

DPHI Gateway Conditions - 921 Punchbowl, Punchbowl NSW

Assessment of Contamination – Direction 4.4

Foundation Earth Sciences (FES) was commissioned to Prepare the report in accordance with the following direction:

Local Planning Directions 4.4 Remediation of Contaminated Land Objective:

The objective of this direction is to reduce the risk of harm to human health and the environment by ensuring that contamination and remediation are considered by planning proposal authorities.

Application

This direction applies when a planning proposal authority prepares a planning proposal that applies to:

- (a) land that is within an investigation area within the meaning of the Contaminated Land Management Act 1997;
- (b) land on which development for a purpose referred to in Table 1 to the contaminated land planning guidelines is being, or is known to have been, carried out;
- (c) the extent to which it is proposed to carry out development on it for residential, educational, recreational or childcare purposes, or for the purposes of a hospital - land:
 - i. in relation to which there is no knowledge (or incomplete knowledge) as to whether development for a purpose referred to in Table 1 to the contaminated land planning guidelines has been carried out, and

- ii. on which it would have been lawful to carry out such development during any period in respect of which there is no knowledge (or incomplete knowledge).

Direction 4.4

(1) A planning proposal authority must not include in a particular zone (within the meaning of the local environmental plan) any land to which this direction applies if the inclusion of the land in that zone would permit a change of use of the land, unless:

- (a) the planning proposal authority has considered whether the land is contaminated, and

The land has been assessed as part of this Detailed site investigation (DSI) report and is not contaminated in its current state.

- (b) if the land is contaminated, the planning proposal authority is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for all the purposes for which land in the zone concerned is permitted to be used, and

Not applicable

- (c) if the land requires remediation to be made suitable for any purpose for which land in that zone is permitted to be used, the planning proposal authority is satisfied that the land will be so remediated before the land is used for that purpose. In order to satisfy itself as to paragraph 1(c), the planning proposal authority may need to include certain provisions in the local environmental plan.

Not applicable

(2) Before including any land to which this direction applies in a particular zone, the planning proposal authority is to obtain and have regard to a report specifying the findings of a preliminary investigation of the land carried out in accordance with the contaminated land planning guidelines.

The land has been assessed as part of this DSI report and is not contaminated in its current state.



FOUNDATION
EARTH
SCIENCES

DETAILED SITE INVESTIGATION (DSI)

Property Address

921 Punchbowl Road, Punchbowl NSW

Prepared for

Westwood Pty Ltd

Date

April 2022

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ABBREVIATIONS

AIP	<i>Australian Institute of Petroleum Ltd</i>	QA/QC	<i>Quality Assurance, Quality Control</i>
ANZECC	<i>Australian and New Zealand Environment and Conservation Council</i>	RAC	<i>Remediation Acceptance Criteria</i>
AST	<i>Aboveground Storage Tank</i>	RAP	<i>Remediation Action Plan</i>
BGL	<i>Below Ground Level</i>	RPD	<i>Relative Percentage Difference</i>
BTEX	<i>Benzene, Toluene, Ethyl benzene and Xylene</i>	SAC	<i>Site Assessment Criteria</i>
COC	<i>Chain of Custody</i>	SVC	<i>Site Validation Criteria</i>
DA	<i>Development Approval</i>	TCLP	<i>Toxicity Characteristics Leaching Procedure</i>
DP	<i>Deposited Plan</i>	TPH	<i>Total Petroleum Hydrocarbons</i>
DQOs	<i>Data Quality Objectives</i>	UCL	<i>Upper Confidence Limit</i>
EPA	<i>Environment Protection Authority</i>	UST	<i>Underground Storage Tank</i>
ESA	<i>Environmental Site Assessment</i>	VHC	<i>Volatile Halogenated Compounds</i>
HIL	<i>Health-Based Soil Investigation Level</i>	VOC	<i>Volatile Organic Compounds</i>
LGA	<i>Local Government Area</i>	DPI	<i>Department of Primary Industries</i>
NEHF	<i>National Environmental Health Forum</i>		
NEPC	<i>National Environmental Protection Council</i>		
NHMRC	<i>National Health and Medical Research Council</i>		
OCP	<i>Organochlorine Pesticides</i>		
OPP	<i>Organophosphate Pesticides</i>		
PAH	<i>Polycyclic Aromatic Hydrocarbon</i>		
PCB	<i>Polychlorinated Biphenyl</i>		
PID	<i>Photo Ionisation Detector</i>		
PQL	<i>Practical Quantitation Limit</i>		

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EXECUTIVE SUMMARY

Foundation Earth Sciences was appointed by Westwood Pty Ltd to undertake an update Detailed Site Investigation for the property situated at 921 Punchbowl Road, Punchbowl NSW (“the site”).

The site is currently occupied by one registered club consisting of car park area, driveways and grassed area. The site is proposed to be redeveloped into a mixed use development including new registered club in the southern portion of the site, retail tenancies on the ground floor, new internal road, pocket park, landscape areas, five blocks of residential units in the north and four levels of residential units above the ground floor registered club.

Soils sampled across the Site were assessed against the Site Acceptance Criteria (SAC) provided by the National Environment Protection (Assessment of Site Contamination) Measure (NEPM 2013) Table 1A - Residential A.

The soil laboratory results were below the adopted detection limits and/or the relevant guideline criteria. No identified asbestos was detected in the soil samples analysed. No fibro cement fragments were observed in the fill material located within the boreholes. The assessment is limited to the boreholes.

The following lines of evidence support the low-risk conclusion in relation to groundwater and site suitability:

- The groundwater monitoring undertaken by Foundation Earth Sciences has indicated levels of dissolved metals marginally above groundwater investigation levels for chromium, copper, nickel and zinc. The elevated levels are considered to be related to offsite regional contaminant concentrations

and/or background levels & therefore of limited concern in relation to the proposed development. The levels of dissolved metals detected by FES have reduced from the Benviron Group DSI monitoring in 2016;

- Results for groundwater samples did indicate that levels were above water quality guidelines for ecosystem protection but in compliance with guidelines related to the protection of human health.
- The results for the groundwater wells are similar and indicate that the site is not contributing to the quality of groundwater in the area. It is likely that the quality of the groundwater at this site is similar to the entire area and may be a result of the geology.
- During excavation and construction of the proposed development, management of any water that seeps into the excavation will need to be considered as the quality of groundwater means it cannot be discharged directly to the stormwater system. It will need to be managed through treatment or via appropriate disposal techniques.

Based on the historical review, environmental information, proposed development and laboratory results of the investigation, the site is **suitable** for the proposed development, subject to the following:

- Any soil requiring removal from the site, as part of future site works, should be classified in accordance with the “Waste Classification Guidelines, Part 1: Classifying Waste” NSW EPA (2014).
- An unexpected finds protocol has been included in **Appendix M** and should be followed during the excavation phase of the development.

Thank you for the opportunity of undertaking this work. We would be pleased to provide further information on any aspects of this report.

1.0 INTRODUCTION

Foundation Earth Sciences was appointed by Westwood Pty Ltd to undertake an update Detailed Site Investigation for the property situated at 921 Punchbowl Road, Punchbowl NSW ("the site").

Soils sampled across the Site were assessed against the Site Acceptance Criteria (SAC) provided by the National Environment Protection (Assessment of Site Contamination) Measure (NEPM 2013) Table 1A - Residential A.

