan II	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin aldehyde	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin ketone	0.05	mg/kg	< 0.05	-	< 0.05	-
g-HCH (Lindane)	0.05	mg/kg	< 0.05	-	< 0.05	-
Heptachlor	0.05	mg/kg	< 0.05	-	< 0.05	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	-	< 0.05	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	-	< 0.05	-
Methoxychlor	0.05	mg/kg	< 0.05	-	< 0.05	-
Toxaphene	0.5	mg/kg	< 0.5	-	< 0.5	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	-	< 0.05	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	-	< 0.05	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	-	< 0.1	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	-	< 0.1	-
Dibutylchlorendate (surr.)	1	%	70	-	70	-
Tetrachloro-m-xylene (surr.)	1	%	78	-	87	-
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	-	< 0.2	-
Bolstar	0.2	mg/kg	< 0.2	-	< 0.2	-
Chlorfenvinphos	0.2	mg/kg	< 0.2	-	< 0.2	-
Chlorpyrifos	0.2	mg/kg	< 0.2	-	< 0.2	-
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	-	< 0.2	-
Coumaphos	2	mg/kg	< 2	-	< 2	-
Demeton-S	0.2	mg/kg	< 0.2	-	< 0.2	-
Demeton-O	0.2	mg/kg	< 0.2	-	< 0.2	-
Diazinon	0.2	mg/kg	< 0.2	-	< 0.2	-
Dichlorvos	0.2	mg/kg	< 0.2	-	< 0.2	-
Dimethoate	0.2	mg/kg	< 0.2	-	< 0.2	-

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Client Sample ID			BH310_0.0-0.2	BH310_0.3-0.5	BH311_0.1 - 0.2	BH311_0.3-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027601	S22-Jn0027602	S22-Jn0027603	S22-Jn0027604
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Disulfoton	0.2	mg/kg	< 0.2	-	< 0.2	-
EPN	0.2	mg/kg	< 0.2	-	< 0.2	-
Ethion	0.2	mg/kg	< 0.2	-	< 0.2	-
Ethoprop	0.2	mg/kg	< 0.2	-	< 0.2	-
Ethyl parathion	0.2	mg/kg	< 0.2	-	< 0.2	-
Fenitrothion	0.2	mg/kg	< 0.2	-	< 0.2	-
Fensulfothion	0.2	mg/kg	< 0.2	-	< 0.2	-
Fenthion	0.2	mg/kg	< 0.2	-	< 0.2	-
Malathion	0.2	mg/kg	< 0.2	-	< 0.2	-
Merphos	0.2	mg/kg	< 0.2	-	< 0.2	-
Methyl parathion	0.2	mg/kg	< 0.2	-	< 0.2	-
Mevinphos	0.2	mg/kg	< 0.2	-	< 0.2	-
Monocrotophos	2	mg/kg	< 2	-	< 2	-
Naled	0.2	mg/kg	< 0.2	-	< 0.2	-
Omethoate	2	mg/kg	< 2	-	< 2	-
Phorate	0.2	mg/kg	< 0.2	-	< 0.2	-
Pirimiphos-methyl	0.2	mg/kg	< 0.2	-	< 0.2	-
Pyrazophos	0.2	mg/kg	< 0.2	-	< 0.2	-
Ronnel	0.2	mg/kg	< 0.2	-	< 0.2	-
Terbufos	0.2	mg/kg	< 0.2	-	< 0.2	-
Tetrachlorvinphos	0.2	mg/kg	< 0.2	-	< 0.2	-
Tokuthion	0.2	mg/kg	< 0.2	-	< 0.2	-
Trichloronate	0.2	mg/kg	< 0.2	-	< 0.2	-
Triphenylphosphate (surr.)	1	%	74	-	79	-
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1221	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1232	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1242	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1248	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1254	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1260	0.1	mg/kg	< 0.1	-	< 0.1	-
Total PCB*	0.1	mg/kg	< 0.1	-	< 0.1	-
Dibutylchlorendate (surr.)	1	%	70	-	70	-
Tetrachloro-m-xylene (surr.)	1	%	78	-	87	-
Phenols (Halogenated)						
2-Chlorophenol	0.5	mg/kg	< 0.5	-	< 0.5	-
2.4-Dichlorophenol	0.5	mg/kg	< 0.5	-	< 0.5	-
2.4.5-Trichlorophenol	1	mg/kg	< 1	-	< 1	-
2.4.6-Trichlorophenol	1	mg/kg	< 1	-	< 1	-
2.6-Dichlorophenol	0.5	mg/kg	< 0.5	-	< 0.5	-
4-Chloro-3-methylphenol	1	mg/kg	< 1	-	< 1	-
Pentachlorophenol	1	mg/kg	< 1	-	< 1	-
Tetrachlorophenols - Total	10	mg/kg	< 10	-	< 10	-
Total Halogenated Phenol*	1	mg/kg	< 1	-	< 1	-

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Client Sample ID			BH310_0.0-0.2	BH310_0.3-0.5	BH311_0.1 - 0.2	BH311_0.3-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027601	S22-Jn0027602	S22-Jn0027603	S22-Jn0027604
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Phenols (non-Halogenated)						
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	< 20	-	< 20	-
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5	-	< 5	-
2-Nitrophenol	1	mg/kg	< 1	-	< 1	-
2.4-Dimethylphenol	0.5	mg/kg	< 0.5	-	< 0.5	-
2.4-Dinitrophenol	5	mg/kg	< 5	-	< 5	-
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.2	-	< 0.2	-
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 0.4	-	< 0.4	-
Total cresols*	0.5	mg/kg	< 0.5	-	< 0.5	-
4-Nitrophenol	5	mg/kg	< 5	-	< 5	-
Dinoseb	20	mg/kg	< 20	-	< 20	-
Phenol	0.5	mg/kg	< 0.5	-	< 0.5	-
Phenol-d6 (surr.)	1	%	[Q09]INT	-	62	-
Total Non-Halogenated Phenol*	20	mg/kg	< 20	-	< 20	-
Heavy Metals						
Arsenic	2	mg/kg	< 2	-	< 2	-
Cadmium	0.4	mg/kg	< 0.4	-	< 0.4	-
Chromium	5	mg/kg	24	-	20	-
Copper	5	mg/kg	90	-	88	-
Lead	5	mg/kg	140	-	< 5	-
Mercury	0.1	mg/kg	< 0.1	-	< 0.1	-
Nickel	5	mg/kg	100	-	120	-
Zinc	5	mg/kg	450	-	76	-
% Moisture	1	%	11	-	8.7	-
Per- and Polyfluoroalkyl Substances (PFASs) - Short						
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	< 10	-	< 10	-
13C2-6:2 FTSA (surr.)	1	%	89	-	89	-
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	-	< 5	-
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	-	< 5	-
18O2-PFHxS (surr.)	1	%	85	-	97	-
13C8-PFOS (surr.)	1	%	89	-	99	-
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	-	< 5	-
13C8-PFOA (surr.)	1	%	99	-	99	-
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	-	< 5	-
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	-	< 5	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	-	< 5	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	5.3	-	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	4.4	-	5.5
Reaction Ratings*[S05]	0	-	-	1.0	-	1.0

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Client Sample ID			BH312_0.3-0.5	BH313_0.1-0.2	BH314_0.5-0.6	[G01]BH315_0.3-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027605	S22-Jn0027606	S22-Jn0027607	S22-Jn0027608
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	< 20	-	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	-	< 40
TRH C15-C28	50	mg/kg	< 50	< 50	-	280
TRH C29-C36	50	mg/kg	< 50	< 50	-	160
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	-	440
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	-	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	-	< 100
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	-	< 100
TRH >C16-C34	100	mg/kg	< 100	< 100	-	400
TRH >C34-C40	100	mg/kg	< 100	< 100	-	< 200
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	-	400
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	87	92	-	111
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	-	32
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	-	32
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	-	32
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	-	0.6
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	-	0.6
Anthracene	0.5	mg/kg	< 0.5	< 0.5	-	7.7
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	-	19
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	-	20
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	-	12
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	-	15
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-	17
Chrysene	0.5	mg/kg	< 0.5	< 0.5	-	23
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	-	4.9
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-	48
Fluorene	0.5	mg/kg	< 0.5	< 0.5	-	0.6
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	-	15
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	-	24
Pyrene	0.5	mg/kg	< 0.5	< 0.5	-	37
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	-	240
2-Fluorobiphenyl (surr.)	1	%	65	83	-	118
p-Terphenyl-d14 (surr.)	1	%	100	100	-	116
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	-	< 1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5

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Client Sample ID			BH312_0.3-0.5	BH313_0.1-0.2	BH314_0.5-0.6	[G01]BH315_0.3-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027605	S22-Jn0027606	S22-Jn0027607	S22-Jn0027608
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
a-HCH	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
Aldrin	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
b-HCH	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
d-HCH	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
Endrin	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
g-HCH (Lindane)	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
Toxaphene	0.5	mg/kg	< 0.5	< 0.5	-	< 10
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	-	< 0.5
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	-	< 1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	-	< 1
Dibutylchlorendate (surr.)	1	%	72	98	-	72
Tetrachloro-m-xylene (surr.)	1	%	102	92	-	115
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Bolstar	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Coumaphos	2	mg/kg	< 2	< 2	-	< 5
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Diazinon	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
EPN	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Ethion	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Fenthion	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Malathion	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Merphos	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Monocrotophos	2	mg/kg	< 2	< 2	-	< 5
Naled	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5

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Client Sample ID			BH312_0.3-0.5	BH313_0.1-0.2	BH314_0.5-0.6	[G01]BH315_0.3-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027605	S22-Jn0027606	S22-Jn0027607	S22-Jn0027608
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Omethoate	2	mg/kg	< 2	< 2	-	< 5
Phorate	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Ronnel	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Terbufos	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
Triphenylphosphate (surr.)	1	%	86	106	-	101
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	< 0.1	< 0.1	-	< 1
Aroclor-1221	0.1	mg/kg	< 0.1	< 0.1	-	< 1
Aroclor-1232	0.1	mg/kg	< 0.1	< 0.1	-	< 1
Aroclor-1242	0.1	mg/kg	< 0.1	< 0.1	-	< 1
Aroclor-1248	0.1	mg/kg	< 0.1	< 0.1	-	< 1
Aroclor-1254	0.1	mg/kg	< 0.1	< 0.1	-	< 1
Aroclor-1260	0.1	mg/kg	< 0.1	< 0.1	-	< 1
Total PCB*	0.1	mg/kg	< 0.1	< 0.1	-	< 1
Dibutylchlorendate (surr.)	1	%	72	98	-	72
Tetrachloro-m-xylene (surr.)	1	%	102	92	-	115
Phenols (Halogenated)						
2-Chlorophenol	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
2.4-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
2.4.5-Trichlorophenol	1	mg/kg	< 1	< 1	-	< 1
2.4.6-Trichlorophenol	1	mg/kg	< 1	< 1	-	< 1
2.6-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
4-Chloro-3-methylphenol	1	mg/kg	< 1	< 1	-	< 1
Pentachlorophenol	1	mg/kg	< 1	< 1	-	< 1
Tetrachlorophenols - Total	10	mg/kg	< 10	< 10	-	< 10
Total Halogenated Phenol*	1	mg/kg	< 1	< 1	-	< 1
Phenols (non-Halogenated)						
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	< 20	< 20	-	< 20
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5	< 5	-	< 5
2-Nitrophenol	1	mg/kg	< 1	< 1	-	< 1
2.4-Dimethylphenol	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
2.4-Dinitrophenol	5	mg/kg	< 5	< 5	-	< 5
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 0.4	< 0.4	-	< 1
Total cresols*	0.5	mg/kg	< 0.5	< 0.5	-	< 1
4-Nitrophenol	5	mg/kg	< 5	< 5	-	< 5
Dinoseb	20	mg/kg	< 20	< 20	-	< 20
Phenol	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Phenol-d6 (surr.)	1	%	57	79	-	74
Total Non-Halogenated Phenol*	20	mg/kg	< 20	< 20	-	< 20

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Client Sample ID			BH312_0.3-0.5	BH313_0.1-0.2	BH314_0.5-0.6	[G01]BH315_0.3-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027605	S22-Jn0027606	S22-Jn0027607	S22-Jn0027608
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	16	8.6	-	9.0
Cadmium	0.4	mg/kg	< 0.4	< 0.4	-	< 0.4
Chromium	5	mg/kg	56	35	-	26
Copper	5	mg/kg	< 5	26	-	200
Lead	5	mg/kg	24	49	-	120
Mercury	0.1	mg/kg	< 0.1	< 0.1	-	0.1
Nickel	5	mg/kg	6.1	36	-	17
Zinc	5	mg/kg	13	82	-	150
% Moisture	1	%	21	11	-	21
Per- and Polyfluoroalkyl Substances (PFASs) - Short						
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	< 10	< 10	-	< 10
13C2-6:2 FTSA (surr.)	1	%	87	95	-	161
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	< 5	-	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	< 5	-	< 5
18O2-PFHxS (surr.)	1	%	83	98	-	91
13C8-PFOS (surr.)	1	%	80	106	-	115
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	< 5	-	< 5
13C8-PFOA (surr.)	1	%	76	89	-	97
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5	-	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5	-	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	-	5.9	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	-	5.0	-
Reaction Ratings*[S05]	0	-	-	-	1.0	-

Client Sample ID			[G01]BH315_0.6-0.7	[G01]BH316_0.4-0.5	[G01]BH309_0.0-0.2	BH309_1.1-1.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027609	S22-Jn0027610	S22-Jn0027611	S22-Jn0027612
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 40	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	250	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 100	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	250	< 50	< 50	< 50
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 100	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 100	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	320	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 200	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	320	< 100	< 100	< 100

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Client Sample ID			[G01]BH315_0.6-0.7	[G01]BH316_0.4-0.5	[G01]BH309_0.0-0.2	BH309_1.1-1.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027609	S22-Jn0027610	S22-Jn0027611	S22-Jn0027612
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	83	86	89	72
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	21	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	21	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	21	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	2.8	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	11	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	15	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	14	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	8.7	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	8.6	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	14	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	18	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	2.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	43	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	1.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	8.3	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	0.8	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	39	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	40	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	230	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	79	113	113	79
p-Terphenyl-d14 (surr.)	1	%	109	122	116	89
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 1	< 1	-
4.4'-DDD	0.05	mg/kg	-	< 0.5	< 0.5	-
4.4'-DDE	0.05	mg/kg	-	< 0.5	< 0.5	-
4.4'-DDT	0.05	mg/kg	-	< 0.5	< 0.5	-
a-HCH	0.05	mg/kg	-	< 0.5	< 0.5	-
Aldrin	0.05	mg/kg	-	< 0.5	< 0.5	-
b-HCH	0.05	mg/kg	-	< 0.5	< 0.5	-
d-HCH	0.05	mg/kg	-	< 0.5	< 0.5	-
Dieldrin	0.05	mg/kg	-	< 0.5	< 0.5	-
Endosulfan I	0.05	mg/kg	-	< 0.5	< 0.5	-
Endosulfan II	0.05	mg/kg	-	< 0.5	< 0.5	-
Endosulfan sulphate	0.05	mg/kg	-	< 0.5	< 0.5	-
Endrin	0.05	mg/kg	-	< 0.5	< 0.5	-
Endrin aldehyde	0.05	mg/kg	-	< 0.5	< 0.5	-
Endrin ketone	0.05	mg/kg	-	< 0.5	< 0.5	-
g-HCH (Lindane)	0.05	mg/kg	-	< 0.5	< 0.5	-
Heptachlor	0.05	mg/kg	-	< 0.5	< 0.5	-
Heptachlor epoxide	0.05	mg/kg	-	< 0.5	< 0.5	-