2.0 OBJECTIVE

The format of this report closely follows that recommended in the NSW EPA "*Consultants Reporting on Contaminated Land*" dated 2020. The NSW Office of Environment and Heritage (OEH) indicates that an Environmental Investigation should provide comprehensive information on:

- Any issues raised in preliminary investigations;
- The type, extent and level of contamination;
- Contaminant dispersal in the air, surface water, soil and dust;
- The potential effects of contaminants on public health and the environment;
- Where applicable, off-site impacts on soil, sediment and biota; and
- The adequacy and completeness of all information available to be used in making decisions on remediation.

The project objectives of this additional Site Investigation are to satisfy the stated NSW EPA Detailed Site Investigation requirements in accordance with *NSW EPA, Consultants Reporting on Contaminated Land, 2020*. Specifically, this investigation will consider the potential for suspected historical activities to have caused contamination at the Site and determine land use suitability for the proposed land use.

The proposed investigation program are designed to assess the presence of any unacceptable on site or off-site risk to human health or the environment. The report will draw conclusions regarding the land use suitability of the Site for the proposed land use or provide recommendations to enable such conclusions and determine the need for a further assessment.

3.0 SCOPE OF WORKS

The scope of works for this Detailed Site Investigation (DSI) included:

- Collecting site information, review of historical information and past site practices, (site surveys, site records on waste management practices, NSW Land Titles Office records of ownership, aerial photographs obtained from the NSW Department of Lands, WorkCover NSW records and site interviews);
- A site inspection to identify areas of environmental concern, on-site waste disposal practices and location of sewers, drains, holding tanks, Underground Storage Tanks, Aboveground Storage Tanks and pits, spills and ground discolouration etc.;
- Ten (10) additional boreholes to allow for the collection of soil samples to target landscape areas, building footprint & further assessment of the soil quality based on the results from the Benviron Group DSI in 2016.

- The sampling of three (3) existing monitoring wells to provide second round of water quality monitoring at the site.
- Laboratory analysis and results from sample analysis – findings and comparison to regulatory guidelines;
- Quality Assurance/Quality Control (QA/QC) – all QA/QC procedures were undertaken in accordance with the Foundation Earth Sciences Quality Assurance/Quality Control manual;
- Interpretation of results and findings; and
- Recommendations and final conclusions drawn from interpretation of the results.

4.0 SITE IDENTIFICATION AND SITE HISTORY REVIEW

4.1 Site identification

The site is identified as follows:

Table 1: Site Identification Review

Site Identifier	Site Details	
Site Location	921 Punchbowl Road, Punchbowl NSW	
Lot/DP	Lot A in DP378634; Lot D in DP 382627; Lot 6 in DP5245 Lot 14&15 in DP132440; Lot 1 in DP236825	
Site Coordinates #	SW corner: Latitude: -33.922595, Longitude: 151.201726	
Parish	Botany	
County	Cumberland	
Site Area	Approximate 1.790 hectares	
Local Government Area (LGA)	Canterbury-Bankstown	
Zoning##	B1 – Neighbourhood Centre R2 - Low Density Residential SP2 - Infrastructure	
Surrounding Land Uses	<i>North</i>	Residential
	<i>South</i>	Road then commercial
	<i>East</i>	Road then Service Station
	<i>West</i>	Commercial Storage

Notes: # Six Maps

refer to NSW Planning Portal

<https://www.planningportal.nsw.gov.au/spatialviewer/#!/find-a-property/address>

<https://www.planningportal.nsw.gov.au/find-a-property>

4.2 Review of Historical Maps

A review of the maps originally produced by Higinbotham & Robinson from late-nineteenth-century was undertaken. No relevant information was found as part of this assessment.

4.3 Underground Services

Dial Before You Dig' plans were requested and reviewed for the Site. Plans were provided by Ausgrid, Jemena Gas West, Sydney Water, NBN Co, Nextgen NCC – NSW, Optus and or Uecomm Nsw, TPG Telcom, Transport for NSW & Telstra NSW. Most of the plans did not indicate the presence of any major underground services or utility easements at the Site.

The Sydney Water plan indicates some stormwater main running along the central of the site from west to east, as well as the sewer main. Optus plan indicated a major line connected with building from the eastern boundary. It is noted that the associated underground services are considered a potential preferential pathway.

Refer to **Appendix A** – DBYD Plans.

4.4 Review of aerial photographs

The following information regarding the aerial photographs has been obtained and the summary of this review are presented in the following table:

Table 2: Review of Aerial Photographs

Year	Site		Surrounding areas
1943	Rural residential	The site appeared to be part of a larger rural residential property. Stormwater drainage channels are open & clearly visible in the central portion of the site & run in an east west direction & in a north south direction along the western boundary of the site. The stormwater channels appeared unsealed. No distinguishable farming activities appear visible. The majority of the site is grassed covered with trees.	The surrounding area is mostly rural residential & cleared land.
1955	Residential	The site appeared to occupied by rural residential at south portion of the site, the stormwater channels appeared unsealed.	N: Vacant and residential. S: Road and then residential E: Punchbowl Road then residential/commercial W: Commercial and residential
1971	Commercial	The northern portion of the site consists of an unsealed large car park area. The stormwater drainage channels remain open and above the ground and appeared sealed. The southern portion of the site has re-developed into a large	N: Vacant and residential. S: Road and then residential E: Punchbowl Road then residential/Commercial W: Commercial and residential

		commercial building and one small building towards punchbowl road.	
1982	Commercial	The northern portion of the site consists of an unsealed large car park area. The stormwater drainage channels remain open and above the ground and appeared sealed. The southern portion of the site consists of one large commercial building and one small building towards punchbowl road.	N: Vacant and residential. S: Road and then residential E: Punchbowl Road, seems like starting of construction of service station W: Commercial and residential
1994	Commercial	The large car park area in the northern portion of the site appeared to be sealed. The stormwater drainage channels remain open and above the ground and appeared sealed. However a portion of the channel has been covered with concrete. The southern portion of the site remains unchanged with exception of a large grassed area along the eastern boundary.	N: Residential. S: Road and then residential and commercial E: Road then residential, commercial (including service station) and large race track. W: Commercial and residential. Visible stormwater drainage channel.
2004	Commercial	There site has undergone significant redevelopment works. The surface of the entire large car park area	N: Residential. S: Road and then residential and commercial E: Road then residential, commercial (including service station) and large race track.

		appeared new. The stormwater drainage channels have been covered and sealed underground. The buildings present in the 1991 aerial photograph in the southern portion of the site have been demolished and one large commercial building has been erected.	W: Commercial and residential. The storm water channel has been covered and sealed underground.
Current	As per inspection	The site is as inspected (section 7.2)	As per inspection

The aerial photographs indicate the site had been occupied by vacant land sometimes before 1955, and then was redeveloped into rural residential. Sometime before 1971, the site was redeveloped into one large commercial dwelling associated with open car park, renovation works has been carried between 1994 to 2004, and remain unchanged until present. The surrounding land appeared to be rural residential from 1955, sometime before 1982, east of the site has re-developed into a service station and remain until present.

Refer to **Appendix J** – Aerial Photographs.

4.5 Title search

The land title information was obtained.

Table 3: Historical land title data

Lot A in DP 378634		
Year	Proprietor	Company/Personal Occupation
1983-Current	The Croatian Club	Cultural club
1970	The Commissioner for Roads (Part of the land)	Government
1958	Glanville Pty Ltd	-
1953	The Electricity Commissioner of NSW (Part of the land)	-
1952	Charles Henderson & Son Pty Ltd	-
1949	Robert William Arthur Richardson	-
1926	Margaret Richardson	-

Lot D in DP 382627		
Year	Proprietor	Company/Personal Occupation
1983-Current	The Croatian Club	Cultural club
1978	Tooheys Ltd	-
1978	Cragford Pty Ltd	-
1958	Glanville Pty Limited	-
1958	Charles Henderson & Son Pty Ltd	-

1958	Charles Richard Henderson	-
1951	John Davis	-
1950	James Lever & Phoebe Lever	-
1949	James Lever	-
1949	Charles Henderson & Son Pty Ltd	-
1926	Florence Sharp	-

Lot 6 in DP 5245		
Year	Proprietor	Company/Personal Occupation
1983-Current	The Croatian Club	Cultural club
1970	The Commissioner for Roads (Part of the land)	Government
1958	Glanville Pty Ltd	-
1953	The Electricity Commissioner of NSW (Part of the land)	-
1949	Charles Henderson & Son Pty Ltd	-
1926	Florence Sharp	-

Lot 1 in DP 236825		
Year	Proprietor	Company/Personal Occupation
1983-Current	The Croatian Club	Cultural club
1976	Clanville Pty Ltd	-
1965	The Commissioner for Roads	Government

1960	H C Sleigh Limited	Petroleum products and service stations
1948	Charles Henderson & Son Pty Ltd	-
1945	Rosewell Henderson	Electrician
1913	Harold Hawksford	Motor Engineer

Lot 14 in DP 132440		
Year	Proprietor	Company/Personal Occupation
1983-Current	The Croatian Club	Cultural club
1978	Tooheys Limited	-
1978	Cragford Pty Limited	-
1970	The Commissioner for Roads	Government
1958	Glanville Pty Limited	-
1954	Charles Henderson & Son Pty Ltd	-

Lot D in DP 382627		
Year	Proprietor	Company/Personal Occupation
1983-Current	The Croatian Club	Cultural club
1978	Tooheys Ltd	-
1978	Cragford Pty Ltd	-
1958	Glanville Pty Limited	-
1958	Charles Henderson & Son Pty Ltd	-
1958	Charles Richard Henderson	-

1951	John Davis	-
1950	James Lever & Phoebe Lever	-
1949	James Lever	-
1949	Charles Henderson & Son Pty Ltd	-
1926	Florence Sharp	-

In summary, the site at 921 Punchbowl Road, Punchbowl NSW has been owned by private individuals from 1926 to 1948, after which it has been owned by both commercial and private individuals.

The land titles have revealed potential contaminating land uses from the company H C Sleight Limited which is involved with petroleum-based products and the operation of service stations.

4.6 Planning Certificate

The Planning Certificate – Section 149 (2) of the Environmental Planning & Assessment Act 1979 for the site was provided by the client. A summary of the information pertaining to site is provided below:

Lot 14 in DP132440

- The land has been identified as B1 Neighbourhood Centre under the provision of the Bankstown *Local Environmental Plan 2015*.
- Bankstown Development Control Plan 2015 apply to this land.

- The land is affected by a road widening or road realignment under section 25 of the Roads Act, 1993.
- The land is not affected by the operation of Section 38 or 39 of the *Coastal Protection Act 1979*.
- The land is not within a proclaimed mine subsidence district.
- The land is affected by a resolution of Council adopting a policy, which may restrict development of the land because of the likelihood of acid sulphate soils.
- The land is affected by a resolution of Council adopting a policy concerning the management of contaminated land.
- The land is a flood control lot. The property is affected by a policy known as Bankstown DCP 2015, Pt B12 – Flood Risk & Management & clause 6.3 – Flood Planning of the LEP 2015 by reference to the Salt Pan Creek Stormwater Catchment Study
- The land is affected by either environmental planning instrument or proposed environmental planning instrument.
- The land is affected by Bankstown City Council Section 94A Development Contributions Plan 2009 which allows council to impose a levy on development.
- The land is not affected by one of the matters prescribed by Section 59 (2) of the *Contaminated Land Management Act 1997*.
- The property is not bush fire prone land.
- The land is not biodiversity certified land or part of any bio banking arrangements.
- Complying Developments under the General Development Code, Subdivision Code, Fire Safety Code and Demolition Code may be carried out.
- A residential dwelling erected on this land has not been identified in the Loose-Fill Asbestos Insulation Register as containing loose-ceiling insulation.

Refer to **Appendix O** – Section 149 Certificate

4.7 Anecdotal Evidence

No anecdotal evidence was available at the time of the investigation.

4.8 NSW EPA Records

The NSW EPA publishes records of contaminated sites under Section 58 of the Contaminated Land Management (CLM) Act 1997. The notices relate to investigation and/or remediation of site contamination considered to pose a significant risk of harm under the definition in the CLM Act.

A search of the database revealed that the subject site is not listed and there was no listed property in the suburb of Punchbowl. It should be noted that the NSW EPA record of Notices for Contaminated Land does not provide a record of all contaminated land in NSW.

Refer to **Appendix B** – NSW EPA Records.

4.9 NSW EPA POEO Register

A search of the POEO Register revealed the subject site is not listed on the register. However, there are over thirty registered properties within the suburb of Punchbowl. The majority of the properties were not seen as cause for concern as they are located more than 500m from the site.

Refer to **Appendix B** – NSW EPA Records.

4.10 NSW EPA Notified Contaminated Sites

The NSW EPA publishes a list of notified contaminated sites each month. The list of notified sites contain land that has been notified to the EPA as being potentially contaminated.

A search of the list was completed on the 23rd February 2022. The subject site is not listed on the register. Three of the properties has identified, the properties were not seen as cause for concern as they are located more than 500m from the site.

Refer to **Appendix B** – NSW EPA Records.

4.11 PFAS Preliminary Screen

NSW EPA requires that PFAS is considered when investigating land contamination. The preliminary screen is based on guidelines from the PFAS National Environmental Management Plan (NEMP 2020). From this screen a decision can be made as to whether PFAS sampling of soil and groundwater is required.

Table 4: PFAS Preliminary Screen

Preliminary Screen	Risk of Occurrence
Any past or present site activity listed in NEMP 2020 as being activity associated with PFAS contamination?	L
Any past or present off-site activity up-gradient / adjacent to the site listed in NEMP 2020 as being activity associated with PFAS contamination?	L
Did fire training involving the use of suppressants occur from 1970 to 2010?	L
Have fuel fires ever occurred on site from 1970 to 2010?	L
Have PFAS been used in manufacturing or stored on site?	L

Could PFAS have been imported to the site in fill materials from a site activity listed in NEMP 2020?	L
Could PFAS contaminated groundwater or run-off migrated to the site	No
Is the site or adjacent site listed in the NSW EPA PFAS Investigation Program	No
If the risk is medium or high in any of the above, does the inclusion of preliminary sampling / testing of PFAS in soil (including ASLP) and water need to be included?	No

- Note 1
 - o Risk: L – low (all necessary documentation has been reviewed and there is no recorded instance or compelling rationale),
 - o M – medium/moderate (all necessary documentation has been reviewed and there is potential evidence of a recorded instance with compelling rationale);
 - o H – high (all necessary documentation has been reviewed and there is evidence of a recorded instance with compelling rationale);
 - o Risk, N/A – not applicable (or “-“).
 - o No /Yes
- Note 2 Activities listed in Appendix B of the NEMP (2020).
- Note 3 Runoff from up-gradient PFAS use may impact surface water, soil, sediment and groundwater.
- Note 4 PFAS is used wide range of industrial processes and consumer products, including in the manufacture of non-stick cookware, specialised garments and textiles, ScotchguardTM and similar products (used to protect fabric, furniture, leather and carpets from oils and stains), metal plating and in some types of fire-fighting foam.
- Note 5 <https://www.epa.nsw.gov.au/your-environment/contaminated-land/pfas-investigation-program>

The potential for PFAS to be present on-site was low and subsequently PFAS sampling / analysis of soil and water was unwarranted.