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Client Sample ID			G01 BH315_0.6-0.7	G01 BH316_0.4-0.5	G01 BH309_0.0-0.2	BH309_1.1-1.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027609	S22-Jn0027610	S22-Jn0027611	S22-Jn0027612
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Hexachlorobenzene	0.05	mg/kg	-	< 0.5	< 0.5	-
Methoxychlor	0.05	mg/kg	-	< 0.5	< 0.5	-
Toxaphene	0.5	mg/kg	-	< 10	< 10	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.5	< 0.5	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	< 0.5	< 0.5	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	< 1	< 1	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	< 1	< 1	-
Dibutylchlorendate (surr.)	1	%	-	74	54	-
Tetrachloro-m-xylene (surr.)	1	%	-	129	115	-
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	< 0.5	< 0.5	-
Bolstar	0.2	mg/kg	-	< 0.5	< 0.5	-
Chlorfenvinphos	0.2	mg/kg	-	< 0.5	< 0.5	-
Chlorpyrifos	0.2	mg/kg	-	< 0.5	< 0.5	-
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.5	< 0.5	-
Coumaphos	2	mg/kg	-	< 5	< 5	-
Demeton-S	0.2	mg/kg	-	< 0.5	< 0.5	-
Demeton-O	0.2	mg/kg	-	< 0.5	< 0.5	-
Diazinon	0.2	mg/kg	-	< 0.5	< 0.5	-
Dichlorvos	0.2	mg/kg	-	< 0.5	< 0.5	-
Dimethoate	0.2	mg/kg	-	< 0.5	< 0.5	-
Disulfoton	0.2	mg/kg	-	< 0.5	< 0.5	-
EPN	0.2	mg/kg	-	< 0.5	< 0.5	-
Ethion	0.2	mg/kg	-	< 0.5	< 0.5	-
Ethoprop	0.2	mg/kg	-	< 0.5	< 0.5	-
Ethyl parathion	0.2	mg/kg	-	< 0.5	< 0.5	-
Fenitrothion	0.2	mg/kg	-	< 0.5	< 0.5	-
Fensulfothion	0.2	mg/kg	-	< 0.5	< 0.5	-
Fenthion	0.2	mg/kg	-	< 0.5	< 0.5	-
Malathion	0.2	mg/kg	-	< 0.5	< 0.5	-
Merphos	0.2	mg/kg	-	< 0.5	< 0.5	-
Methyl parathion	0.2	mg/kg	-	< 0.5	< 0.5	-
Mevinphos	0.2	mg/kg	-	< 0.5	< 0.5	-
Monocrotophos	2	mg/kg	-	< 5	< 5	-
Naled	0.2	mg/kg	-	< 0.5	< 0.5	-
Omethoate	2	mg/kg	-	< 5	< 5	-
Phorate	0.2	mg/kg	-	< 0.5	< 0.5	-
Pirimiphos-methyl	0.2	mg/kg	-	< 0.5	< 0.5	-
Pyrazophos	0.2	mg/kg	-	< 0.5	< 0.5	-
Ronnel	0.2	mg/kg	-	< 0.5	< 0.5	-
Terbufos	0.2	mg/kg	-	< 0.5	< 0.5	-
Tetrachlorvinphos	0.2	mg/kg	-	< 0.5	< 0.5	-
Tokuthion	0.2	mg/kg	-	< 0.5	< 0.5	-
Trichloronate	0.2	mg/kg	-	< 0.5	< 0.5	-
Triphenylphosphate (surr.)	1	%	-	85	78	-

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Client Sample ID			[G01]BH315_0.6-0.7	[G01]BH316_0.4-0.5	[G01]BH309_0.0-0.2	BH309_1.1-1.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027609	S22-Jn0027610	S22-Jn0027611	S22-Jn0027612
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 1	< 1	-
Aroclor-1221	0.1	mg/kg	-	< 1	< 1	-
Aroclor-1232	0.1	mg/kg	-	< 1	< 1	-
Aroclor-1242	0.1	mg/kg	-	< 1	< 1	-
Aroclor-1248	0.1	mg/kg	-	< 1	< 1	-
Aroclor-1254	0.1	mg/kg	-	< 1	< 1	-
Aroclor-1260	0.1	mg/kg	-	< 1	< 1	-
Total PCB*	0.1	mg/kg	-	< 1	< 1	-
Dibutylchlorendate (surr.)	1	%	-	74	54	-
Tetrachloro-m-xylene (surr.)	1	%	-	129	115	-
Phenols (Halogenated)						
2-Chlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-Trichlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
2.4.6-Trichlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
2.6-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
4-Chloro-3-methylphenol	1	mg/kg	< 1	< 1	< 1	< 1
Pentachlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
Tetrachlorophenols - Total	10	mg/kg	< 10	< 10	< 10	< 10
Total Halogenated Phenol*	1	mg/kg	< 1	< 1	< 1	< 1
Phenols (non-Halogenated)						
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	< 20	< 20	< 20	< 20
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
2-Nitrophenol	1	mg/kg	< 1	< 1	< 1	< 1
2.4-Dimethylphenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-Dinitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.5	< 0.5	< 0.5	< 0.2
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 1	< 1	< 1	< 0.4
Total cresols*	0.5	mg/kg	< 1	< 1	< 1	< 0.5
4-Nitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
Dinoseb	20	mg/kg	< 20	< 20	< 20	< 20
Phenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenol-d6 (surr.)	1	%	78	84	85	74
Total Non-Halogenated Phenol*	20	mg/kg	< 20	< 20	< 20	< 20
Heavy Metals						
Arsenic	2	mg/kg	11	4.0	3.0	16
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	37	12	16	56
Copper	5	mg/kg	31	33	33	11
Lead	5	mg/kg	220	48	50	77
Mercury	0.1	mg/kg	0.3	< 0.1	< 0.1	0.8
Nickel	5	mg/kg	5.3	7.5	12	6.6
Zinc	5	mg/kg	48	150	100	280
% Moisture	1	%	23	9.9	11	23

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Client Sample ID			[G01]BH315_0.6-0.7	[G01]BH316_0.4-0.5	[G01]BH309_0.0-0.2	BH309_1.1-1.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027609	S22-Jn0027610	S22-Jn0027611	S22-Jn0027612
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Per- and Polyfluoroalkyl Substances (PFASs) - Short						
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	-	-	< 10	-
13C2-6:2 FTSA (surr.)	1	%	-	-	81	-
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	-	-	< 5	-
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	-	-	< 5	-
18O2-PFHxS (surr.)	1	%	-	-	86	-
13C8-PFOS (surr.)	1	%	-	-	100	-
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	-	-	< 5	-
13C8-PFOA (surr.)	1	%	-	-	93	-
Sum (PFHxS + PFOS)*	5	ug/kg	-	-	< 5	-
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	-	-	< 5	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	-	-	< 5	-
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.0	-	-	7.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.1	-	-	6.7
Reaction Ratings*[S05]	0	-	1.0	-	-	1.0

Client Sample ID			BH323_0.0-0.2	BH323_0.4-0.6	BH325_0.0-0.2	BH325_0.6-0.8
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027613	S22-Jn0027614	S22-Jn0027615	S22-Jn0027616
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	27	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	110	170
TRH C29-C36	50	mg/kg	< 50	< 50	53	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	190	170
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	200	270
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	200	270
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	0.2	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	131	145	143	81

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Client Sample ID			BH323_0.0-0.2	BH323_0.4-0.6	BH325_0.0-0.2	BH325_0.6-0.8
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027613	S22-Jn0027614	S22-Jn0027615	S22-Jn0027616
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	4.3
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	4.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	4.8
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 2
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	2.2
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	3.2
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	2.1
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.7
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	4.7
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	4.8
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	4.4
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 2
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	5.2
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	30
2-Fluorobiphenyl (surr.)	1	%	83	77	84	90
p-Terphenyl-d14 (surr.)	1	%	105	89	97	94
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	-	< 0.1	-
4.4'-DDD	0.05	mg/kg	< 0.05	-	< 0.05	-
4.4'-DDE	0.05	mg/kg	< 0.05	-	< 0.05	-
4.4'-DDT	0.05	mg/kg	< 0.05	-	< 0.05	-
a-HCH	0.05	mg/kg	< 0.05	-	< 0.05	-
Aldrin	0.05	mg/kg	< 0.05	-	< 0.05	-
b-HCH	0.05	mg/kg	< 0.05	-	< 0.05	-
d-HCH	0.05	mg/kg	< 0.05	-	< 0.05	-
Dieldrin	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan I	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan II	0.05	mg/kg	< 0.05	-	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin aldehyde	0.05	mg/kg	< 0.05	-	< 0.05	-
Endrin ketone	0.05	mg/kg	< 0.05	-	< 0.05	-
g-HCH (Lindane)	0.05	mg/kg	< 0.05	-	< 0.05	-
Heptachlor	0.05	mg/kg	< 0.05	-	< 0.05	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	-	< 0.05	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	-	< 0.05	-
Methoxychlor	0.05	mg/kg	< 0.05	-	< 0.05	-
Toxaphene	0.5	mg/kg	< 0.5	-	< 0.5	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	-	< 0.05	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	-	< 0.05	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	-	< 0.1	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	-	< 0.1	-
Dibutylchlorendate (surr.)	1	%	112	-	110	-
Tetrachloro-m-xylene (surr.)	1	%	99	-	99	-

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Client Sample ID			BH323_0.0-0.2	BH323_0.4-0.6	BH325_0.0-0.2	BH325_0.6-0.8
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027613	S22-Jn0027614	S22-Jn0027615	S22-Jn0027616
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	-	< 0.2	-
Bolstar	0.2	mg/kg	< 0.2	-	< 0.2	-
Chlorfenvinphos	0.2	mg/kg	< 0.2	-	< 0.2	-
Chlorpyrifos	0.2	mg/kg	< 0.2	-	< 0.2	-
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	-	< 0.2	-
Coumaphos	2	mg/kg	< 2	-	< 2	-
Demeton-S	0.2	mg/kg	< 0.2	-	< 0.2	-
Demeton-O	0.2	mg/kg	< 0.2	-	< 0.2	-
Diazinon	0.2	mg/kg	< 0.2	-	< 0.2	-
Dichlorvos	0.2	mg/kg	< 0.2	-	< 0.2	-
Dimethoate	0.2	mg/kg	< 0.2	-	< 0.2	-
Disulfoton	0.2	mg/kg	< 0.2	-	< 0.2	-
EPN	0.2	mg/kg	< 0.2	-	< 0.2	-
Ethion	0.2	mg/kg	< 0.2	-	< 0.2	-
Ethoprop	0.2	mg/kg	< 0.2	-	< 0.2	-
Ethyl parathion	0.2	mg/kg	< 0.2	-	< 0.2	-
Fenitrothion	0.2	mg/kg	< 0.2	-	< 0.2	-
Fensulfothion	0.2	mg/kg	< 0.2	-	< 0.2	-
Fenthion	0.2	mg/kg	< 0.2	-	< 0.2	-
Malathion	0.2	mg/kg	< 0.2	-	< 0.2	-
Merphos	0.2	mg/kg	< 0.2	-	< 0.2	-
Methyl parathion	0.2	mg/kg	< 0.2	-	< 0.2	-
Mevinphos	0.2	mg/kg	< 0.2	-	< 0.2	-
Monocrotophos	2	mg/kg	< 2	-	< 2	-
Naled	0.2	mg/kg	< 0.2	-	< 0.2	-
Omethoate	2	mg/kg	< 2	-	< 2	-
Phorate	0.2	mg/kg	< 0.2	-	< 0.2	-
Pirimiphos-methyl	0.2	mg/kg	< 0.2	-	< 0.2	-
Pyrazophos	0.2	mg/kg	< 0.2	-	< 0.2	-
Ronnel	0.2	mg/kg	< 0.2	-	< 0.2	-
Terbufos	0.2	mg/kg	< 0.2	-	< 0.2	-
Tetrachlorvinphos	0.2	mg/kg	< 0.2	-	< 0.2	-
Tokuthion	0.2	mg/kg	< 0.2	-	< 0.2	-
Trichloronate	0.2	mg/kg	< 0.2	-	< 0.2	-
Triphenylphosphate (surr.)	1	%	99	-	92	-
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1221	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1232	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1242	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1248	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1254	0.1	mg/kg	< 0.1	-	< 0.1	-
Aroclor-1260	0.1	mg/kg	< 0.1	-	< 0.1	-
Total PCB*	0.1	mg/kg	< 0.1	-	< 0.1	-
Dibutylchlorendate (surr.)	1	%	112	-	110	-
Tetrachloro-m-xylene (surr.)	1	%	99	-	99	-

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Client Sample ID			BH323_0.0-0.2	BH323_0.4-0.6	BH325_0.0-0.2	BH325_0.6-0.8
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027613	S22-Jn0027614	S22-Jn0027615	S22-Jn0027616
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Phenols (Halogenated)						
2-Chlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-Trichlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
2.4.6-Trichlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
2.6-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
4-Chloro-3-methylphenol	1	mg/kg	< 1	< 1	< 1	< 1
Pentachlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
Tetrachlorophenols - Total	10	mg/kg	< 10	< 10	< 10	< 10
Total Halogenated Phenol*	1	mg/kg	< 1	< 1	< 1	< 1
Phenols (non-Halogenated)						
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	< 20	< 20	< 20	< 20
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
2-Nitrophenol	1	mg/kg	< 1	< 1	< 1	< 1
2.4-Dimethylphenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-Dinitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.2	< 0.2	0.3	< 0.2
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Total cresols*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
4-Nitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
Dinoseb	20	mg/kg	< 20	< 20	< 20	< 20
Phenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenol-d6 (surr.)	1	%	97	90	100	111
Total Non-Halogenated Phenol*	20	mg/kg	< 20	< 20	< 20	< 20
Heavy Metals						
Arsenic	2	mg/kg	5.6	2.9	4.1	6.9
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	16	8.7	13	17
Copper	5	mg/kg	30	14	26	38
Lead	5	mg/kg	22	30	14	68
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.4
Nickel	5	mg/kg	16	< 5	8.8	14
Zinc	5	mg/kg	69	9.3	56	84
% Moisture	1	%	14	12	19	13
Per- and Polyfluoroalkyl Substances (PFASs) - Short						
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	< 10	-	< 10	-
13C2-6:2 FTSA (surr.)	1	%	97	-	152	-
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	-	< 5	-
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	-	< 5	-
18O2-PFHxS (surr.)	1	%	88	-	95	-
13C8-PFOS (surr.)	1	%	103	-	86	-
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	-	< 5	-
13C8-PFOA (surr.)	1	%	94	-	89	-
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	-	< 5	-
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	-	< 5	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	-	< 5	-

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Client Sample ID			BH326_0.0-0.2	BH324_0.3-0.45	BH322_0.3-0.45	BH317_0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027617	S22-Jn0027618	S22-Jn0027619	S22-Jn0027620
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	35	< 20	< 20	31
TRH C15-C28	50	mg/kg	120	83	70	58
TRH C29-C36	50	mg/kg	61	< 50	< 50	57
TRH C10-C36 (Total)	50	mg/kg	216	83	70	146
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	220	150	130	120
TRH >C34-C40	100	mg/kg	110	< 100	< 100	130
TRH >C10-C40 (total)*	100	mg/kg	330	150	130	250
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	137	80	77	80
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	0.6	< 0.5	0.6
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	1.1	< 0.5	0.6
2-Fluorobiphenyl (surr.)	1	%	78	76	66	72
p-Terphenyl-d14 (surr.)	1	%	99	83	93	86
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05

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Client Sample ID			BH326_0.0-0.2	BH324_0.3-0.45	BH322_0.3-0.45	BH317_0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027617	S22-Jn0027618	S22-Jn0027619	S22-Jn0027620
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
a-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-HCH (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	87	86	104	94
Tetrachloro-m-xylene (surr.)	1	%	102	93	100	96
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	< 2	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
EPN	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	< 2	< 2	< 2	< 2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

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Client Sample ID			BH326_0.0-0.2	BH324_0.3-0.45	BH322_0.3-0.45	BH317_0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027617	S22-Jn0027618	S22-Jn0027619	S22-Jn0027620
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Omethoate	2	mg/kg	< 2	< 2	< 2	< 2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	103	89	94	88
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1221	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1232	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1242	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1248	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1254	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1260	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Total PCB*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	87	86	104	94
Tetrachloro-m-xylene (surr.)	1	%	102	93	100	96
Phenols (Halogenated)						
2-Chlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-Trichlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
2.4.6-Trichlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
2.6-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
4-Chloro-3-methylphenol	1	mg/kg	< 1	< 1	< 1	< 1
Pentachlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
Tetrachlorophenols - Total	10	mg/kg	< 10	< 10	< 10	< 10
Total Halogenated Phenol*	1	mg/kg	< 1	< 1	< 1	< 1
Phenols (non-Halogenated)						
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	< 20	< 20	< 20	< 20
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
2-Nitrophenol	1	mg/kg	< 1	< 1	< 1	< 1
2.4-Dimethylphenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-Dinitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Total cresols*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
4-Nitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
Dinoseb	20	mg/kg	< 20	< 20	< 20	< 20
Phenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenol-d6 (surr.)	1	%	103	87	71	74
Total Non-Halogenated Phenol*	20	mg/kg	< 20	< 20	< 20	< 20