4.12 SafeWork NSW

Previous Benviron Group submitted a request for information on the Storage of Hazardous Chemicals at the site with SAFEWORK NSW. A specific site search of the records held by SafeWork NSW has indicated no information pertaining to the site.

4.13 Previous Investigations

Two (2) previous investigations for the property are summarised below:

- Benviron Group, “Detailed Site Investigation” for 921 Punchbowl Road, Punchbowl, Reference E881, dated September 2016
- Foundation Earth Sciences Pty Ltd “Remediation Action Plan” for 921 Punchbowl Road, Punchbowl, Reference E2232 Rev 1, dated July 2021.

4.13.1 Benviron Group Detailed Site Investigation 2016

Benviron Group was appointed by Westwood Pty Ltd to undertake a Detailed Site Investigation (DSI) for the property situated at 921 Punchbowl Road, Punchbowl NSW (“the site”).

The proposed development plans have not been provided for the site and therefore the most stringent guidelines have been adopted. The Site Assessment forms part of SEPP 55 Guideline (Remediation of Land) with a proposed redevelopment to determine the end land-use suitability of the property.

The investigation revealed the following areas of environmental concern:

- The chromium concentration within BH11 (SS2) is located in the fill layer to a depth of 0.3m BGL. Analysis of the deeper soil in BH11 (SS2) has not been completed at this location.
- The chromium concentration within BH19 is located in the fill layer to a depth of 0.3m BGL. Analysis of the deeper soil in BH19 has not been completed at this location.

- The chromium concentration within BH23 is located in the fill layer to a depth of 0.5m BGL. Analysis of the deeper soil in BH23 has not been completed at this location.
- The chromium concentration within BH24 is located in the fill layer to a depth of 0.5m BGL. Analysis of the deeper soil in BH24 has not been completed at this location.

The following data gaps were identified:

- The lateral and vertical extent of BH11, BH19, BH23 & BH24 is currently unknown and an appropriate remediation strategy should be devised as part of the remediation works to be carried out.
- The two storey Croatian Club building was in use at the time of the site investigation. No access was available to investigate the soil beneath the building. The approximate size of the building equates to 21% of the total site area or 3618m². Sufficient samples were collected to satisfy the NSW EPA Sampling Design Guidelines for a site of 1.770 hectares. However, considering the size and age of the building further sampling beneath the building surface is recommended.
- Asbestos soil sampling (%w/w) is required to be completed once all buildings have been demolished.

Based on the results of the investigation, the abovementioned soil exceedance locations BH11, BH19, BH23 & BH24 requires remediation in order to render the site suitable for the proposed development, subject to the following:

- It is considered that the site would be deemed suitable for the proposed development subject to the implementation of a Remediation Action Plan (RAP) to manage the abovementioned environmental concerns and data gaps.
- An acid sulphate soils assessment is required to be completed once the proposed development plans have been finalised.
- Any soil requiring removal from the site, as part of future site works, should be classified in accordance with the “Waste Classification Guidelines, Part 1: Classifying Waste” NSW EPA (2014).

4.13.2 Foundation Earth Sciences – Remediation Action Plan Rev 1

Benviron Group (Benviron) was appointed by Waldron Hill Projects Pty Ltd, to prepare a Remediation Action Plan (RAP) for the property located at 921 Punchbowl Road, Punchbowl NSW. The site is proposed to be redeveloped into a new facility for use as a registered club with; shops, retail, office & business on the ground floor; basement and at grade car parking, new residential unit towers in current car park area and residential units above the new registered club, new internal roads, landscaping & drainage works.

Assuming appropriate permits have been granted, the remediation of the site is to take place in the following stages:

- Stage One -Hazardous Materials Assessment & Site Preparation
- Stage Two – Additional Investigation
 - o Ten (10) additional boreholes will be drilled at the proposed locations shown in Figure 2 to allow for the collection of soil samples to target landscape areas, building footprint & further assessment of the soil quality based on the results from Benviron Group DSI 2016.
 - o The sampling of three (3) existing monitoring wells to provide second round of water quality at the site.

- o Six (6) boreholes to be drilled for an Acid Sulphate Soil Assessment.
- Stage Three – Removal of previous soil impacted Hotspots (BH6)
 - o Hotspot SS2 (BH11) – contains chromium impacted fill materials to a depth of 0.3m BGL. It is intended to initially excavate the Hotspot 2m long x 2m wide x 1m vertically deep. The material is to be classified in accordance with the NSW EPA Waste Classification Guidelines and can be disposed of at EPA licenced landfill facility that can accept the waste. The approximate volume to be disposed of is 4m³. The floors and walls of BH11 will be validated by taking 1 floor sample and 4 walls samples. Recovery of appropriate QA/QC samples.
 - o Hotspot BH19 – contains chromium impacted fill materials to a depth of 0.3m BGL. It is intended to initially excavate the Hotspot 2m long x 2m wide x 1m vertically deep. The material is to be classified in accordance with the NSW EPA Waste Classification Guidelines and can be disposed of at EPA licenced landfill facility that can accept the waste. The approximate volume to be disposed of is 4m³. The floors and walls of BH19 will be validated by taking 1 floor sample and 4 walls samples. Recovery of appropriate QA/QC samples.
 - o Hotspot BH23 – contains chromium impacted fill materials to a depth of 0.5m BGL. It is intended to initially excavate the Hotspot 2m long x 2m wide x 1m vertically deep. The material is to be classified in accordance with the NSW EPA Waste Classification Guidelines and can be disposed of at EPA licenced landfill facility that can accept the waste. The approximate volume to be disposed of is 4m³. The floors and walls of BH23 will be validated by taking 1 floor sample and 4 walls samples. Recovery of appropriate QA/QC samples.
 - o Hotspot BH24 – contains chromium impacted fill materials to a depth of 0.5m BGL. It is intended to initially excavate the Hotspot 2m long x 2m wide

x 1m vertically deep. The material is to be classified in accordance with the NSW EPA Waste Classification Guidelines and can be disposed of at EPA licenced landfill facility that can accept the waste. The approximate volume to be disposed of is 4m³. The floors and walls of BH24 will be validated by taking 1 floor sample and 4 walls samples. Recovery of appropriate QA/QC samples.