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Client Sample ID			BH326_0.0-0.2	BH324_0.3-0.45	BH322_0.3-0.45	BH317_0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027617	S22-Jn0027618	S22-Jn0027619	S22-Jn0027620
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	5.7	10	2.9	6.5
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	18	19	18	13
Copper	5	mg/kg	54	99	48	53
Lead	5	mg/kg	26	210	32	110
Mercury	0.1	mg/kg	0.1	0.5	0.2	0.2
Nickel	5	mg/kg	13	21	32	9.4
Zinc	5	mg/kg	110	270	120	130
% Moisture	1	%	43	16	13	17
Per- and Polyfluoroalkyl Substances (PFASs) - Short						
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	< 10	< 10	< 10	< 10
13C2-6:2 FTSA (surr.)	1	%	108	99	112	121
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	< 5	[N09]8.2	< 5
18O2-PFHxS (surr.)	1	%	74	86	87	85
13C8-PFOS (surr.)	1	%	95	106	120	99
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	< 5	< 5	< 5
13C8-PFOA (surr.)	1	%	80	84	101	84
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5	8.2	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5	8.2	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5	8.2	< 5

Client Sample ID			BH317_1.0-1.1	BH318_0.0-0.2	BH318_0.5-0.7	BH319_0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027621	S22-Jn0027622	S22-Jn0027623	S22-Jn0027624
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	100	93	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	100	93	< 50
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	170	150	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	170	150	< 100

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Client Sample ID			BH317_1.0-1.1	BH318_0.0-0.2	BH318_0.5-0.7	BH319_0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027621	S22-Jn0027622	S22-Jn0027623	S22-Jn0027624
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	0.4	< 0.2	0.2
o-Xylene	0.1	mg/kg	< 0.1	0.2	< 0.1	0.2
Xylenes - Total*	0.3	mg/kg	< 0.3	0.6	< 0.3	0.4
4-Bromofluorobenzene (surr.)	1	%	142	143	83	150
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	1.0	2.0	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	1.3	2.2	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.6	2.5	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 1	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	0.6	1.0	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	0.8	1.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	0.9	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	1.0	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	0.8	1.9	< 0.5
Chrysene	0.5	mg/kg	< 0.5	1.1	1.7	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	1.8	2.0	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	0.7	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 1	< 1	< 0.5
Pyrene	0.5	mg/kg	< 0.5	1.8	2.1	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	6.9	13	< 0.5
2-Fluorobiphenyl (surr.)	1	%	76	83	79	71
p-Terphenyl-d14 (surr.)	1	%	83	92	86	91
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
a-HCH	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
b-HCH	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
d-HCH	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
g-HCH (Lindane)	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05

DRAFT

Client Sample ID			BH317_1.0-1.1	BH318_0.0-0.2	BH318_0.5-0.7	BH319_0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027621	S22-Jn0027622	S22-Jn0027623	S22-Jn0027624
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Hexachlorobenzene	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Toxaphene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	-	103	89	90
Tetrachloro-m-xylene (surr.)	1	%	-	96	95	94
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Bolstar	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Coumaphos	2	mg/kg	-	< 2	< 2	< 2
Demeton-S	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Diazinon	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Dimethoate	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
EPN	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Ethyl parathion	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Malathion	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Monocrotophos	2	mg/kg	-	< 2	< 2	< 2
Naled	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Omethoate	2	mg/kg	-	< 2	< 2	< 2
Phorate	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Pyrazophos	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Terbufos	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	-	89	91	91

DRAFT

Client Sample ID			BH317_1.0-1.1	BH318_0.0-0.2	BH318_0.5-0.7	BH319_0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027621	S22-Jn0027622	S22-Jn0027623	S22-Jn0027624
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Aroclor-1221	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Aroclor-1232	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Aroclor-1242	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Aroclor-1248	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Aroclor-1254	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Aroclor-1260	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Total PCB*	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	-	103	89	90
Tetrachloro-m-xylene (surr.)	1	%	-	96	95	94
Phenols (Halogenated)						
2-Chlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-Trichlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
2.4.6-Trichlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
2.6-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
4-Chloro-3-methylphenol	1	mg/kg	< 1	< 1	< 1	< 1
Pentachlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
Tetrachlorophenols - Total	10	mg/kg	< 10	< 10	< 10	< 10
Total Halogenated Phenol*	1	mg/kg	< 1	< 1	< 1	< 1
Phenols (non-Halogenated)						
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	< 20	< 20	< 20	< 20
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
2-Nitrophenol	1	mg/kg	< 1	< 1	< 1	< 1
2.4-Dimethylphenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-Dinitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Total cresols*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
4-Nitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
Dinoseb	20	mg/kg	< 20	< 20	< 20	< 20
Phenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenol-d6 (surr.)	1	%	85	96	84	71
Total Non-Halogenated Phenol*	20	mg/kg	< 20	< 20	< 20	< 20
Heavy Metals						
Arsenic	2	mg/kg	7.6	11	9.6	< 2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	23	16	23	21
Copper	5	mg/kg	13	75	15	50
Lead	5	mg/kg	60	140	97	6.5
Mercury	0.1	mg/kg	0.1	0.4	0.4	< 0.1
Nickel	5	mg/kg	5.5	11	5.2	94
Zinc	5	mg/kg	32	190	61	59
% Moisture	1	%	22	29	19	7.1

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Client Sample ID			BH317_1.0-1.1	BH318_0.0-0.2	BH318_0.5-0.7	BH319_0.0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027621	S22-Jn0027622	S22-Jn0027623	S22-Jn0027624
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Per- and Polyfluoroalkyl Substances (PFASs) - Short						
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	-	< 10	-	< 10
13C2-6:2 FTSA (surr.)	1	%	-	86	-	90
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	-	< 5	-	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	-	6.0	-	< 5
18O2-PFHxS (surr.)	1	%	-	79	-	90
13C8-PFOS (surr.)	1	%	-	96	-	104
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	-	< 5	-	< 5
13C8-PFOA (surr.)	1	%	-	92	-	98
Sum (PFHxS + PFOS)*	5	ug/kg	-	6	-	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	-	6	-	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	-	6	-	< 5
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.7	-	-	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.0	-	-	-
Reaction Ratings*[S05]	0	-	3.0	-	-	-

Client Sample ID			BH319_1.0-1.1	Trip Blank	Trip Spike	[G01]QA100
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027625	S22-Jn0027626	S22-Jn0027627	S22-Jn0027628
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	-	-	< 50
TRH C10-C14	20	mg/kg	< 20	-	-	< 100
TRH C15-C28	50	mg/kg	< 50	-	-	< 250
TRH C29-C36	50	mg/kg	< 50	-	-	< 250
TRH C10-C36 (Total)	50	mg/kg	< 50	-	-	< 250
Naphthalene[N02]	0.5	mg/kg	< 0.5	-	-	< 1.25
TRH C6-C10	20	mg/kg	< 20	-	-	< 50
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	-	-	< 50
TRH >C10-C16	50	mg/kg	< 50	-	-	< 250
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	-	-	< 250
TRH >C16-C34	100	mg/kg	< 100	-	-	< 500
TRH >C34-C40	100	mg/kg	< 100	-	-	< 500
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	-	< 500
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.25
Toluene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.25
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.25
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	-	< 0.5
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.25
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	-	< 0.75
4-Bromofluorobenzene (surr.)	1	%	80	110	-	80

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Client Sample ID			BH319_1.0-1.1	Trip Blank	Trip Spike	[G01]QA100
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027625	S22-Jn0027626	S22-Jn0027627	S22-Jn0027628
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	-	-	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	-	-	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	-	-	1.2
Acenaphthene	0.5	mg/kg	< 0.5	-	-	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	-	-	< 0.5
Anthracene	0.5	mg/kg	< 0.5	-	-	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	-	-	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	-	-	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	-	-	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	-	-	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	-	-	< 0.5
Chrysene	0.5	mg/kg	< 0.5	-	-	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	-	-	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	-	-	0.5
Fluorene	0.5	mg/kg	< 0.5	-	-	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	-	-	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	-	-	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	-	-	< 0.5
Pyrene	0.5	mg/kg	< 0.5	-	-	0.6
Total PAH*	0.5	mg/kg	< 0.5	-	-	1.1
2-Fluorobiphenyl (surr.)	1	%	68	-	-	72
p-Terphenyl-d14 (surr.)	1	%	98	-	-	85
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	-	-	< 0.1
4.4'-DDD	0.05	mg/kg	-	-	-	< 0.05
4.4'-DDE	0.05	mg/kg	-	-	-	< 0.05
4.4'-DDT	0.05	mg/kg	-	-	-	< 0.05
a-HCH	0.05	mg/kg	-	-	-	< 0.05
Aldrin	0.05	mg/kg	-	-	-	< 0.05
b-HCH	0.05	mg/kg	-	-	-	< 0.05
d-HCH	0.05	mg/kg	-	-	-	< 0.05
Dieldrin	0.05	mg/kg	-	-	-	< 0.05
Endosulfan I	0.05	mg/kg	-	-	-	< 0.05
Endosulfan II	0.05	mg/kg	-	-	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	-	-	< 0.05
Endrin	0.05	mg/kg	-	-	-	< 0.05
Endrin aldehyde	0.05	mg/kg	-	-	-	< 0.05
Endrin ketone	0.05	mg/kg	-	-	-	< 0.05
g-HCH (Lindane)	0.05	mg/kg	-	-	-	< 0.05
Heptachlor	0.05	mg/kg	-	-	-	< 0.05
Heptachlor epoxide	0.05	mg/kg	-	-	-	< 0.05
Hexachlorobenzene	0.05	mg/kg	-	-	-	< 0.05
Methoxychlor	0.05	mg/kg	-	-	-	< 0.05
Toxaphene	0.5	mg/kg	-	-	-	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	-	-	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	-	-	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	-	-	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	-	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	-	-	102
Tetrachloro-m-xylene (surr.)	1	%	-	-	-	95

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Client Sample ID			BH319_1.0-1.1	Trip Blank	Trip Spike	[G01]QA100
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027625	S22-Jn0027626	S22-Jn0027627	S22-Jn0027628
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	-	-	< 0.2
Bolstar	0.2	mg/kg	-	-	-	< 0.2
Chlorfenvinphos	0.2	mg/kg	-	-	-	< 0.2
Chlorpyrifos	0.2	mg/kg	-	-	-	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	-	-	-	< 0.2
Coumaphos	2	mg/kg	-	-	-	< 2
Demeton-S	0.2	mg/kg	-	-	-	< 0.2
Demeton-O	0.2	mg/kg	-	-	-	< 0.2
Diazinon	0.2	mg/kg	-	-	-	< 0.2
Dichlorvos	0.2	mg/kg	-	-	-	< 0.2
Dimethoate	0.2	mg/kg	-	-	-	< 0.2
Disulfoton	0.2	mg/kg	-	-	-	< 0.2
EPN	0.2	mg/kg	-	-	-	< 0.2
Ethion	0.2	mg/kg	-	-	-	< 0.2
Ethoprop	0.2	mg/kg	-	-	-	< 0.2
Ethyl parathion	0.2	mg/kg	-	-	-	< 0.2
Fenitrothion	0.2	mg/kg	-	-	-	< 0.2
Fensulfothion	0.2	mg/kg	-	-	-	< 0.2
Fenthion	0.2	mg/kg	-	-	-	< 0.2
Malathion	0.2	mg/kg	-	-	-	< 0.2
Merphos	0.2	mg/kg	-	-	-	< 0.2
Methyl parathion	0.2	mg/kg	-	-	-	< 0.2
Mevinphos	0.2	mg/kg	-	-	-	< 0.2
Monocrotophos	2	mg/kg	-	-	-	< 2
Naled	0.2	mg/kg	-	-	-	< 0.2
Omethoate	2	mg/kg	-	-	-	< 2
Phorate	0.2	mg/kg	-	-	-	< 0.2
Pirimiphos-methyl	0.2	mg/kg	-	-	-	< 0.2
Pyrazophos	0.2	mg/kg	-	-	-	< 0.2
Ronnel	0.2	mg/kg	-	-	-	< 0.2
Terbufos	0.2	mg/kg	-	-	-	< 0.2
Tetrachlorvinphos	0.2	mg/kg	-	-	-	< 0.2
Tokuthion	0.2	mg/kg	-	-	-	< 0.2
Trichloronate	0.2	mg/kg	-	-	-	< 0.2
Triphenylphosphate (surr.)	1	%	-	-	-	88
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1221	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1232	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1242	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1248	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1254	0.1	mg/kg	-	-	-	< 0.1
Aroclor-1260	0.1	mg/kg	-	-	-	< 0.1
Total PCB*	0.1	mg/kg	-	-	-	< 0.1
Dibutylchlorendate (surr.)	1	%	-	-	-	102
Tetrachloro-m-xylene (surr.)	1	%	-	-	-	95

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Client Sample ID			BH319_1.0-1.1	Trip Blank	Trip Spike	[G01]QA100
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027625	S22-Jn0027626	S22-Jn0027627	S22-Jn0027628
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Phenols (Halogenated)						
2-Chlorophenol	0.5	mg/kg	< 0.5	-	-	< 0.5
2.4-Dichlorophenol	0.5	mg/kg	< 0.5	-	-	< 0.5
2.4.5-Trichlorophenol	1	mg/kg	< 1	-	-	< 1
2.4.6-Trichlorophenol	1	mg/kg	< 1	-	-	< 1
2.6-Dichlorophenol	0.5	mg/kg	< 0.5	-	-	< 0.5
4-Chloro-3-methylphenol	1	mg/kg	< 1	-	-	< 1
Pentachlorophenol	1	mg/kg	< 1	-	-	< 1
Tetrachlorophenols - Total	10	mg/kg	< 10	-	-	< 10
Total Halogenated Phenol*	1	mg/kg	< 1	-	-	< 1
Phenols (non-Halogenated)						
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	< 20	-	-	< 20
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5	-	-	< 5
2-Nitrophenol	1	mg/kg	< 1	-	-	< 1
2.4-Dimethylphenol	0.5	mg/kg	< 0.5	-	-	< 0.5
2.4-Dinitrophenol	5	mg/kg	< 5	-	-	< 5
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.2	-	-	< 0.2
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 0.4	-	-	< 0.4
Total cresols*	0.5	mg/kg	< 0.5	-	-	< 0.5
4-Nitrophenol	5	mg/kg	< 5	-	-	< 5
Dinoseb	20	mg/kg	< 20	-	-	< 20
Phenol	0.5	mg/kg	< 0.5	-	-	< 0.5
Phenol-d6 (surr.)	1	%	69	-	-	84
Total Non-Halogenated Phenol*	20	mg/kg	< 20	-	-	< 20
Heavy Metals						
Arsenic	2	mg/kg	8.1	-	-	10
Cadmium	0.4	mg/kg	< 0.4	-	-	< 0.4
Chromium	5	mg/kg	19	-	-	18
Copper	5	mg/kg	6.3	-	-	67
Lead	5	mg/kg	39	-	-	120
Mercury	0.1	mg/kg	< 0.1	-	-	0.3
Nickel	5	mg/kg	< 5	-	-	21
Zinc	5	mg/kg	8.4	-	-	160
% Moisture	1	%	21	-	-	21
Per- and Polyfluoroalkyl Substances (PFASs) - Short						
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	-	-	-	< 10
13C2-6:2 FTSA (surr.)	1	%	-	-	-	94
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	-	-	-	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	-	-	-	< 5
18O2-PFHxS (surr.)	1	%	-	-	-	83
13C8-PFOS (surr.)	1	%	-	-	-	98
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	-	-	-	< 5
13C8-PFOA (surr.)	1	%	-	-	-	90
Sum (PFHxS + PFOS)*	5	ug/kg	-	-	-	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	-	-	-	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	-	-	-	< 5

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Client Sample ID			BH319_1.0-1.1	Trip Blank	Trip Spike	[G01]QA100
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Jn0027625	S22-Jn0027626	S22-Jn0027627	S22-Jn0027628
Date Sampled			Jun 10, 2022	Jun 10, 2022	Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	-	-	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	-	-	-
Reaction Ratings*[S05]	0	-	2.0	-	-	-
BTEX						
Benzene	1	%	-	-	100	-
Ethylbenzene	1	%	-	-	100	-
m&p-Xylenes	1	%	-	-	100	-
o-Xylene	1	%	-	-	100	-
Toluene	1	%	-	-	95	-
Xylenes - Total	1	%	-	-	100	-
4-Bromofluorobenzene (surr.)	1	%	-	-	94	-

Client Sample ID			BH316_0.8-1.0
Sample Matrix			Soil
Eurofins Sample No.			S22-Jn0027633
Date Sampled			Jun 10, 2022
Test/Reference	LOR	Unit	
Acid Sulfate Soils Field pH Test			
pH-F (Field pH test)*	0.1	pH Units	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.6
Reaction Ratings*[S05]	0	-	2.0

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Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Jun 14, 2022	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 14, 2022	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 14, 2022	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Jun 14, 2022	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Polycyclic Aromatic Hydrocarbons	Sydney	Jun 14, 2022	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Phenols (Halogenated)	Sydney	Jun 14, 2022	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Phenols (non-Halogenated)	Sydney	Jun 14, 2022	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Metals M8	Sydney	Jun 14, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B15			
Organochlorine Pesticides	Sydney	Jun 16, 2022	14 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Organophosphorus Pesticides	Sydney	Jun 16, 2022	14 Days
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Polychlorinated Biphenyls	Sydney	Jun 16, 2022	28 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
% Moisture	Sydney	Jun 14, 2022	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs) - Short	Brisbane	Jun 16, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Acid Sulfate Soils Field pH Test	Sydney	Jun 14, 2022	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			

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Address: Level 9, 203 Pacific Highway
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Project Name: ROYAL PRINCE ALFRED
Project ID: 80022026

Order No.:
Report #: 896934
Phone: 0294967700
Fax: 02 9499 3902

Received: Jun 10, 2022 6:50 PM
Due: Jun 16, 2022
Priority: 2 Day
Contact Name: Michael Koerner

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Asbestos - AS4964	HOLD	Acid Sulfate Soils Field pH Test	BTEX	Eurofins Suite B15	Moisture Set	Eurofins Suite B7A	Per- and Polyfluoroalkyl Substances (PFASs) - Short	BTEX
Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**									
1	BH310_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027601	X				X	X	X	X	
2	BH310_0.3-0.5	Jun 10, 2022		Soil	S22-Jn0027602			X						
3	BH311_0.1 - 0.2	Jun 10, 2022		Soil	S22-Jn0027603	X				X	X	X	X	
4	BH311_0.3-0.5	Jun 10, 2022		Soil	S22-Jn0027604			X						
5	BH312_0.3-0.5	Jun 10, 2022		Soil	S22-Jn0027605					X	X	X	X	
6	BH313_0.1-0.2	Jun 10, 2022		Soil	S22-	X				X	X	X	X	

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Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
					Jn0027606									
7	BH314_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027607			X						
8	BH315_0.3-0.4	Jun 10, 2022		Soil	S22-Jn0027608	X				X	X	X	X	
9	BH315_0.6-0.7	Jun 10, 2022		Soil	S22-Jn0027609			X			X	X		
10	BH316_0.4-0.5	Jun 10, 2022		Soil	S22-Jn0027610	X				X	X	X		
11	BH309_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027611	X				X	X	X	X	
12	BH309_1.1-1.2	Jun 10, 2022		Soil	S22-Jn0027612			X			X	X		

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Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Asbestos - AS4964	HOLD	Acid Sulfate Soils Field pH Test	BTEX	Eurofins Suite B15	Moisture Set	Eurofins Suite B7A	Per- and Polyfluoroalkyl Substances (PFASs) - Short	BTEX
Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
13	BH323_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027613	X				X	X	X	X	
14	BH323_0.4-0.6	Jun 10, 2022		Soil	S22-Jn0027614						X	X		
15	BH325_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027615	X				X	X	X	X	
16	BH325_0.6-0.8	Jun 10, 2022		Soil	S22-Jn0027616						X	X		
17	BH326_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027617	X				X	X	X	X	
18	BH324_0.3-0.45	Jun 10, 2022		Soil	S22-Jn0027618	X				X	X	X	X	
19	BH322_0.3-	Jun 10, 2022		Soil	S22-	X				X	X	X	X	

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Eurofins Analytical Services Manager : Hannah Mawbey

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Sample Detail						Asbestos - AS4964	HOLD	Acid Sulfate Soils Field pH Test	BTEX	Eurofins Suite B15	Moisture Set	Eurofins Suite B7A	Per- and Polyfluoroalkyl Substances (PFASs) - Short	BTEX
Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
	0.45				Jn0027619									
20	BH317_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027620	X				X	X	X	X	
21	BH317_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0027621			X			X	X		
22	BH318_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027622	X				X	X	X	X	
23	BH318_0.5-0.7	Jun 10, 2022		Soil	S22-Jn0027623					X	X	X		
24	BH319_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027624	X				X	X	X	X	
25	BH319_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0027625			X			X	X		

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Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Asbestos - AS4964	HOLD	Acid Sulfate Soils Field pH Test	BTEX	Eurofins Suite B15	Moisture Set	Eurofins Suite B7A	Per- and Polyfluoroalkyl Substances (PFASs) - Short	BTEX
Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
26	Trip Blank	Jun 10, 2022		Soil	S22-Jn0027626				X					
27	Trip Spike	Jun 10, 2022		Soil	S22-Jn0027627									X
28	QA100	Jun 10, 2022		Soil	S22-Jn0027628	X				X	X	X	X	
29	BH312_0.-0.2	Jun 10, 2022		Soil	S22-Jn0027630		X							
30	BH313_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027631		X							
31	BH314_0.0-0.2	Jun 10, 2022		Soil	S22-Jn0027632		X							
32	BH316_0.8-1.0	Jun 10, 2022		Soil	S22-			X						

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Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
					Jn0027633									
33	BH309_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027634		X							
34	BH317_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027635		X							
35	BH318_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0027636		X							
36	BH319_0.5-0.7	Jun 10, 2022		Soil	S22-Jn0027637		X							
37	BH320_0-0.2	Jun 10, 2022		Soil	S22-Jn0027638		X							
38	BH320_0.5-0.6	Jun 10, 2022		Soil	S22-Jn0027639		X							

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Project Name: ROYAL PRINCE ALFRED
Project ID: 80022026

Order No.:
Report #: 896934
Phone: 0294967700
Fax: 02 9499 3902

Received: Jun 10, 2022 6:50 PM
Due: Jun 16, 2022
Priority: 2 Day
Contact Name: Michael Koerner

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Asbestos - AS4964	HOLD	Acid Sulfate Soils Field pH Test	BTEX	Eurofins Suite B15	Moisture Set	Eurofins Suite B7A	Per- and Polyfluoroalkyl Substances (PFASs) - Short	BTEX
Melbourne Laboratory - NATA # 1261 Site # 1254														
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	X	X		X
Brisbane Laboratory - NATA # 1261 Site # 20794													X	
Mayfield Laboratory - NATA # 1261 Site # 25079														
Perth Laboratory - NATA # 2377 Site # 2370														
External Laboratory														
39	BH320_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0027640		X							
40	BH326_0-0.2	Jun 10, 2022		Soil	S22-Jn0027641		X							
Test Counts						15	11	8	1	17	23	23	15	1

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Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

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QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

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

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Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-HCH (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/kg	< 0.2			0.2	Pass	
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorfenvinphos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos-methyl	mg/kg	< 0.2			0.2	Pass	
Coumaphos	mg/kg	< 2			2	Pass	
Demeton-S	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Dimethoate	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
EPN	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Ethyl parathion	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Malathion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Monocrotophos	mg/kg	< 2			2	Pass	
Naled	mg/kg	< 0.2			0.2	Pass	
Omethoate	mg/kg	< 2			2	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	
Pirimiphos-methyl	mg/kg	< 0.2			0.2	Pass	
Pyrazophos	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Terbufos	mg/kg	< 0.2			0.2	Pass	
Tetrachlorvinphos	mg/kg	< 0.2			0.2	Pass	
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.1			0.1	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.1			0.1	Pass	
Aroclor-1242	mg/kg	< 0.1			0.1	Pass	
Aroclor-1248	mg/kg	< 0.1			0.1	Pass	
Aroclor-1254	mg/kg	< 0.1			0.1	Pass	
Aroclor-1260	mg/kg	< 0.1			0.1	Pass	

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Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total PCB*	mg/kg	< 0.1			0.1	Pass	
Method Blank							
Phenols (Halogenated)							
2-Chlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4.5-Trichlorophenol	mg/kg	< 1			1	Pass	
2.4.6-Trichlorophenol	mg/kg	< 1			1	Pass	
2.6-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
4-Chloro-3-methylphenol	mg/kg	< 1			1	Pass	
Pentachlorophenol	mg/kg	< 1			1	Pass	
Tetrachlorophenols - Total	mg/kg	< 10			10	Pass	
Method Blank							
Phenols (non-Halogenated)							
2-Cyclohexyl-4.6-dinitrophenol	mg/kg	< 20			20	Pass	
2-Methyl-4.6-dinitrophenol	mg/kg	< 5			5	Pass	
2-Nitrophenol	mg/kg	< 1			1	Pass	
2.4-Dimethylphenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dinitrophenol	mg/kg	< 5			5	Pass	
2-Methylphenol (o-Cresol)	mg/kg	< 0.2			0.2	Pass	
3&4-Methylphenol (m&p-Cresol)	mg/kg	< 0.4			0.4	Pass	
4-Nitrophenol	mg/kg	< 5			5	Pass	
Dinoseb	mg/kg	< 20			20	Pass	
Phenol	mg/kg	< 0.5			0.5	Pass	
Total Non-Halogenated Phenol*	mg/kg	< 0			20	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Per- and Polyfluoroalkyl Substances (PFASs) - Short							
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/kg	< 10			10	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	101			70-130	Pass	
TRH C10-C14	%	92			70-130	Pass	
Naphthalene	%	119			70-130	Pass	
TRH C6-C10	%	98			70-130	Pass	
TRH >C10-C16	%	92			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	99			70-130	Pass	
Toluene	%	105			70-130	Pass	
Ethylbenzene	%	95			70-130	Pass	
m&p-Xylenes	%	104			70-130	Pass	
o-Xylene	%	93			70-130	Pass	

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Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Xylenes - Total*	%	101			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	88			70-130	Pass	
Acenaphthylene	%	72			70-130	Pass	
Anthracene	%	76			70-130	Pass	
Benz(a)anthracene	%	70			70-130	Pass	
Benzo(a)pyrene	%	78			70-130	Pass	
Benzo(b&j)fluoranthene	%	78			70-130	Pass	
Benzo(g.h.i)perylene	%	77			70-130	Pass	
Benzo(k)fluoranthene	%	86			70-130	Pass	
Chrysene	%	74			70-130	Pass	
Dibenz(a.h)anthracene	%	79			70-130	Pass	
Fluoranthene	%	75			70-130	Pass	
Fluorene	%	72			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	74			70-130	Pass	
Naphthalene	%	74			70-130	Pass	
Phenanthrene	%	73			70-130	Pass	
Pyrene	%	70			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	88			70-130	Pass	
4.4'-DDD	%	103			70-130	Pass	
4.4'-DDE	%	83			70-130	Pass	
4.4'-DDT	%	110			70-130	Pass	
a-HCH	%	83			70-130	Pass	
Aldrin	%	89			70-130	Pass	
b-HCH	%	94			70-130	Pass	
d-HCH	%	88			70-130	Pass	
Dieldrin	%	88			70-130	Pass	
Endosulfan I	%	89			70-130	Pass	
Endosulfan II	%	96			70-130	Pass	
Endosulfan sulphate	%	86			70-130	Pass	
Endrin	%	104			70-130	Pass	
Endrin aldehyde	%	99			70-130	Pass	
Endrin ketone	%	81			70-130	Pass	
g-HCH (Lindane)	%	101			70-130	Pass	
Heptachlor	%	100			70-130	Pass	
Heptachlor epoxide	%	94			70-130	Pass	
Hexachlorobenzene	%	84			70-130	Pass	
Methoxychlor	%	98			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	106			70-130	Pass	
Dimethoate	%	95			70-130	Pass	
Ethion	%	86			70-130	Pass	
Fenitrothion	%	88			70-130	Pass	
Methyl parathion	%	100			70-130	Pass	
Mevinphos	%	88			70-130	Pass	
LCS - % Recovery							
Polychlorinated Biphenyls							
Aroclor-1016	%	121			70-130	Pass	
Aroclor-1260	%	77			70-130	Pass	
LCS - % Recovery							