- Stage Four – Validation of Basement & Ground Floor
 - After removal of all fill soil material from the proposed basement area in accordance with the NSW EPA Waste Classification guidelines, the floors of exposed basement floor area & remaining ground floor areas will be sampled by taking thirty (30) floor samples plus QA/QC samples to validate the basement & ground floor area.
- Stage Five – Validation Report Preparation

4.14 Site History Summary

In summary:

- In summary, the site at 921 Punchbowl Road, Punchbowl NSW has been owned by private individuals from 1926 to 1948, after which it has been owned by both commercial and private individuals. The land titles have revealed potential contaminating land uses from the company H C Sleigh Limited which is involved with petroleum-based products and the operation of service stations.
- The aerial photographs indicate the site had been occupied by vacant land sometimes before 1955, and then was redeveloped into rural residential. Sometime before 1971, the site was redeveloped into one large commercial dwelling associated with open car park, renovation works has been carried between 1994 to 2004, and remain unchanged until present. The surrounding land

appeared to be rural residential from 1955, sometime before 1982, east of the site has re-developed into a service station and remain until present.

- The NSW EPA contaminated land database, POEO Register and List of Notified Sites indicate subject site is not listed.
- Previous Benviron Group submitted a request for information on the Storage of Hazardous Chemicals at the site with SAFEWORK NSW. A specific site search of the records held by SafeWork NSW has indicated no information pertaining to the site.

4.15 Integrity Assessment

The information found in the historical sources has been found to be in general concurrence. It is therefore considered that accuracy of this data is acceptable for this investigation.

5.0 REVIEW OF ENVIRONMENTAL INFORMATION

Table 5: Site Condition and Surrounding Environment Review

Site Information	Descriptions
Sensitive Receivers	The nearest sensitive human receptors are the current and future users of the site, construction workers during the site redevelopment and the general public. The nearest downgradient watercourse is a stormwater channel that is located beneath the site running through the central portion of the site in east west direction and along the western boundary in a north south direction. The stormwater channels appear to drain into Salt Pan Creek located approximately 531m south west of the site, which eventually discharges into the Georges River. The nearest watercourse is tributary of Salt Pan Creek located within the western of the site.
Soil Landscape <i>Review of NSW Soil and Land Information website ESPADE.</i>	The Soil Landscape Map viewed on NSW ESPADE indicates that the site is located within the Birrong landscape area and typically consists of fluvial soils with high soil erosion hazard, very low soil fertility, saline subsoils and seasonal water logging.
Topography	The topography viewed on NSW ESPADE indicated the following for the Birrong Fluvial Landscape. Level to gently undulating alluvial floodplains with local relief <5m and slope gradients <3%. Broad concave valleys. Most drainage lines have been converted

	to lined concrete and brick channels. Based on the site inspection It was determined that the site area had a slight slope of 2° to the north west.
Geological Profile	The borders the following two geological profiles: 1.The Geological Map of Sydney (Geological Series Sheet 9130, Scale 1:100,000, 1983), published by the Department of Mineral Resources indicates the residual soils within the site to be underlain by Quaternary Age soils consisting of silty to peaty quartz sand, silt and clay. Ferruginous and humic cementation in places with common shell layers. 2. The Geological Map of Sydney (Geological Series Sheet 9130, Scale 1:100,000, 1983), published by the Department of Mineral Resources indicates the residual soils within the site to be underlain by Triassic Age Shale of the Wianamatta Group, comprising black to dark grey shale and laminite. The soil profile encountered during the intrusive investigation is consistence with both geological profiles.
Presence of Acid Sulphate Soils <i>Review of NSW Department of Land & Water Conservation (DLWC) Acid Sulphate Soil Risk Maps (Edition Two, December 1997, Scale 1:250,000).</i>	A review of the Botany Bay map indicated that the site is located in “Disturbed Terrain”. Disturbed terrain may include filled areas, which often occur during reclamation of low-lying swamps for urban development. The Bankstown Local Environmental Plan 2015 - Acid Sulfate Soils Risk Class Map _Sheet ASS _ 005 indicated that the site lies within a Class 3 ASS area.

Localised Hydrogeology Review of DPI (Office of Water) Database. Appendix D – DPI (Office of Water) Database Records.	Number	Location from Site	Depth (m BGL)	SWL (m BGL)	Use	Water Bearing Zones
	GW107854	1.4km north	234.00	36	Domestic	Sandstone
	GW103667	1km south west	4.5	-	Monitoring	Clay
	GW103674	1km south west	5.9	-	Monitoring	Clay / Shale
Nearest Surface Water Body	The nearest watercourse is tributary of Salt Pan Creek located within the western of the site.					
Local Meteorology (Bureau of Meteorology BOM website) Appendix E – BOM Data.	The monthly rainfall of the local surrounding area is represented by the data collected from the BOM rainfall gauge located in Canterbury Racecourse, which is located approximately 5.1km from Punchbowl. The records indicate that the highest daily rainfall recorded in February (date of fieldwork) was 189.2mm.					
Nearest Active Service Station (Google Maps Search)	25m east of the site.					

6.0 REVIEW OF CONSTRUCTION AND SERVICE INFORMATION

6.1 Proposed Development

The site is currently occupied by one registered club consisting of car park area, driveways and grassed area. The site is proposed to be redeveloped into a mixed use development including new registered club in the southern portion of the site, retail tenancies on the ground floor, new internal road, pocket park, landscape areas, five blocks of residential units in the north and four levels of residential units above the ground floor registered club.

Refer to **Appendix F** - Proposed Development Plans.

7.0 SITE VISIT

7.1 General

The site was visited on the 17th February 2022 by Foundation Earth Sciences Environmental Scientists to inspect the site for any potential sources of contamination.

The following items were considered as part of the site visit:

- Description of the building structures;
- Site surroundings;
- Present and past industrial processes and operations at the site;
- Surface water, groundwater, stormwater and sewer;
- Present and past storage of chemicals and wastes associated with site use and their on-site location;
- Waste management practices and management of hazardous materials;
- Presence of Underground Storage Tanks or Above Ground Storage Tanks;
- Odour; and
- Occupational health and safety.

7.2 Site observations

At the time of the site visit the following observations were made as per the following table:

Table 6: Site Inspection Review

Factors Considered	Description of Sites
Buildings & Structures on Site	The site is currently occupied by one large multi storey commercial building, irregular in shape and surrounded by bitumen car park, concrete loading bay, and landscaping area. A major stormwater channel running in the centre of the site from west to east. The commercial property was utilised by Croatian Club (RSL type venue).
Percentage Hard-standing surface	Approximately 90%
Hard standing surface condition	Average – poor
Chemical Storage	Chemical storage areas were not noted at the time of the site inspection in accessible areas.
Above and Underground Storage Tanks	No above or underground storage tanks areas were noted at the time of the site inspection in accessible areas.
Trade Waste Pits	No trade waste pits were identified at the site.
Nearby Electrical Transformers	No electricity sub-station was observed within the property. However, a power transmission tower observed in the north-west portion of the site.
Asbestos	No fibro cement sheeting was identified within the boreholes locations. No fibro cement sheeting was identified on the surface of accessible area.
Site Vegetation	Appeared healthy.
Soil Staining and Odours	No odours were identified within the property. No significant soil staining was noted during the inspection.
Stormwater and Sewer	Stormwater was connected to the local utilities.

Refer to **Figure 2** - Site Features, Borehole Locations & Exceedance Plan and **Appendix C** – Site Photographs.