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Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Phenols (Halogenated)							
2-Chlorophenol	%	82			25-140	Pass	
2.4-Dichlorophenol	%	77			25-140	Pass	
2.4.5-Trichlorophenol	%	70			25-140	Pass	
2.4.6-Trichlorophenol	%	102			25-140	Pass	
2.6-Dichlorophenol	%	73			25-140	Pass	
4-Chloro-3-methylphenol	%	91			25-140	Pass	
Pentachlorophenol	%	109			25-140	Pass	
Tetrachlorophenols - Total	%	70			25-140	Pass	
LCS - % Recovery							
Phenols (non-Halogenated)							
2-Cyclohexyl-4.6-dinitrophenol	%	102			25-140	Pass	
2-Nitrophenol	%	77			25-140	Pass	
2.4-Dimethylphenol	%	82			25-140	Pass	
2.4-Dinitrophenol	%	82			25-140	Pass	
2-Methylphenol (o-Cresol)	%	71			25-140	Pass	
3&4-Methylphenol (m&p-Cresol)	%	90			25-140	Pass	
4-Nitrophenol	%	82			25-140	Pass	
Dinoseb	%	76			25-140	Pass	
Phenol	%	99			25-140	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	94			80-120	Pass	
Cadmium	%	94			80-120	Pass	
Chromium	%	103			80-120	Pass	
Copper	%	107			80-120	Pass	
Lead	%	107			80-120	Pass	
Mercury	%	107			80-120	Pass	
Nickel	%	104			80-120	Pass	
Zinc	%	98			80-120	Pass	
LCS - % Recovery							
Per- and Polyfluoroalkyl Substances (PFASs) - Short							
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	89			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	103			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	100			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	101			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Phenols (Halogenated)				Result 1					
2.4.6-Trichlorophenol	S22-My0071690	NCP	%	70			30-130	Pass	
Spike - % Recovery									
Per- and Polyfluoroalkyl Substances (PFASs) - Short				Result 1					
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S22-Jn0027601	CP	%	90			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S22-Jn0027601	CP	%	101			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S22-Jn0027601	CP	%	100			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S22-Jn0027601	CP	%	89			50-150	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	S22-Jn0027603	CP	%	105			70-130	Pass	
Naphthalene	S22-Jn0027603	CP	%	95			70-130	Pass	
TRH C6-C10	S22-Jn0027603	CP	%	104			70-130	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
BTEX				Result 1					
Benzene	S22-Jn0027603	CP	%	104			70-130	Pass	
Toluene	S22-Jn0027603	CP	%	97			70-130	Pass	
Ethylbenzene	S22-Jn0027603	CP	%	103			70-130	Pass	
m&p-Xylenes	S22-Jn0027603	CP	%	104			70-130	Pass	
o-Xylene	S22-Jn0027603	CP	%	104			70-130	Pass	
Xylenes - Total*	S22-Jn0027603	CP	%	104			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S22-Jn0027603	CP	%	93			70-130	Pass	
Acenaphthylene	S22-Jn0027603	CP	%	80			70-130	Pass	
Anthracene	S22-Jn0027603	CP	%	91			70-130	Pass	
Benz(a)anthracene	S22-Jn0027603	CP	%	88			70-130	Pass	
Benzo(a)pyrene	S22-Jn0027603	CP	%	91			70-130	Pass	
Benzo(b&j)fluoranthene	S22-Jn0027603	CP	%	82			70-130	Pass	
Benzo(g.h.i)perylene	S22-Jn0027603	CP	%	111			70-130	Pass	
Benzo(k)fluoranthene	S22-Jn0027603	CP	%	92			70-130	Pass	
Chrysene	S22-Jn0027603	CP	%	86			70-130	Pass	
Dibenz(a.h)anthracene	S22-Jn0027603	CP	%	106			70-130	Pass	
Fluoranthene	S22-Jn0027603	CP	%	90			70-130	Pass	
Fluorene	S22-Jn0027603	CP	%	97			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S22-Jn0027603	CP	%	100			70-130	Pass	
Naphthalene	S22-Jn0027603	CP	%	94			70-130	Pass	
Phenanthrene	S22-Jn0027603	CP	%	94			70-130	Pass	
Pyrene	S22-Jn0027603	CP	%	83			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	S22-Jn0027603	CP	%	83			70-130	Pass	
4.4'-DDD	S22-Jn0027603	CP	%	89			70-130	Pass	
4.4'-DDE	S22-Jn0027603	CP	%	79			70-130	Pass	
4.4'-DDT	S22-Jn0027603	CP	%	90			70-130	Pass	
a-HCH	S22-Jn0027603	CP	%	87			70-130	Pass	
Aldrin	S22-Jn0027603	CP	%	82			70-130	Pass	
b-HCH	S22-Jn0027603	CP	%	87			70-130	Pass	
d-HCH	S22-Jn0027603	CP	%	84			70-130	Pass	
Dieldrin	S22-Jn0027603	CP	%	89			70-130	Pass	
Endosulfan I	S22-Jn0027603	CP	%	83			70-130	Pass	
Endosulfan II	S22-Jn0027603	CP	%	90			70-130	Pass	
Endosulfan sulphate	S22-Jn0027603	CP	%	74			70-130	Pass	
Endrin	S22-Jn0027603	CP	%	92			70-130	Pass	
Endrin aldehyde	S22-Jn0027603	CP	%	125			70-130	Pass	
Endrin ketone	S22-Jn0027603	CP	%	78			70-130	Pass	
g-HCH (Lindane)	S22-Jn0027603	CP	%	86			70-130	Pass	
Heptachlor	S22-Jn0027603	CP	%	86			70-130	Pass	
Heptachlor epoxide	S22-Jn0027603	CP	%	79			70-130	Pass	
Hexachlorobenzene	S22-Jn0027603	CP	%	84			70-130	Pass	
Methoxychlor	S22-Jn0027603	CP	%	88			70-130	Pass	
Spike - % Recovery									
Organophosphorus Pesticides				Result 1					
Diazinon	S22-Jn0027603	CP	%	93			70-130	Pass	
Dimethoate	S22-Jn0027603	CP	%	86			70-130	Pass	
Ethion	S22-Jn0027603	CP	%	82			70-130	Pass	
Fenitrothion	S22-Jn0027603	CP	%	92			70-130	Pass	

DRAFT

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Methyl parathion	S22-Jn0027603	CP	%	123			70-130	Pass	
Mevinphos	S22-Jn0027603	CP	%	103			70-130	Pass	
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1016	S22-Jn0027603	CP	%	104			70-130	Pass	
Spike - % Recovery									
Phenols (Halogenated)				Result 1					
2-Chlorophenol	S22-Jn0027603	CP	%	87			30-130	Pass	
2.4-Dichlorophenol	S22-Jn0027603	CP	%	79			30-130	Pass	
2.4.5-Trichlorophenol	S22-Jn0027603	CP	%	87			30-130	Pass	
2.6-Dichlorophenol	S22-Jn0027603	CP	%	97			30-130	Pass	
4-Chloro-3-methylphenol	S22-Jn0027603	CP	%	88			30-130	Pass	
Pentachlorophenol	S22-Jn0027603	CP	%	89			30-130	Pass	
Tetrachlorophenols - Total	S22-Jn0027603	CP	%	98			30-130	Pass	
Spike - % Recovery									
Phenols (non-Halogenated)				Result 1					
2-Cyclohexyl-4.6-dinitrophenol	S22-Jn0027603	CP	%	94			30-130	Pass	
2-Methyl-4.6-dinitrophenol	S22-Jn0027603	CP	%	98			30-130	Pass	
2-Nitrophenol	S22-Jn0027603	CP	%	87			30-130	Pass	
2.4-Dimethylphenol	S22-Jn0027603	CP	%	80			30-130	Pass	
2.4-Dinitrophenol	S22-Jn0027603	CP	%	102			70-130	Pass	
2-Methylphenol (o-Cresol)	S22-Jn0027603	CP	%	86			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	S22-Jn0027603	CP	%	83			30-130	Pass	
4-Nitrophenol	S22-Jn0027603	CP	%	96			30-130	Pass	
Dinoseb	S22-Jn0027603	CP	%	99			30-130	Pass	
Phenol	S22-Jn0027603	CP	%	80			30-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S22-Jn0027603	CP	%	103			75-125	Pass	
Cadmium	S22-Jn0027603	CP	%	102			75-125	Pass	
Chromium	S22-Jn0027603	CP	%	104			75-125	Pass	
Copper	S22-Jn0027603	CP	%	109			75-125	Pass	
Lead	S22-Jn0027603	CP	%	108			75-125	Pass	
Mercury	S22-Jn0027603	CP	%	117			75-125	Pass	
Nickel	S22-Jn0027603	CP	%	117			75-125	Pass	
Zinc	S22-Jn0027603	CP	%	114			75-125	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S22-Jn0027614	CP	%	80			70-130	Pass	
Anthracene	S22-Jn0027614	CP	%	70			70-130	Pass	
Benzo(k)fluoranthene	S22-Jn0027614	CP	%	77			70-130	Pass	
Fluoranthene	S22-Jn0027614	CP	%	73			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	S22-Jn0027614	CP	%	77			70-130	Pass	
4.4'-DDD	S22-Jn0027614	CP	%	83			70-130	Pass	
4.4'-DDE	S22-Jn0027614	CP	%	89			70-130	Pass	
4.4'-DDT	S22-Jn0027614	CP	%	93			70-130	Pass	
a-HCH	S22-Jn0027614	CP	%	78			70-130	Pass	
Aldrin	S22-Jn0027614	CP	%	83			70-130	Pass	
b-HCH	S22-Jn0027614	CP	%	78			70-130	Pass	
d-HCH	S22-Jn0027614	CP	%	86			70-130	Pass	
Dieldrin	S22-Jn0027614	CP	%	94			70-130	Pass	
Endosulfan I	S22-Jn0027614	CP	%	93			70-130	Pass	

DRAFT

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endosulfan II	S22-Jn0027614	CP	%	92			70-130	Pass	
Endosulfan sulphate	S22-Jn0027614	CP	%	83			70-130	Pass	
Endrin	S22-Jn0027614	CP	%	121			70-130	Pass	
Endrin aldehyde	S22-Jn0027614	CP	%	77			70-130	Pass	
Endrin ketone	S22-Jn0027614	CP	%	74			70-130	Pass	
g-HCH (Lindane)	S22-Jn0027614	CP	%	85			70-130	Pass	
Heptachlor	S22-Jn0027614	CP	%	104			70-130	Pass	
Heptachlor epoxide	S22-Jn0027614	CP	%	90			70-130	Pass	
Hexachlorobenzene	S22-Jn0027614	CP	%	83			70-130	Pass	
Methoxychlor	S22-Jn0027614	CP	%	98			70-130	Pass	
Spike - % Recovery									
Organophosphorus Pesticides				Result 1					
Diazinon	S22-Jn0027614	CP	%	114			70-130	Pass	
Dimethoate	S22-Jn0027614	CP	%	117			70-130	Pass	
Ethion	S22-Jn0027614	CP	%	111			70-130	Pass	
Fenitrothion	S22-Jn0027614	CP	%	81			70-130	Pass	
Methyl parathion	S22-Jn0027614	CP	%	117			70-130	Pass	
Mevinphos	S22-Jn0027614	CP	%	114			70-130	Pass	
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1016	S22-Jn0027614	CP	%	71			70-130	Pass	
Aroclor-1260	S22-Jn0027614	CP	%	82			70-130	Pass	
Spike - % Recovery									
Phenols (Halogenated)				Result 1					
4-Chloro-3-methylphenol	S22-Jn0027614	CP	%	78			30-130	Pass	
Spike - % Recovery									
Phenols (non-Halogenated)				Result 1					
2-Nitrophenol	S22-Jn0027614	CP	%	98			30-130	Pass	
2.4-Dimethylphenol	S22-Jn0027614	CP	%	71			30-130	Pass	
2-Methylphenol (o-Cresol)	S22-Jn0027614	CP	%	74			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	S22-Jn0027614	CP	%	75			30-130	Pass	
Phenol	S22-Jn0027614	CP	%	78			30-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C10-C14	S22-Jn0027615	CP	%	79			70-130	Pass	
TRH >C10-C16	S22-Jn0027615	CP	%	89			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S22-Jn0027625	CP	%	116			75-125	Pass	
Cadmium	S22-Jn0027625	CP	%	111			75-125	Pass	
Chromium	S22-Jn0027625	CP	%	88			75-125	Pass	
Copper	S22-Jn0027625	CP	%	87			75-125	Pass	
Lead	S22-Jn0027625	CP	%	116			75-125	Pass	
Mercury	S22-Jn0027625	CP	%	117			75-125	Pass	
Nickel	S22-Jn0027625	CP	%	81			75-125	Pass	
Zinc	S22-Jn0027625	CP	%	80			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	S22-Jn0027601	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S22-Jn0029555	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S22-Jn0029555	NCP	mg/kg	54	< 50	34	30%	Fail	Q15
TRH C29-C36	S22-Jn0029555	NCP	mg/kg	60	< 50	34	30%	Fail	Q15
Naphthalene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

DRAFT

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C10	S22-Jn0027601	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S22-Jn0029555	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S22-Jn0029555	NCP	mg/kg	120	< 100	32	30%	Fail	Q15
TRH >C34-C40	S22-Jn0029555	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S22-Jn0027601	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S22-Jn0027601	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S22-Jn0027601	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S22-Jn0027601	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	S22-Jn0027601	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S22-Jn0027601	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-HCH	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-HCH	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-HCH	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-HCH (Lindane)	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S22-Jn0027601	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

DRAFT

Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	S22-Jn0027601	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	S22-Jn0027601	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	S22-Jn0027601	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	S22-Jn0027601	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1221	S22-Jn0027601	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	S22-Jn0027601	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1242	S22-Jn0027601	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1248	S22-Jn0027601	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1254	S22-Jn0027601	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1260	S22-Jn0027601	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Total PCB*	S22-Jn0027601	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Phenols (Halogenated)				Result 1	Result 2	RPD			
2-Chlorophenol	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dichlorophenol	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-Trichlorophenol	S22-Jn0027601	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4.6-Trichlorophenol	S22-Jn0027601	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.6-Dichlorophenol	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Chloro-3-methylphenol	S22-Jn0027601	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Pentachlorophenol	S22-Jn0027601	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Tetrachlorophenols - Total	S22-Jn0027601	CP	mg/kg	< 10	< 10	<1	30%	Pass	

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Duplicate									
Phenols (non-Halogenated)				Result 1	Result 2	RPD			
2-Cyclohexyl-4.6-dinitrophenol	S22-Jn0027601	CP	mg/kg	< 20	< 20	<1	30%	Pass	
2-Methyl-4.6-dinitrophenol	S22-Jn0027601	CP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Nitrophenol	S22-Jn0027601	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4-Dimethylphenol	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dinitrophenol	S22-Jn0027601	CP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Methylphenol (o-Cresol)	S22-Jn0027601	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
3&4-Methylphenol (m&p-Cresol)	S22-Jn0027601	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
4-Nitrophenol	S22-Jn0027601	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Dinoseb	S22-Jn0027601	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Phenol	S22-Jn0027601	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S22-Jn0027601	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cadmium	S22-Jn0027601	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S22-Jn0027601	CP	mg/kg	24	24	<1	30%	Pass	
Copper	S22-Jn0027601	CP	mg/kg	90	93	3.0	30%	Pass	
Lead	S22-Jn0027601	CP	mg/kg	140	140	3.0	30%	Pass	
Mercury	S22-Jn0027601	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S22-Jn0027601	CP	mg/kg	100	110	9.0	30%	Pass	
Zinc	S22-Jn0027601	CP	mg/kg	450	490	8.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S22-Jn0027601	CP	%	11	9.7	13	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	S22-Jn0027602	CP	pH Units	5.3	5.1	pass	20%	Pass	
pH-FOX (Field pH Peroxide test)*	S22-Jn0027602	CP	pH Units	4.4	4.5	pass	0%	Pass	
Duplicate									
Per- and Polyfluoroalkyl Substances (PFASs) - Short				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S22-Jn0027603	CP	ug/kg	< 10	< 10	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S22-Jn0027603	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	S22-Jn0027603	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	S22-Jn0027603	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S22-Jn0027614	CP	mg/kg	2.9	2.5	12	30%	Pass	
Cadmium	S22-Jn0027614	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S22-Jn0027614	CP	mg/kg	8.7	8.2	7.0	30%	Pass	
Copper	S22-Jn0027614	CP	mg/kg	14	13	9.0	30%	Pass	
Lead	S22-Jn0027614	CP	mg/kg	30	33	11	30%	Pass	
Mercury	S22-Jn0027614	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S22-Jn0027614	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	S22-Jn0027614	CP	mg/kg	9.3	5.9	45	30%	Fail	Q15
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S22-Jn0027614	CP	%	12	8.9	29	30%	Pass	

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Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S22-Jn0027618	CP	mg/kg	0.6	< 0.5	34	30%	Fail	Q15
Fluorene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S22-Jn0027618	CP	mg/kg	0.5	< 0.5	23	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S22-Jn0027618	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-HCH	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-HCH	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-HCH	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-HCH (Lindane)	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S22-Jn0027618	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	S22-Jn0027618	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	

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Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Ethion	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	S22-Jn0027618	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	S22-Jn0027618	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	S22-Jn0027618	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1221	S22-Jn0027618	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	S22-Jn0027618	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1242	S22-Jn0027618	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1248	S22-Jn0027618	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1254	S22-Jn0027618	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1260	S22-Jn0027618	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Total PCB*	S22-Jn0027618	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Phenols (Halogenated)				Result 1	Result 2	RPD			
2-Chlorophenol	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dichlorophenol	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-Trichlorophenol	S22-Jn0027618	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4.6-Trichlorophenol	S22-Jn0027618	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.6-Dichlorophenol	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Chloro-3-methylphenol	S22-Jn0027618	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Pentachlorophenol	S22-Jn0027618	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Tetrachlorophenols - Total	S22-Jn0027618	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Phenols (non-Halogenated)				Result 1	Result 2	RPD			
2-Cyclohexyl-4.6-dinitrophenol	S22-Jn0027618	CP	mg/kg	< 20	< 20	<1	30%	Pass	
2-Methyl-4.6-dinitrophenol	S22-Jn0027618	CP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Nitrophenol	S22-Jn0027618	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4-Dimethylphenol	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dinitrophenol	S22-Jn0027618	CP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Methylphenol (o-Cresol)	S22-Jn0027618	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
3&4-Methylphenol (m&p-Cresol)	S22-Jn0027618	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
4-Nitrophenol	S22-Jn0027618	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Dinoseb	S22-Jn0027618	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Phenol	S22-Jn0027618	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

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Duplicate									
Per- and Polyfluoroalkyl Substances (PFASs) - Short				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S22-Jn0027620	CP	ug/kg	< 10	< 10	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S22-Jn0027620	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	S22-Jn0027620	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	S22-Jn0027620	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S22-Jn0027624	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-HCH	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-HCH	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-HCH	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-HCH (Lindane)	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S22-Jn0027624	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	

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Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Chlorpyrifos-methyl	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	S22-Jn0027624	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	S22-Jn0027624	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	S22-Jn0027624	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	S22-Jn0027624	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1221	S22-Jn0027624	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	S22-Jn0027624	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1242	S22-Jn0027624	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1248	S22-Jn0027624	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1254	S22-Jn0027624	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1260	S22-Jn0027624	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Total PCB*	S22-Jn0027624	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Phenols (Halogenated)				Result 1	Result 2	RPD			
2-Chlorophenol	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dichlorophenol	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-Trichlorophenol	S22-Jn0027624	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4.6-Trichlorophenol	S22-Jn0027624	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.6-Dichlorophenol	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Chloro-3-methylphenol	S22-Jn0027624	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Pentachlorophenol	S22-Jn0027624	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Tetrachlorophenols - Total	S22-Jn0027624	CP	mg/kg	< 10	< 10	<1	30%	Pass	

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Duplicate									
Phenols (non-Halogenated)				Result 1	Result 2	RPD			
2-Cyclohexyl-4.6-dinitrophenol	S22-Jn0027624	CP	mg/kg	< 20	< 20	<1	30%	Pass	
2-Methyl-4.6-dinitrophenol	S22-Jn0027624	CP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Nitrophenol	S22-Jn0027624	CP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4-Dimethylphenol	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dinitrophenol	S22-Jn0027624	CP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Methylphenol (o-Cresol)	S22-Jn0027624	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
3&4-Methylphenol (m&p-Cresol)	S22-Jn0027624	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
4-Nitrophenol	S22-Jn0027624	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Dinoseb	S22-Jn0027624	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Phenol	S22-Jn0027624	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S22-Jn0027624	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cadmium	S22-Jn0027624	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S22-Jn0027624	CP	mg/kg	21	22	3.0	30%	Pass	
Copper	S22-Jn0027624	CP	mg/kg	50	54	9.0	30%	Pass	
Lead	S22-Jn0027624	CP	mg/kg	6.5	5.9	11	30%	Pass	
Mercury	S22-Jn0027624	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S22-Jn0027624	CP	mg/kg	94	100	10	30%	Pass	
Zinc	S22-Jn0027624	CP	mg/kg	59	69	15	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S22-Jn0027624	CP	%	7.1	8.6	19	30%	Pass	

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Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
Q09	The Surrogate recovery is outside of the recommended acceptance criteria due to matrix interference. Acceptance criteria were met for all other QC
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised by:

Hannah Mawbey	Analytical Services Manager
Chamath JHM Annakkage	Senior Analyst-Asbestos
Gabriele Cordero	Senior Analyst-Metal
Roopesh Rangarajan	Senior Analyst-Volatile
Roopesh Rangarajan	Senior Analyst-Organic



Glenn Jackson
General Manager

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Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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FW: Additional testing for job 896934-urgent TAT 24hrs

Charl Du Preez <CharlDuPreez@eurofins.com>
Fri 2022-06-17 2:12 PM

To: #AU04_Enviro_Sample_NSW <EnviroSampleNSW@eurofins.com>;Ryan Phillips <RyanPhillips@eurofins.com>

INFO: INTERNAL EMAIL - Sent from your own Eurofins email domain.

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Regards

Charl du Preez
0488348999

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From: Alejandra Beltran <alejandra.beltran@cardno.com.au>
Sent: Friday, 17 June 2022 2:11 PM
To: Charl Du Preez <CharlDuPreez@eurofins.com>
Cc: Hannah Mawbey <HannahMawbey@eurofins.com>
Subject: RE: Additional testing for job 896934-urgent TAT 24hrs

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Apologies, please cancel PFAS on BH320_1.0-1.1.

Cheers,

Alejandra Beltran
Environmental Engineer

Cardno now Stantec

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From: Charl Du Preez <CharlDuPreez@eurofins.com>
Sent: Friday, 17 June 2022 2:06 PM
To: Alejandra Beltran <alejandra.beltran@cardno.com.au>
Cc: Hannah Mawbey <HannahMawbey@eurofins.com>
Subject: RE: Additional testing for job 896934-urgent TAT 24hrs

Hi Alejandra

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I will get this sorted now.

Regards

Charl du Preez
0488348999

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From: Alejandra Beltran <alejandra.beltran@cardno.com.au>
Sent: Friday, 17 June 2022 1:46 PM
To: Charl Du Preez <CharlDuPreez@eurofins.com>
Cc: Hannah Mawbey <HannahMawbey@eurofins.com>
Subject: Additional testing for job 896934-urgent TAT 24hrs
Importance: High

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Hi Charl,

Would you be please test the following on 24hrs TAT – Results **MUST** come in by **Monday 20/6 3pm**, please do not delay the request, this is an extremely urgent job.

BH320_0-0.2
S22-Jn0027638

For B7A suite, B15 suite, asbestos (presence/absence), PFAS short suite.

Also test the following samples

BH320_1.0-1.1
S22-Jn0027640

B7A suite (without phenols) and PFAS short suite.

Thanks,
Alejandra Beltran
Environmental Engineer

Phone: +61 2 9024 7072

alejandra.beltran@cardno.com.au

Stantec Australia
Level 9, The Forum, 203 Pacific Highway St Leonards New South Wales 2065 Australia

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Fri 2022-06-17 2:12 PM

To: #AU04_Enviro_Sample_NSW <EnviroSampleNSW@eurofins.com>;Ryan Phillips <RyanPhillips@eurofins.com>

INFO: INTERNAL EMAIL - Sent from your own Eurofins email domain.

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Regards

Charl du Preez
0488348999

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Cheers,

Alejandra Beltran
Environmental Engineer

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Hi Alejandra

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I will get this sorted now.

Regards

Charl du Preez
0488348999

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Importance: High

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BH320_0-0.2
S22-Jn0027638

For B7A suite, B15 suite, asbestos (presence/absence), PFAS short suite.

Also test the following samples

BH320_1.0-1.1
S22-Jn0027640

B7A suite (without phenols) and PFAS short suite.

Thanks,
Alejandra Beltran
Environmental Engineer

Phone: +61 2 9024 7072

alejandra.beltran@cardno.com.au

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Level 9, The Forum, 203 Pacific Highway St Leonards New South Wales 2065 Australia

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www.eurofins.com.au EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
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6 Monterey Road
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NATA # 1261 Site # 1254

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179 Magowar Road
Girraween NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
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Murarrie QLD 4172
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NATA # 1261 Site # 20794

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NATA # 1261 Site # 25079

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NATA # 2377 Site # 2370

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Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Sample Receipt Advice

Company name:	Stantec Australia Pty Ltd (NSW/ACT)
Contact name:	Alejandro Beltran
Project name:	ADDITIONAL-ROYAL PRINCE ALFRED
Project ID:	80022026
Turnaround time:	Overnight
Date/Time received	Jun 17, 2022 2:12 PM
Eurofins reference	898577

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✗	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
✗	Split sample sent to requested external lab.
✗	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Hannah Mawbey on phone : or by email: HannahMawbey@eurofins.com

Results will be delivered electronically via email to Alejandro Beltran - alejandra.beltran@cardno.com.au.

Note: A copy of these results will also be delivered to the general Stantec Australia Pty Ltd (NSW/ACT) email address.

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web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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Sydney
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Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Company Name: Stantec Australia Pty Ltd (NSW/ACT)
Address: Level 22, 570 Bourke Street
Melbourne
VIC 3000

Project Name: ADDITIONAL-ROYAL PRINCE ALFRED
Project ID: 80022026

Order No.:
Report #: 898577
Phone:
Fax:

Received: Jun 17, 2022 2:12 PM
Due: Jun 20, 2022
Priority: Overnight
Contact Name: Alejandro Beltran

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Asbestos - AS4964	Eurofins Suite B15	Moisture Set	Eurofins Suite B7	Eurofins Suite B7A	Per- and Polyfluoroalkyl Substances (PFASs) - Short
Melbourne Laboratory - NATA # 1261 Site # 1254											
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	
Brisbane Laboratory - NATA # 1261 Site # 20794											X
Mayfield Laboratory - NATA # 1261 Site # 25079											
Perth Laboratory - NATA # 2377 Site # 2370											
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	BH320_0-0.2	Jun 10, 2022		Soil	S22-Jn0040272	X	X	X		X	X
2	BH320_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0040273			X	X		
Test Counts						1	1	2	1	1	1

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NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025–Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Stantec Australia Pty Ltd
Level 22, 570 Bourke Street
Melbourne
VIC 3000

Attention:	Alejandro Beltran
Report	898577-AID
Project Name	ADDITIONAL-ROYAL PRINCE ALFRED
Project ID	80022026
Received Date	Jun 17, 2022
Date Reported	Jun 21, 2022

Methodology:

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

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Project Name ADDITIONAL-ROYAL PRINCE ALFRED
Project ID 80022026
Date Sampled Jun 10, 2022
Report 898577-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
BH320_0-0.2	22-Jn0040272	Jun 10, 2022	Approximate Sample 127g Sample consisted of: Brown fine-grained clayey soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.

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Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Sydney	Jun 17, 2022	Indefinite

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eurofins | Environment Testing

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Company Name: Stantec Australia Pty Ltd (NSW/ACT)
Address: Level 22, 570 Bourke Street
Melbourne
VIC 3000

Project Name: ADDITIONAL-ROYAL PRINCE ALFRED
Project ID: 80022026

Order No.:
Report #: 898577
Phone:
Fax:

Received: Jun 17, 2022 2:12 PM
Due: Jun 20, 2022
Priority: Overnight
Contact Name: Alejandro Beltran

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Asbestos - AS4964	Eurofins Suite B15	Moisture Set	Eurofins Suite B7	Eurofins Suite B7A	Per- and Polyfluoroalkyl Substances (PFASs) - Short
Melbourne Laboratory - NATA # 1261 Site # 1254											
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	
Brisbane Laboratory - NATA # 1261 Site # 20794											X
Mayfield Laboratory - NATA # 1261 Site # 25079											
Perth Laboratory - NATA # 2377 Site # 2370											
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	BH320_0-0.2	Jun 10, 2022		Soil	S22-Jn0040272	X	X	X		X	X
2	BH320_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0040273			X	X		
Test Counts						1	1	2	1	1	1

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Internal Quality Control Review and Glossary General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. Information identified on this report with the colour **blue** indicates data provided by customer that may have an impact on the results.
5. Information identified on this report with the colour **orange** indicates sections of the report not covered by the laboratory's scope of NATA accreditation.
6. This report replaces any interim results previously issued.

Holding Times

Please refer to the most recent version of the 'Sample Preservation and Container Guide' for holding times (QS3001).
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

% w/w:	Percentage weight-for-weight basis, e.g. of asbestos in asbestos-containing finds in soil samples (**% w/w**)
F/fld	Airborne fibre filter loading as Fibres (**N**) per Fields counted (**n**)
F/mL	Airborne fibre reported concentration as Fibres per millilitre of air drawn over the sampler membrane (**C**)
g, kg	Mass, e.g. of whole sample (**M**) or asbestos-containing find within the sample (**m**)
g/kg	Concentration in grams per kilogram
L, mL	Volume, e.g. of air as measured in AFM (**V** = **r** x **t**)
L/min	Airborne fibre sampling Flowrate as litres per minute of air drawn over the sampler membrane (**r**)
min	Time (**t**), e.g. of air sample collection period

Calculations

Airborne Fibre Concentration: $C = \left(\frac{A}{a}\right) \times \left(\frac{N}{n}\right) \times \left(\frac{1}{r}\right) \times \left(\frac{1}{t}\right) = K \times \left(\frac{N}{n}\right) \times \left(\frac{1}{V}\right)$

Asbestos Content (as asbestos): $\%\, w/w = \frac{(m \times P_A)}{M}$

Weighted Average (of asbestos): $\%_{WA} = \sum \frac{(m \times P_A)_x}{x}$

Terms

%asbestos	Estimated percentage of asbestos in a given matrix. May be derived from knowledge or experience of the material, informed by HSG264 *Appendix 2*, else assumed to be 15% in accordance with WA DOH *Appendix 2* (**P_A**).
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded (non-friable) condition. For the purposes of the NEPM and WA DOH, ACM corresponds to material larger than 7 mm x 7 mm.
AF	Asbestos Fines. Asbestos contamination within a soil sample, as defined by WA DOH. Includes loose fibre bundles and small pieces of friable and non-friable material such as asbestos cement fragments mixed with soil. Considered under the NEPM as equivalent to "non-bonded / friable".
AFM	Airborne Fibre Monitoring, e.g. by the MFM.
Amosite	Amosite Asbestos Detected. Amosite may also refer to Fibrous Grunerite or Brown Asbestos. Identified in accordance with AS 4964-2004.
AS	Australian Standard.
Asbestos Content (as asbestos)	Total % w/w asbestos content in asbestos-containing finds in a soil sample (**% w/w**).
Chrysotile	Chrysotile Asbestos Detected. Chrysotile may also refer to Fibrous Serpentine or White Asbestos. Identified in accordance with AS 4964-2004.
COC	Chain of Custody.
Crocidolite	Crocidolite Asbestos Detected. Crocidolite may also refer to Fibrous Riebeckite or Blue Asbestos. Identified in accordance with AS 4964-2004.
Dry	Sample is dried by heating prior to analysis.
DS	Dispersion Staining. Technique required for Unequivocal Identification of asbestos fibres by PLM.
FA	Fibrous Asbestos. Asbestos containing material that is wholly or in part friable, including materials with higher asbestos content with a propensity to become friable with handling, and any material that was previously non-friable and in a severely degraded condition. For the purposes of the NEPM and WA DOH, FA generally corresponds to material larger than 7 mm x 7 mm, although FA may be more difficult to visibly distinguish and may be assessed as AF.
Fibre Count	Total of all fibres (whether asbestos or not) meeting the counting criteria set out in the NOHSC:3003
Fibre ID	Fibre Identification. Unequivocal identification of asbestos fibres according to AS 4964-2004. Includes Chrysotile, Amosite (Grunerite) or Crocidolite asbestos.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory's remit to assess degree of friability.
HSG248	UK HSE HSG248, *Asbestos: The Analysts Guide*, 2nd Edition (2021).
HSG264	UK HSE HSG264, *Asbestos: The Survey Guide* (2012).
ISO (also ISO/IEC)	International Organization for Standardization / International Electrotechnical Commission.
K Factor	Microscope constant (**K**) as derived from the effective filter area of the given AFM membrane used for collecting the sample (**A**) and the projected eyepiece graticule area of the specific microscope used for the analysis (**a**).
LOR	Limit of Reporting.
MFM (also NOHSC:3003)	Membrane Filter Method. As described by the Australian Government National Occupational Health and Safety Commission, *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres*, 2nd Edition [NOHSC:3003(2005)].
NEPM (also ASC NEPM)	National Environment Protection (Assessment of Site Contamination) Measure, (2013, as amended).
Organic	Organic Fibres Detected. Organic may refer to Natural or Man-Made Polymeric Fibres. Identified in accordance with AS 4964-2004.
PCM	Phase Contrast Microscopy. As used for Fibre Counting according to the MFM.
PLM	Polarised Light Microscopy. As used for Fibre Identification and Trace Analysis according to AS 4964-2004.
SMF	Synthetic Mineral Fibre Detected. SMF may also refer to Man Made Vitreous Fibres. Identified in accordance with AS 4964-2004.
SRA	Sample Receipt Advice.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres (particularly asbestos) in a given sample matrix.
UK HSE HSG	United Kingdom, Health and Safety Executive, Health and Safety Guidance, publication.
UMF	Unidentified Mineral Fibre Detected. Fibrous minerals that are detected but have not been unequivocally identified by PLM with DS according the AS 4964-2004. May include (but not limited to) Actinolite, Anthophyllite or Tremolite asbestos.
WA DOH	Reference document for the NEPM. Government of Western Australia, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (updated 2021), including Appendix Four: *Laboratory analysis*
Weighted Average	Combined average % w/w asbestos content of all asbestos-containing finds in the given aliquot or total soil sample (**$\%_{WA}$**).