8.0 PRELIMINARY CONCEPTUAL SITE MODEL (CSM)

Based on the above information, site history and site walkover, the areas of potential concern and associated contaminants for the site CSM were identified. These are summarised in the following table.

Table 7: Areas and Contaminants of Concern

Known and potential contamination source	Associated Contaminants
<i>Historical Site Uses (Commercial/Car Park)</i>	Heavy Metals, TRH, BTEX, PAH, OCP, PCB & Asbestos
<i>Potential Pesticides Use</i>	OCP, OPP
<i>Imported Fill</i>	Heavy Metals, TRH, BTEX, PAH, OCP, PCB & Asbestos
<i>Car parking Areas</i>	TRH, BTEX, PAH
<i>Building degradation/ Demolition</i>	Heavy Metals and Asbestos

Table 8: Potentially Contaminated Media

Known and potential contamination source	Associated Contaminants
<i>Fill Material</i>	There is the potential for contamination to be present in the upper fill material.
<i>Groundwater</i>	There is the potential for the leaching of contaminants into groundwater onsite and also migration of the contaminants.

Potential for Migration

Contaminants generally migrate from site via a combination of windblown dusts, rainwater infiltration, groundwater migration and surface water runoff. The potential for contaminants to migrate is a combination of:

- The nature of the contaminants (solid/liquid and mobility characteristics);
- The extent of the contaminants (isolated or widespread);
- The location of the contaminants (surface soils or at depth); and
- The site topography, geology, hydrology and hydrogeology.

The potential contaminants identified as part of the site history review & site inspection are present in solid (e.g. impacted fill, asbestos) & liquid (e.g. dissolved in water).

Aerial photography has indicated that there were significant unsealed ground surfaces and therefore, there is the potential for migration of contaminants via wind-blown dust.

Rainfall infiltration at the site is expected to occur in unsealed areas. There is therefore the potential that soil contamination could result in impacts to groundwater.

Potential Exposure Pathways

Potential exposure pathways include:

- Dermal;
- Ingestion; and
- Inhalation.

Due to the presence of exposed potentially impacted soil/fill on ground surfaces, dermal and inhalation exposure is considered a potential exposure pathway.

The potential for ingestion of soil is considered as a potential exposure pathway. Although groundwater is not used at the site, there is the potential, for ingestion of contaminants via groundwater removed from monitoring wells.

A basement is not proposed for the development. Because of this dermal and inhalation exposure pathway by potentially contaminated groundwater is considered a limited / low risk potential.

Receptors

Potential receptors of environmental impact present within the site which will be required to be addressed with respect to the suitability of the site for the proposed use include:

- Excavation/construction/maintenance workers conducting activities at the site, who may potentially be exposed to COPCs through direct contact with impacted soils, Vapour Intrusion and/or groundwater present within excavations and/or inhalation of dusts/fibres associated with impacted soils;
- Future occupants/users of the site may potentially be exposed to COPCs through direct contact with impacted soils and/or ingestion of impacted soils and/or inhalation of dusts/fibres associated with impacted soils and/or exposure to vapour; and/or
- Offsite sensitive receptors of groundwater; and/or
- Flora species to be established on vegetated areas of the site.
- Salt Pan Creek/ Tributary of Salt Pan Creek

Preferential Pathways

For the purpose of this assessment, preferential pathways have been identified as natural and/or man-made pathways that result in the preferential migration of COPCs as either liquids or gases.

Man-made preferential pathways are present throughout the site, generally associated with fill materials and services present beneath existing ground surface. Fill materials and service lines are anticipated to have a higher permeability than the underlying natural soil and/or bedrock.

The Sydney Water plan indicates some stormwater main running along the central of the site from west to east, as well as the sewer main. Optus plan indicated a major line connected with building from the eastern boundary. It is noted that the associated underground services are considered a potential preferential pathway.

9.0 REVIEW OF DATA QUALITY OBJECTIVES

The DQOs were also prepared using Appendix IV of the Site Auditor Guidelines. These require 7 steps. The steps being

- a. State the problem
- b. Identify the decisions
- c. Identify inputs to decision
- d. Define the study boundaries
- e. Develop a decision rule
- f. Specify limits on decision errors
- g. Optimise the design for obtaining data

9.1 State the Problem

The site requires to be confirmed suitable for the proposed development. The site is proposed to be redeveloped and has had some areas of potential concern, those being historical & current land uses, surrounding land use, possible areas of imported fill of unknown origin, degradation of the building materials and leakages from vehicles on site.

Technically defensible evidence needs to be provided so that the identified Site does not present an unacceptable risk to human health or the environment and is suitable for the intended land use.

9.2 Identify the Decisions

The decisions to be made on the contamination and the new environmental data required includes considering relevant site contamination criteria for each medium (fill, soil and sediment). A proposed use of the 95% UCL on the mean concentrations for all soil chemicals of potential concern must be less than the site criteria identified for the relevant land use suitability.

The decisions made in completing this assessment are as follows:

- Does the site or is the site likely to present a risk of harm to humans or the environment
- Is the site currently suitable for the proposed land use including residential with access to soil?
- Is there a potential for soil and groundwater contamination?
- Is there a potential for offsite migration issues?
- Do the sampling results meet the site criteria proposed?
- If not, does the site require remediation works

9.3 Identify Inputs to Decision

This step requires the identification of the environmental variables/characteristics that need measuring, identification of which media (fill, soil etc.) need to be collected, identification of the site criteria for each medium of concern and appropriate analytical testing. Inputs include:

- Existing site information
- Site history
- Regional geology, topography and hydrogeology
- Potential contaminants

- Proposed Land Use
- Site assessment criteria
- Results as measured against criteria

9.4 Define the Study Boundaries

Specific spatial and temporal aspects must be provided to identify the boundaries of the investigation and to identify any restrictions that may hinder the assessment process. The site is located at 921 Punchbowl Road, Punchbowl NSW. The site is approximately 1.770 hectares in area.

9.5 Develop a Decision Rule

The information obtained through this assessment will be used to characterise the soils and the groundwater on the site in terms of contamination issues and risks to human health and the environment. The decision rule in characterising the site will be as follows:

- Laboratory test results will be measured against the criteria provided within this report
- The site will be deemed suitable for the proposed use if the following criteria are fulfilled:
 - Soil and groundwater concentrations are within background levels
 - QA/QC shows data can be relied upon
 - Results generally meet regulatory criteria
 - Results are from NATA accredited laboratories
 - Detection limits are below assessment criteria
 - Results can be shown to be of minimal concern

9.6 Specify Limits on Decision Errors

The limits on decision errors for this assessment are as follows:

- The assessment criteria adopted from the guidelines within this report have risk probabilities already incorporated.
- The acceptable limits for inter/intra laboratory duplicate sample comparisons are laid out within our protocols.
- The acceptable limits for laboratory QA/QC parameters are based upon the laboratory reported acceptable limits and those stated within the NEPM 2013 Guidelines.

9.7 Optimise the Design for Obtaining Data

A resource-effective sampling and analysis design was undertaken for data collection that satisfies the DQO's. The sampling and analytical plan is designed to avoid Type 1 and Type 2 errors and includes defining minimum sample numbers required to detect contamination as determined with procedures provided in the NSW EPA 1995 Sampling Design Guidelines and AS 4482.1 - 2005 and appropriate quality control procedures.