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Comments

Sample Integrity

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

Asbestos Counter/Identifier:

Bennel Jiri	Senior Analyst-Asbestos

Authorised by:

Sayeed Abu	Senior Analyst-Asbestos



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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Stantec Australia Pty Ltd
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NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Alejandro Beltran**

Report **898577-S**
Project name ADDITIONAL-ROYAL PRINCE ALFRED
Project ID 80022026
Received Date Jun 17, 2022

Client Sample ID			**BH320_0-0.2**	**BH320_1.0-1.1**
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**S22-Jn0040272**	**S22-Jn0040273**
Date Sampled			**Jun 10, 2022**	**Jun 10, 2022**
Test/Reference	LOR	Unit		
Total Recoverable Hydrocarbons				
TRH C6-C9	20	mg/kg	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100
BTEX				
Benzene	0.1	mg/kg	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	82	85
Polycyclic Aromatic Hydrocarbons				
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	1.3	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	1.5	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.8	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	0.7	< 0.5
Benzo(a)pyrene	0.5	mg/kg	1.0	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	0.6	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	0.7	< 0.5
Chrysene	0.5	mg/kg	0.8	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5

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Client Sample ID			BH320_0-0.2	BH320_1.0-1.1
Sample Matrix			Soil	Soil
Eurofins Sample No.			S22-Jn0040272	S22-Jn0040273
Date Sampled			Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit		
Polycyclic Aromatic Hydrocarbons				
Fluoranthene	0.5	mg/kg	0.6	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	0.5	< 0.5
Pyrene	0.5	mg/kg	1.4	< 0.5
Total PAH*	0.5	mg/kg	7.3	< 0.5
2-Fluorobiphenyl (surr.)	1	%	110	110
p-Terphenyl-d14 (surr.)	1	%	122	124
Organochlorine Pesticides				
Chlordanes - Total	0.1	mg/kg	< 0.1	-
4.4'-DDD	0.05	mg/kg	< 0.05	-
4.4'-DDE	0.05	mg/kg	0.08	-
4.4'-DDT	0.05	mg/kg	0.06	-
a-HCH	0.05	mg/kg	< 0.05	-
Aldrin	0.05	mg/kg	< 0.05	-
b-HCH	0.05	mg/kg	< 0.05	-
d-HCH	0.05	mg/kg	< 0.05	-
Dieldrin	0.05	mg/kg	< 0.05	-
Endosulfan I	0.05	mg/kg	< 0.05	-
Endosulfan II	0.05	mg/kg	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	-
Endrin	0.05	mg/kg	< 0.05	-
Endrin aldehyde	0.05	mg/kg	< 0.05	-
Endrin ketone	0.05	mg/kg	< 0.05	-
g-HCH (Lindane)	0.05	mg/kg	< 0.05	-
Heptachlor	0.05	mg/kg	< 0.05	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	-
Methoxychlor	0.05	mg/kg	< 0.05	-
Toxaphene	0.5	mg/kg	< 0.5	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	0.14	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	0.14	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	-
Dibutylchlorendate (surr.)	1	%	103	-
Tetrachloro-m-xylene (surr.)	1	%	124	-
Organophosphorus Pesticides				
Azinphos-methyl	0.2	mg/kg	< 0.2	-
Bolstar	0.2	mg/kg	< 0.2	-
Chlorfenvinphos	0.2	mg/kg	< 0.2	-
Chlorpyrifos	0.2	mg/kg	< 0.2	-
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	-
Coumaphos	2	mg/kg	< 2	-
Demeton-S	0.2	mg/kg	< 0.2	-
Demeton-O	0.2	mg/kg	< 0.2	-
Diazinon	0.2	mg/kg	< 0.2	-
Dichlorvos	0.2	mg/kg	< 0.2	-
Dimethoate	0.2	mg/kg	< 0.2	-

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Client Sample ID			BH320_0-0.2	BH320_1.0-1.1
Sample Matrix			Soil	Soil
Eurofins Sample No.			S22-Jn0040272	S22-Jn0040273
Date Sampled			Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit		
Organophosphorus Pesticides				
Disulfoton	0.2	mg/kg	< 0.2	-
EPN	0.2	mg/kg	< 0.2	-
Ethion	0.2	mg/kg	< 0.2	-
Ethoprop	0.2	mg/kg	< 0.2	-
Ethyl parathion	0.2	mg/kg	< 0.2	-
Fenitrothion	0.2	mg/kg	< 0.2	-
Fensulfothion	0.2	mg/kg	< 0.2	-
Fenthion	0.2	mg/kg	< 0.2	-
Malathion	0.2	mg/kg	< 0.2	-
Merphos	0.2	mg/kg	< 0.2	-
Methyl parathion	0.2	mg/kg	< 0.2	-
Mevinphos	0.2	mg/kg	< 0.2	-
Monocrotophos	2	mg/kg	< 2	-
Naled	0.2	mg/kg	< 0.2	-
Omethoate	2	mg/kg	< 2	-
Phorate	0.2	mg/kg	< 0.2	-
Pirimiphos-methyl	0.2	mg/kg	< 0.2	-
Pyrazophos	0.2	mg/kg	< 0.2	-
Ronnel	0.2	mg/kg	< 0.2	-
Terbufos	0.2	mg/kg	< 0.2	-
Tetrachlorvinphos	0.2	mg/kg	< 0.2	-
Tokuthion	0.2	mg/kg	< 0.2	-
Trichloronate	0.2	mg/kg	< 0.2	-
Triphenylphosphate (surr.)	1	%	96	-
Polychlorinated Biphenyls				
Aroclor-1016	0.1	mg/kg	< 0.1	-
Aroclor-1221	0.1	mg/kg	< 0.1	-
Aroclor-1232	0.1	mg/kg	< 0.1	-
Aroclor-1242	0.1	mg/kg	< 0.1	-
Aroclor-1248	0.1	mg/kg	< 0.1	-
Aroclor-1254	0.1	mg/kg	< 0.1	-
Aroclor-1260	0.1	mg/kg	< 0.1	-
Total PCB*	0.1	mg/kg	< 0.1	-
Dibutylchlorendate (surr.)	1	%	103	-
Tetrachloro-m-xylene (surr.)	1	%	124	-
Phenols (Halogenated)				
2-Chlorophenol	0.5	mg/kg	< 0.5	-
2.4-Dichlorophenol	0.5	mg/kg	< 0.5	-
2.4.5-Trichlorophenol	1	mg/kg	< 1	-
2.4.6-Trichlorophenol	1	mg/kg	< 1	-
2.6-Dichlorophenol	0.5	mg/kg	< 0.5	-
4-Chloro-3-methylphenol	1	mg/kg	< 1	-
Pentachlorophenol	1	mg/kg	< 1	-
Tetrachlorophenols - Total	10	mg/kg	< 10	-
Total Halogenated Phenol*	1	mg/kg	< 1	-

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Client Sample ID			BH320_0-0.2	BH320_1.0-1.1
Sample Matrix			Soil	Soil
Eurofins Sample No.			S22-Jn0040272	S22-Jn0040273
Date Sampled			Jun 10, 2022	Jun 10, 2022
Test/Reference	LOR	Unit		
Phenols (non-Halogenated)				
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	< 20	-
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5	-
2-Nitrophenol	1	mg/kg	< 1	-
2.4-Dimethylphenol	0.5	mg/kg	< 0.5	-
2.4-Dinitrophenol	5	mg/kg	< 5	-
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.2	-
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 0.4	-
Total cresols*	0.5	mg/kg	< 0.5	-
4-Nitrophenol	5	mg/kg	< 5	-
Dinoseb	20	mg/kg	< 20	-
Phenol	0.5	mg/kg	< 0.5	-
Phenol-d6 (surr.)	1	%	98	-
Total Non-Halogenated Phenol*	20	mg/kg	< 20	-
Heavy Metals				
Arsenic	2	mg/kg	42	7.7
Cadmium	0.4	mg/kg	0.5	< 0.4
Chromium	5	mg/kg	17	25
Copper	5	mg/kg	460	< 5
Lead	5	mg/kg	730	35
Mercury	0.1	mg/kg	1.0	< 0.1
Nickel	5	mg/kg	10	< 5
Zinc	5	mg/kg	290	5.0
% Moisture	1	%	20	23
Per- and Polyfluoroalkyl Substances (PFASs) - Short				
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	< 10	-
13C2-6:2 FTSA (surr.)	1	%	89	-
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	-
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	-
18O2-PFHxS (surr.)	1	%	91	-
13C8-PFOS (surr.)	1	%	83	-
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	-
13C8-PFOA (surr.)	1	%	104	-
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	-
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	-

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Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Jun 17, 2022	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 17, 2022	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 17, 2022	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Jun 17, 2022	14 Days
- Method: LTM-ORG-2010 BTEX and Volatile TRH			
Polycyclic Aromatic Hydrocarbons	Sydney	Jun 17, 2022	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Phenols (Halogenated)	Sydney	Jun 17, 2022	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Phenols (non-Halogenated)	Sydney	Jun 17, 2022	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Metals M8	Sydney	Jun 17, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins Suite B15			
Organochlorine Pesticides	Sydney	Jun 17, 2022	14 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Organophosphorus Pesticides	Sydney	Jun 17, 2022	14 Days
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Polychlorinated Biphenyls	Sydney	Jun 17, 2022	28 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
% Moisture	Sydney	Jun 17, 2022	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs) - Short	Brisbane	Jun 17, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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Project Name: ADDITIONAL-ROYAL PRINCE ALFRED
Project ID: 80022026

Order No.:
Report #: 898577
Phone:
Fax:

Received: Jun 17, 2022 2:12 PM
Due: Jun 20, 2022
Priority: Overnight
Contact Name: Alejandro Beltran

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Asbestos - AS4964	Eurofins Suite B15	Moisture Set	Eurofins Suite B7	Eurofins Suite B7A	Per- and Polyfluoroalkyl Substances (PFASs) - Short
Melbourne Laboratory - NATA # 1261 Site # 1254											
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X	
Brisbane Laboratory - NATA # 1261 Site # 20794											X
Mayfield Laboratory - NATA # 1261 Site # 25079											
Perth Laboratory - NATA # 2377 Site # 2370											
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	BH320_0-0.2	Jun 10, 2022		Soil	S22-Jn0040272	X	X	X		X	X
2	BH320_1.0-1.1	Jun 10, 2022		Soil	S22-Jn0040273			X	X		
Test Counts						1	1	2	1	1	1

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Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

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QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

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

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Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-HCH (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.1			0.1	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.1			0.1	Pass	
Aroclor-1242	mg/kg	< 0.1			0.1	Pass	
Aroclor-1248	mg/kg	< 0.1			0.1	Pass	
Aroclor-1254	mg/kg	< 0.1			0.1	Pass	
Aroclor-1260	mg/kg	< 0.1			0.1	Pass	
Total PCB*	mg/kg	< 0.1			0.1	Pass	
Method Blank							
Phenols (non-Halogenated)							
Total Non-Halogenated Phenol*	mg/kg	< 0			20	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Per- and Polyfluoroalkyl Substances (PFASs) - Short							
Sum of US EPA PFAS (PFOS + PFOA)*	ug/kg	-			5	N/A	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	73			70-130	Pass	
TRH C10-C14	%	79			70-130	Pass	
Naphthalene	%	101			70-130	Pass	
TRH C6-C10	%	97			70-130	Pass	
TRH >C10-C16	%	73			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	83			70-130	Pass	
Toluene	%	78			70-130	Pass	
Ethylbenzene	%	79			70-130	Pass	
m&p-Xylenes	%	80			70-130	Pass	
o-Xylene	%	82			70-130	Pass	
Xylenes - Total*	%	81			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	79			70-130	Pass	
Acenaphthylene	%	72			70-130	Pass	

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Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Anthracene	%	87			70-130	Pass	
Benz(a)anthracene	%	74			70-130	Pass	
Benzo(a)pyrene	%	82			70-130	Pass	
Benzo(b&j)fluoranthene	%	82			70-130	Pass	
Benzo(g.h.i)perylene	%	75			70-130	Pass	
Benzo(k)fluoranthene	%	84			70-130	Pass	
Chrysene	%	72			70-130	Pass	
Dibenz(a.h)anthracene	%	77			70-130	Pass	
Fluoranthene	%	113			70-130	Pass	
Fluorene	%	83			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	77			70-130	Pass	
Naphthalene	%	74			70-130	Pass	
Phenanthrene	%	81			70-130	Pass	
Pyrene	%	84			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	119			70-130	Pass	
4.4'-DDD	%	119			70-130	Pass	
4.4'-DDE	%	123			70-130	Pass	
4.4'-DDT	%	102			70-130	Pass	
a-HCH	%	116			70-130	Pass	
Aldrin	%	110			70-130	Pass	
b-HCH	%	118			70-130	Pass	
d-HCH	%	123			70-130	Pass	
Dieldrin	%	112			70-130	Pass	
Endosulfan I	%	112			70-130	Pass	
Endosulfan II	%	127			70-130	Pass	
Endosulfan sulphate	%	98			70-130	Pass	
Endrin	%	107			70-130	Pass	
Endrin aldehyde	%	128			70-130	Pass	
Endrin ketone	%	130			70-130	Pass	
g-HCH (Lindane)	%	125			70-130	Pass	
Heptachlor	%	101			70-130	Pass	
Heptachlor epoxide	%	101			70-130	Pass	
Hexachlorobenzene	%	112			70-130	Pass	
Methoxychlor	%	104			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	126			70-130	Pass	
Dimethoate	%	101			70-130	Pass	
Ethion	%	107			70-130	Pass	
Fenitrothion	%	110			70-130	Pass	
Methyl parathion	%	110			70-130	Pass	
Mevinphos	%	127			70-130	Pass	
LCS - % Recovery							
Polychlorinated Biphenyls							
Aroclor-1016	%	88			70-130	Pass	
Aroclor-1260	%	79			70-130	Pass	
LCS - % Recovery							
Phenols (Halogenated)							
2-Chlorophenol	%	73			25-140	Pass	
2.4-Dichlorophenol	%	79			25-140	Pass	
2.4.6-Trichlorophenol	%	95			25-140	Pass	
2.6-Dichlorophenol	%	78			25-140	Pass	

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Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
4-Chloro-3-methylphenol	%	81			25-140	Pass	
LCS - % Recovery							
Phenols (non-Halogenated)							
2.4-Dimethylphenol	%	84			25-140	Pass	
2-Methylphenol (o-Cresol)	%	83			25-140	Pass	
3&4-Methylphenol (m&p-Cresol)	%	77			25-140	Pass	
Phenol	%	77			25-140	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	109			80-120	Pass	
Cadmium	%	104			80-120	Pass	
Chromium	%	108			80-120	Pass	
Copper	%	106			80-120	Pass	
Lead	%	110			80-120	Pass	
Mercury	%	111			80-120	Pass	
Nickel	%	105			80-120	Pass	
Zinc	%	105			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	N22-Jn0034860	NCP	%	87			70-130	Pass	
TRH C10-C14	S22-Jn0034865	NCP	%	97			70-130	Pass	
Naphthalene	S22-Jn0023222	NCP	%	79			70-130	Pass	
TRH C6-C10	N22-Jn0034860	NCP	%	81			70-130	Pass	
TRH >C10-C16	S22-Jn0034865	NCP	%	91			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S22-Jn0023222	NCP	%	80			70-130	Pass	
Toluene	S22-Jn0023222	NCP	%	78			70-130	Pass	
Ethylbenzene	S22-Jn0023222	NCP	%	77			70-130	Pass	
m&p-Xylenes	S22-Jn0023222	NCP	%	78			70-130	Pass	
o-Xylene	S22-Jn0023222	NCP	%	75			70-130	Pass	
Xylenes - Total*	S22-Jn0023222	NCP	%	77			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthylene	N22-Jn0022707	NCP	%	72			70-130	Pass	
Anthracene	N22-Jn0022707	NCP	%	126			70-130	Pass	
Benz(a)anthracene	N22-Jn0022707	NCP	%	107			70-130	Pass	
Benzo(a)pyrene	N22-Jn0022707	NCP	%	99			70-130	Pass	
Benzo(b&j)fluoranthene	N22-Jn0022707	NCP	%	121			70-130	Pass	
Benzo(g.h.i)perylene	N22-Jn0022707	NCP	%	112			70-130	Pass	
Dibenz(a.h)anthracene	N22-Jn0022707	NCP	%	122			70-130	Pass	
Fluoranthene	N22-Jn0022707	NCP	%	120			70-130	Pass	
Indeno(1.2.3-cd)pyrene	N22-Jn0022707	NCP	%	130			70-130	Pass	
Naphthalene	N22-Jn0022707	NCP	%	110			70-130	Pass	
Phenanthrene	N22-Jn0022707	NCP	%	115			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S22-Jn0032019	NCP	%	94			75-125	Pass	
Cadmium	S22-Jn0032019	NCP	%	90			75-125	Pass	
Chromium	S22-Jn0032019	NCP	%	85			75-125	Pass	
Copper	S22-Jn0032019	NCP	%	83			75-125	Pass	
Lead	S22-Jn0032019	NCP	%	87			75-125	Pass	
Mercury	S22-Jn0032019	NCP	%	111			75-125	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nickel	S22-Jn0032019	NCP	%	79			75-125	Pass	
Zinc	N22-Jn0034859	NCP	%	95			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	S22-Jn0023221	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S22-Jn0034864	NCP	mg/kg	< 20	23	71	30%	Fail	Q15
TRH C15-C28	S22-Jn0034864	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S22-Jn0034864	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Naphthalene	S22-Jn0023221	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S22-Jn0023221	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S22-Jn0034864	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S22-Jn0034864	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S22-Jn0034864	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S22-Jn0023221	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S22-Jn0023221	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S22-Jn0023221	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S22-Jn0023221	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S22-Jn0023221	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	S22-Jn0023221	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S22-Jn0031639	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-HCH	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-HCH	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-HCH	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	

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Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Endrin	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-HCH (Lindane)	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S22-Jn0031639	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	S22-Jn0031639	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	N22-Jn0022696	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	N22-Jn0022696	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	N22-Jn0022696	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	N22-Jn0022696	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	S22-Jn0031639	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1221	S22-Jn0031639	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	S22-Jn0031639	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1242	S22-Jn0031639	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1248	S22-Jn0031639	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1254	S22-Jn0031639	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1260	S22-Jn0031639	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Total PCB*	S22-Jn0031639	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	

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Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S22-Jn0028503	NCP	mg/kg	5.0	4.5	10	30%	Pass	
Cadmium	S22-Jn0028503	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S22-Jn0028503	NCP	mg/kg	16	14	14	30%	Pass	
Copper	S22-Jn0028503	NCP	mg/kg	27	24	10	30%	Pass	
Lead	S22-Jn0028503	NCP	mg/kg	28	25	12	30%	Pass	
Mercury	S22-Jn0028503	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S22-Jn0028503	NCP	mg/kg	14	13	10	30%	Pass	
Zinc	S22-Jn0028503	NCP	mg/kg	45	40	11	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S22-Jn0040272	CP	%	20	18	7.0	30%	Pass	

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Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Robert Biviano	Analytical Services Manager
Sayeed Abu	Senior Analyst-Asbestos
Roopesh Rangarajan	Senior Analyst-Organic
Gabriele Cordero	Senior Analyst-Metal
Gabriele Cordero	Senior Analyst-Volatile
Jonathon Angell	Senior Analyst-PFAS



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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URGENT 24HR FW: Eurofins Test Results - Draft Report 898577 : Site ADDITIONAL-ROYAL PRINCE ALFRED (80022026)

Charl Du Preez <CharlDuPreez@eurofins.com>

Mon 2022-06-20 4:06 PM

To: #AU04_Enviro_Sample_NSW <EnviroSampleNSW@eurofins.com>

Cc: Adam Bateup <AdamBateup@eurofins.com>;Ryan Phillips <RyanPhillips@eurofins.com>

INFO: INTERNAL EMAIL - Sent from your own Eurofins email domain.

URGENT 24HR REQUEST!!!

Regards

Charl du Preez
0488348999

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From: Alejandra Beltran <alejandra.beltran@cardno.com.au>
Sent: Monday, 20 June 2022 4:04 PM
To: Charl Du Preez <CharlDuPreez@eurofins.com>
Subject: RE: Eurofins Test Results - Draft Report 898577 : Site ADDITIONAL-ROYAL PRINCE ALFRED (80022026)

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CAUTION: EXTERNAL EMAIL - Sent from an email domain that is not formally trusted by Eurofins.

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Hi Charl,

Please run TCLP testing for lead on BH320_0-0.2, on 24hrs. I will need the results tomorrow no later please. I know Eurofins work overnight so it would be good if this request is set up so that the machine runs overnight.

Best regards,

Alejandra Beltran
Environmental Engineer

Cardno now Stantec

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Please consider the environment before printing this email.

From: CharlduPreez@eurofins.com <CharlduPreez@eurofins.com>
Sent: Monday, 20 June 2022 3:40 PM

To: Alejandra Beltran <alejandra.beltran@cardno.com.au>
Subject: Eurofins Test Results - Draft Report 898577 : Site ADDITIONAL-ROYAL PRINCE ALFRED (80022026)

Regards

Charl du Preez

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Mobile: +61 488 348 999

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Website: www.eurofins.com
View our latest EnviroNotes
How did we do? Provide your feedback here



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IANZ # 1290

Sample Receipt Advice

Company name:	Stantec Australia Pty Ltd (NSW/ACT)
Contact name:	Alejandro Beltran
Project name:	ADDITIONAL - ROYAL PRINCE ALFRED
Project ID:	ADDITIONAL - 80022026
Turnaround time:	1 Day
Date/Time received	Jun 20, 2022 3:40 PM
Eurofins reference	898957

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	All samples have been received as described on the above COC.
✓	COC has been completed correctly.
✓	Attempt to chill was evident.
✓	Appropriately preserved sample containers have been used.
✓	All samples were received in good condition.
✓	Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
✓	Appropriate sample containers have been used.
✓	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	Some samples have been subcontracted.
N/A	Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

Hannah Mawbey on phone : or by email: HannahMawbey@eurofins.com

Results will be delivered electronically via email to Alejandro Beltran - alejandra.beltran@cardno.com.au.

Note: A copy of these results will also be delivered to the general Stantec Australia Pty Ltd (NSW/ACT) email address.

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email: EnviroSales@eurofins.com

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Company Name: Stantec Australia Pty Ltd (NSW/ACT)
Address: Level 22, 570 Bourke Street
Melbourne
VIC 3000

Project Name: ADDITIONAL - ROYAL PRINCE ALFRED
Project ID: ADDITIONAL - 80022026

Order No.:
Report #: 898957
Phone:
Fax:

Received: Jun 20, 2022 3:40 PM
Due: Jun 21, 2022
Priority: 1 Day
Contact Name: Alejandro Beltran

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Lead	USA Leaching Procedure
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217						X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							
Mayfield Laboratory - NATA # 1261 Site # 25079							
Perth Laboratory - NATA # 2377 Site # 2370							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	BH320_0-0.2	Jun 10, 2022		US Leachate	S22-Jn0043828	X	X
Test Counts						1	1

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Stantec Australia Pty Ltd
Level 22, 570 Bourke Street
Melbourne
VIC 3000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Alejandro Beltran**

Report **898957-L**
Project name ADDITIONAL - ROYAL PRINCE ALFRED
Project ID ADDITIONAL - 80022026
Received Date Jun 20, 2022

Client Sample ID			**BH320_0-0.2**
Sample Matrix			**US Leachate**
Eurofins Sample No.			**S22-Jn0043828**
Date Sampled			**Jun 10, 2022**
Test/Reference	LOR	Unit	
Heavy Metals			
Lead	0.01	mg/L	0.09
USA Leaching Procedure			
Leachate Fluid[C01]		comment	1.0
pH (initial)	0.1	pH Units	7.5
pH (off)	0.1	pH Units	5.1
pH (USA HCl addition)	0.1	pH Units	2.0

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Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Sydney	Jun 20, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
USA Leaching Procedure	Sydney	Jun 20, 2022	14 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			

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Address: Level 22, 570 Bourke Street
Melbourne
VIC 3000

Project Name: ADDITIONAL - ROYAL PRINCE ALFRED
Project ID: ADDITIONAL - 80022026

Order No.:
Report #: 898957
Phone:
Fax:

Received: Jun 20, 2022 3:40 PM
Due: Jun 21, 2022
Priority: 1 Day
Contact Name: Alejandro Beltran

Eurofins Analytical Services Manager : Hannah Mawbey

Sample Detail						Lead	USA Leaching Procedure
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217						X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							
Mayfield Laboratory - NATA # 1261 Site # 25079							
Perth Laboratory - NATA # 2377 Site # 2370							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	BH320_0-0.2	Jun 10, 2022		US Leachate	S22-Jn0043828	X	X
Test Counts						1	1

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Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

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QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Heavy Metals									
Lead			mg/L	< 0.01			0.01	Pass	
LCS - % Recovery									
Heavy Metals									
Lead			%	86			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S22-Jn0044600	NCP	%	82			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S22-Jn0043828	CP	mg/L	0.09	0.09	5.0	30%	Pass	

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Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other

Authorised by:

Robert Biviano	Analytical Services Manager
Gabriele Cordero	Senior Analyst-Metal



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

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

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APPENDIX

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QA/QC RESULTS

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Quality Assurance/Quality Control (QA/QC) procedures were implemented to ensure the precision, accuracy, representativeness, completeness and comparability of all data gathered. Assessment of quality was undertaken with respect to the Data Quality Indicators as summarised below.

Assessment of Field Quality Data

Field data quality assessment is summarised in **Table 12-1**.

Table 12-1 Assessment of Field Data Quality

QAQC Measure	Field Quality Indicator	Conformance Comments
Precision: A quantitative measure of the variability (or reproducibility) of data.	SOPs are appropriate and complied with.	Yes
	Field duplicates and Blind field duplicates are collected and analysed at a rate of 5% (1 per 20 samples).	Partially. Given the sampling methodology, field duplicates could not be collected. The Primary lab completed testing on a duplicate from BH317_0.0-0.2, and sent the remainder of the sample to the secondary laboratory for testing.
	Use of calibrated equipment.	Yes
Accuracy: A quantitative measure of the closeness of reported data to the "true" value.	SOPs are appropriate and complied with.	Yes
	Use of calibrated equipment.	Yes - calibration certificate is provided under **Appendix D**.
	Field interlaboratory duplicates sampled and analysed at a rate of 1 per 20 samples.	Yes
	<30% Relative Percentage Difference (RPD) where concentrations are >5x LOR	No (See results below)
	Analysis of rinsate sample collected at rate of 1 per day.	No rinsate sample was collected. Drilling augers were cleaned of all residual soil between sampling locations and soils that had been in contact with the drill augers were not sampled.
	Trip spike and trip blanks were used.	Yes
Representativeness: The confidence (expressed qualitatively) that data are representative of each media present on site and the conditions encountered in the field	Appropriate media sampled.	Yes, soil
	Preservation and storage of samples upon collection and during transport to the laboratory occurs.	Yes.
	Sampling is undertaken by an experienced sampler.	Yes.
Completeness: A measure of the amount of useable data from the data collected during the fieldwork program	All critical locations sampled.	No. The investigation locations were targeted to Area B and C; however for environmental purposes the locations were proposed to be evenly distributed in a grid patter across each of the areas of investigation. During investigation the grid pattern could not be achieved due to infrastructure, access issues and underground services. Refusal was also encountered in road base gravel in two (2) out of the five (5) boreholes completed within Area C.
	All samples collected (from grid and at depth).	Yes. All planned soil samples were collected.

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QAQC Measure	Field Quality Indicator	Conformance Comments
	Standard operating practices (SOPs) appropriate and complied with.	Yes
	Sampling is undertaken by an experienced sampler.	Yes
	Suitable records of field work are documented.	Yes
	Completed laboratory sample chain-of-custody and documentation.	Yes. See **Appendix E**.
Comparability: The confidence (expressed qualitatively) that data may be considered to be equivalent for each sampling and analytical event	Same SOP is used on each field occasion.	Yes
	Climatic conditions are documented.	Yes
	Experienced sampler	Yes
	Sample type, preservation and handling are consistent at sampling events.	Yes
	Use of calibrated equipment.	Yes

A summary of all field QA/QC samples is provided in **Table 12-2** below:

Table 12-2 Field QA/QC Collection Summary

Environmental Media	Date	Primary	Duplicate	Triplicate
Soil	10/06/2022	BH317_0.0-0.2	QA100	QA200

Laboratory Data Quality Assessment

Laboratory data quality assessment is summarised in **Table 12-3**.

Table 12-3 Assessment of Laboratory Data Quality

QAQC Measure	Laboratory Quality Indicator	Conformance Comments
Precision: A quantitative measure of the variability (or reproducibility) of data.	Analysis of laboratory duplicates	Yes. See **Appendix E**.
Accuracy: A quantitative measure of the closeness of reported data to the "true" value.	Laboratory holds NATA-accreditation for the analyses.	Yes. See **Appendix E**.
	Laboratory limit of reporting is below the adopted investigation level.	Yes. See **Appendix E.**
	Analysis of field blank	Yes
	Analysis of rinsate blank	No
	Analysis of method blanks	Yes. See **Appendix E.**
	Analysis of matrix spikes (MS)	Yes. See **Appendix E.**
	Analysis of matrix spike duplicates (MSD)	Yes. See **Appendix E.**
	Analysis of surrogate spikes	Yes. See **Appendix E.**
	Laboratory spikes: 70-130% recovery for metals 60-140% for organics Laboratory duplicates. If contaminant concentration is: < 10 x PQL, no RPD limit 10-20 x PQL, RPD is 0% to 50% >20 x PQL, RPD is 0% to 20%	Partially. The following lab duplicates from Eurofins report no. 896934-S-V2 were identified as outliers: ▪ S22-Jn0029555 for TRH C15-C28 (34%), TRH C29-C36 (34%) and TRH >C16-C34 (32%). Eurofins reported that the exceedance met their QC - Acceptance Criteria;

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QAQC Measure	Laboratory Quality Indicator	Conformance Comments
		▪ S22-Jn0027614 for zinc (45%). Eurofins reported that the exceedance met their QC - Acceptance Criteria; ▪ S22-Jn0027618 for Fluoranthene (34%). Eurofins reported that the exceedance met their QC - Acceptance Criteria.
	Laboratory surrogates: 60-140% recovery.	Yes. See **Appendix E**.
	Laboratory blanks: <PQL	Yes. See **Appendix E**.
	Laboratory control samples, 70-130% recovery	Yes. See **Appendix E**.
Representativeness: The confidence (expressed qualitatively) that data are representative of each media present on site and the conditions encountered in the field.	RPD values have been calculated and reviewed. Unacceptable RPD values have been assessed and commentary provided.	Yes (read above).
	Rinsate samples results have analytical results <LOR.	N/A
	All key samples analysed.	Yes
	Analysis of laboratory-prepared volatile trip spikes and trip blanks.	No. Not required.
Completeness: A measure of the amount of useable data from the data collected during the fieldwork program	All critical samples analysed according to SAQP and proposal	Yes
	All CoPCs analysed.	Yes. See **Appendix E**.
	Appropriate methods and PQLs implemented.	Yes. See **Appendix E**.
	Sample documentation is complete.	Yes. See **Appendix E.**
	Samples were analysed within holding times.	Yes. See **Appendix E**.
Comparability: The confidence (expressed qualitatively) that data may be considered to be equivalent for each sampling and analytical event	Same sample analytical methods used.	Yes. See **Appendix E**.
	Same sample PQLs	Partially. The primary lab and secondary lab use different PQLs for some analytes.
	Same laboratories are used and justification is given where differences occur.	Yes. See **Appendix E**.
	Same units of measurement are used.	Yes. See **Appendix E**.

Summary of Project QA/QC

The sampling (including decontamination, preservation and transport procedures) and laboratory methods adopted for this limited investigation of contamination at discrete locations were mostly consistent with NEPM, EPA and Cardno protocols and met the DQOs for this project. Some minor discrepancies were identified; however, they were not considered to be detrimental to the overall validity of the final data set. Where non-conformance, or variability, in laboratory results was observed, it could be attributed to the heterogeneous nature of the corresponding (soil) samples, matrix interference and/or different laboratory PQL's.

It was therefore considered that the data were sufficiently precise, accurate, representative, complete and comparable, and could be relied upon for interpretation with the limitations noted.

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About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

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