Furthermore, only laboratories accredited by NATA for the analysis undertaken were used. The laboratory data was assessed from quality data calculated during this assessment. Field QA/QC protocols adopted and incorporate traceable documentation of procedures used in the sampling and analytical program and in data verification procedures.

10.0 INTRUSIVE SOIL INVESTIGATION

The intrusive soil investigation took place on the 17th February 2022 and was designed to meet the Data Quality Objectives.

10.1 Soil Assessment

Sixty-three (63) primary soil sample were recovered from forty-one (41) borehole locations spread across the site and were labelled BH1 to BH31 and BH101 to BH110. These locations were selected to detect any contamination that may have originated from past and present activities, and due to potential excavation and future development in these areas.

Table 9: Sampling Information - Soil

Analyte / Analyte Group		SAMPLING DATE	DUPLICATE & SPLIT	HEAVY METALS (8)	TRH	BTEX	PAH	OCP	PCB	TRH C6-C10 & BTEXN	PH / CEC / %CLAY	Asbestos
Sample	Depth (m)											
Previous BG DSI 2016												
BH1	0.3	1.6.2016		✓	✓	✓	✓					
BH2	0.2	1.6.2016		✓	✓	✓	✓					
BH3	0.3	1.6.2016		✓	✓	✓	✓					
BH4	0.2	1.6.2016		✓	✓	✓	✓					
BH5	0.2	1.6.2016		✓	✓	✓	✓					
BH5	0.5	1.6.2016		✓	✓	✓	✓	✓	✓			
BH6	0.3	1.6.2016		✓	✓	✓	✓	✓	✓			
BH7	0.2	1.6.2016		✓	✓	✓	✓					
BH8	0.2	1.6.2016		✓	✓	✓	✓					
BH9	0.2	1.6.2016		✓	✓	✓	✓					
BH10	0.2	1.6.2016		✓	✓	✓	✓					
BH10	0.5	1.6.2016		✓	✓	✓	✓	✓	✓			
BH11	0.2	1.6.2016	D2/SS2	✓	✓	✓	✓	✓	✓			
BH12	0.2	1.6.2016		✓	✓	✓	✓	✓	✓			
BH13	0.2	1.6.2016		✓	✓	✓	✓					
BH14	0.3	1.6.2016	D3/SS3	✓	✓	✓	✓					
BH15	0.2	1.6.2016		✓	✓	✓	✓	✓	✓			
BH15	0.8	1.6.2016		✓	✓	✓	✓	✓	✓			
BH16	0.2	1.6.2016		✓	✓	✓	✓	✓	✓			
BH17	0.3	1.6.2016		✓	✓	✓	✓					
BH18	0.2	1.6.2016		✓	✓	✓	✓					
BH19	0.2	1.6.2016		✓	✓	✓	✓					
BH20	0.3	1.6.2016		✓	✓	✓	✓					
BH20	1	1.6.2016	D1/SS1	✓	✓	✓	✓	✓	✓			
BH21	0.3	1.6.2016		✓	✓	✓	✓	✓	✓			
BH22	0.2	1.6.2016		✓	✓	✓	✓					
BH23	0.2	1.6.2016		✓	✓	✓	✓					
BH24	0.3	1.6.2016		✓	✓	✓	✓					
BH25	0.2	1.6.2016		✓	✓	✓	✓					
BH25	0.6	1.6.2016		✓	✓	✓	✓	✓	✓			
BH26	0.3	1.6.2016		✓	✓	✓	✓	✓	✓			
BH27	0.3	1.6.2016		✓	✓	✓	✓					
BH28	0.2	1.6.2016		✓	✓	✓	✓					
BH29	0.3	1.6.2016		✓	✓	✓	✓					
BH30	0.2	1.6.2016		✓	✓	✓	✓					
BH31	0.1-0.2	1.6.2016									✓	
BH31	0.4-0.5	1.6.2016									✓	
FES DSI 2022												
BH101	0.3-0.4	17.2.2022		x	x	x	x	x	x			x
BH101	0.9-1.0	17.2.2022		x	x	x	x					
BH102	0.2-0.3	17.2.2022		x	x	x	x	x	x			
BH103	0.2-0.3	17.2.2022		x	x	x	x	x	x			x
BH103	0.6-0.7	17.2.2022		x	x	x	x					
BH104	0.2-0.3	17.2.2022		x	x	x	x	x	x			x
BH104	0.7-0.8	17.2.2022		x	x	x	x					
BH105	0.4-0.5	17.2.2022		x	x	x	x	x	x			
BH105	0.9-1.0	17.2.2022		x	x	x	x	x	x			
BH106	0.3-0.4	17.2.2022		x	x	x	x	x	x			x
BH106	0.7-0.8	17.2.2022		x	x	x	x					
BH107	0.2-0.3	17.2.2022		x	x	x	x	x	x			x
BH107	0.8-0.9	17.2.2022		x	x	x	x	x	x			
BH108	0.4-0.5	17.2.2022		x	x	x	x	x	x			x
BH108	0.9-1.0	17.2.2022		x	x	x	x					
BH109	0.3-0.4	17.2.2022	D101/SS101	x	x	x	x	x	x			
BH110	0.3-0.4	17.2.2022		x	x	x	x	x	x			x
BH110	0.8-0.9	17.2.2022		x	x	x	x					
TS101	-	17.2.2022								x		
TB101	-	17.2.2022								x		

The locations of the boreholes and samples are shown in **Figure 2** and details of the boreholes are presented in **Appendix G – Borehole Logs**.

Based on information from all boreholes, the surface and sub-surface profile across the site is generalised as follows:

- Fill: Silty Clay, Gravelly Silt, Gravel, Gravelly Sandy Silt, Silt
- Natural: Silty CLAY, Clayey SILT;
- Bedrock: SHALE, weathered.

10.2 Sampling Density and Rationale

The NSW EPA “Sampling Design Guidelines” (September 1995) requires a minimum sampling density of thirty (30) sampling points for a site approximately area of 1.790 hectares.

Sixty-three (63) primary soil sample were recovered from forty-one (41) borehole locations spread across the site and were labelled BH1 to BH31 and BH101 to BH110. The locations were drilled by adopting a systematic grid-based sampling pattern across the site and to provide general site coverage with consideration given to accessibility and limitations in relation to underground services & access.

10.3 Sampling Methodology

In summary:

- Soil samples were collected directly from the push tube / split spoon sampler and/or directly from the excavator bucket.
- Soil samples were collected using a hand auger, DCP and U50 to collect undisturbed samples.
- Samples were transferred directly into appropriately labelled clean laboratory supplied containers;
- Samples were transferred into chilled eskies for sample preservation;
- A Chain of Custody was completed and forwarded to the laboratory. Sampling analysis was based on field observations and were in accordance to the schedule outlined in Section 12.
- Soil samples were submitted to their respective laboratories as specified in Section 12.4.

11.0 GROUNDWATER INVESTIGATION

11.1 Groundwater Assessment

Benviron Group installed three groundwater monitoring wells on the 1st June 2016 as part of the Detailed Site Investigation. Samples were recovered from three (3) existed groundwater well labelled as GW1 to GW3. The schedule of analysis is provided below:

Table 10: Sampling Information – Groundwater

SAMPLE ID	SAMPLING DATE	HEAVY METALS	TRH	BTEX	PAH	VOC	OCP&PCB	TRH C6-C10 & BTEXN
BG DSI 2016								
BH1 / GW1	3.6.2016	X	X	X	X		x	
BH7 / GW2	3.6.2016	X	X	X	X		x	
BH14 / GW3	3.6.2016	X	X	X	X		x	
D1	3.6.2016	X	X	X	X		x	
SS1	3.6.2016	X	X	X	X		x	
FES DSI 2022								
BH1 / GW1	24.2.2022	X	X	X	X	X		
BH7 / GW2	24.2.2022	X	X	X	X	X		
BH14 / GW3	24.2.2022	X	X	X	X	X		
GWD101	24.2.2022	X	X	X	X	X		
GWSS101	24.2.2022	X	X	X	X	X		
TS1	-					X		X
TB1	-					X		X

The location of the groundwater well is shown in **Figure 2 – Site Features, Borehole Locations and Exceedance Plan** and details of the boreholes are presented in **Appendix G – Borehole Logs**.

Refer to **Appendix I – Field Record Forms & Appendix L – Calibration Certificate**.

11.2 Groundwater Methodology

Groundwater monitoring wells were constructed on the 1st June 2016 by adopting the following methodology:

- 50mm diameter, Class 18PVC threaded and flush joined casing and 0.45 machine-slotted screens were used;
- Coarse, washed sand and gravel was placed in the annulus surrounding the piping to a height of the screen;
- Bentonite pellets were placed in the annulus to form an impermeable plug near the top of the well to prevent surface runoff from entering directly into the well;
- Bentonite pellets were placed in the annulus to form an impermeable plug near the top encountered bedrock;
- A PVC cap was placed on the casing;
- 100mm diameter stainless steel flushed covers were used for all well finishes and concreted onto the ground surface.

Table 11: Summary of Well Construction Details

Well ID	Total Depth	Screening (m)	Surface Level (RL)	Water Bearing	Comment
BH1/GW1	5.5	2.5-5.5	-	CLAY	Current
BH7/GW2	4.0	1-4.0	-	CLAY	Current
BH14/GW3	5.5	2.5-5.5	-	CLAY	Current

The following works were carried out upon completion of the well installations:

- The wells were developed by removing at least three well volumes until groundwater parameters reached equilibrium and no further turbidity improvements were observed.

Drilling and installation of the monitoring wells was carried out on the during Benviron Group DSI in 2016, using a combination of solid stem , hollow flight auguring and/or NMLC coring under supervision of Foundation Earth Sciences.

11.3 Groundwater Sample Collection

Second round of groundwater sampling completed by FES was undertaken on the 24th February 2022. Prior to sampling, the resting water level was recorded within the well while checking for the presence of phase separated hydrocarbon.

Sampling was completed using a low flow peristaltic pump – a low flow/minimum drawdown sampling technique used to minimise any disturbance to the aquifer.

Field measured parameters were collected using a certified and calibrated In-situ YSI water quality meter. Samples were collected when field measured parameters (pH, electrical conductivity, redox potential, dissolved oxygen and temperature) had stabilised. The samples were placed into appropriate laboratory supplied bottles and preserved on ice. The peri pump and other sampling equipment were decontaminated before and after use to avoid possible cross contamination. All samples collected were preserved on ice and couriered directly to the laboratory under COC documentation.

11.4 Groundwater Observations

Table 12: Groundwater Elevations & Observations

Well ID	Well Depth	Surface Level RL	Groundwater Depth Measured (m BGL)	Groundwater Level (RL)	PSH Depth
BH1 /GW1	5.5	-	1.55	-	None
BH7 /GW2	4.0	-	0.2	-	None
BH14 /GW3	5.5	-	1.2	-	None

The field measured parameters (pH), electrical conductivity (EC), redox potential, dissolved oxygen (DO) and temperature recorded during purging, were allowed to stabilise prior sampling. Final stabilised groundwater field parameters are summarised in below.

Table 13: Groundwater Field Results

Well ID	Date	pH	Electrical Conductivity (EC us/cm)	Redox Potential (ORP mV)	Dissolved Oxygen (mg/L)	Temperature (*C)
BH1 /GW1	24.2.2022	6.62	20966	-149.7	33.3	25.9
BH7 /GW2	24.2.2022	6.86	862	16.2	862	28.9
BH14 /GW3	24.2.2022	6.71	13786	58.6	21.7	26.7

The results of the field parameters measured are summarised as follows:

- pH reading indicated the groundwater is generally neutral;
- The EC reading indicated generally brackish water; and
- Redox reading indicated increasing conditions.

11.5 Catchment Location

It is noted that the groundwater at the site is likely to flow into the George River Catchment area. Interim environmental objective is not provided here for those catchments, for which an inquiry was well under way before the commencement of a wider inquiry into the whole Georges River–Botany Bay system.

12.0 QUALITY ASSURANCE / QUALITY CONTROL

12.1 General QA/QC

The frequency required for each field quality assurance / quality control (QA/QC) sample is presented in the table below.

Table 14: QA/QCs Frequencies

	Intra Lab	Inter Lab	Rinsate	Spikes	Blanks
Sampling Frequency	1 in 20	1 in 20	1/day	1/day	1/day

During the contamination assessment the integrity of data collected is considered vital. With the assessment of the site, a number of measures were taken to ensure the quality of the data. These are as follows:

12.2 Sample Containers

Soil samples collected during the investigation were placed immediately into laboratory prepared glass jars with Teflon lid inserts. Standard identification labels were adhered to each individual container and labelled according to depth, date, sampling team and media collected.

12.3 Decontamination

All equipment used in the sampling program was decontaminated prior to use and between samples to prevent cross contamination. Decontamination of equipment involved the following procedures:

- Cleaning equipment in potable water to remove gross contamination;
- Cleaning in a solution of Decon 90;
- Rinsing in clean demineralised water then wiping with clean lint free cloths;

Foundation Earth Sciences also adopted a sampling gradient of lowest to highest potential contamination to minimise the impact of cross contamination. This gradient was determined from the historical review and the on-site inspection that was carried out prior to sampling.

Although Foundation Earth Sciences maintains consistent sampling procedures, a rinsate sample is obtained to ensure false positive samples are not generated and that decontamination procedures are effective in preventing cross contamination. The Rinsate water is collected after being in contact generally with the trowel used for sampling. Analytical results that target the contaminants of concern are compared to a blank sample, which is taken directly from the rinsate water container supplied by the laboratory.

A rinsate sample was not collected as the samples were taken either directly from the excavator bucket, push tube / split spoon sampler or U50 tube and therefore the chance for cross-contamination was minimal.

12.4 Sample Tracking, Identification and Holding Times

All samples were forwarded to Envirolab and Eurofins under recognised chain of custodies with clear identification outlining the date, location, sampler and sample ID. All samples were recorded by the laboratory as meeting their respective holding times. The sample tracking system is considered adequate for the purposes of sample collection.

12.5 Sample Transport

All samples were packed into an esky with ice from the time of collection. A trip blank and trip spike are collected where appropriate. These were transported under chain of custody from the site to Envirolab Pty Ltd and Eurofins, both NATA registered laboratories. During the project, the laboratory reported that all the samples arrived intact and were analysed within holding times for the respective analytes.

Samples were kept below 4°C at all times, soil samples submitted for asbestos analysis are not required to be kept below 4°C.

12.6 Trip Spike

Trip Spike samples were obtained from the laboratory prior to conducting field sampling where volatile substances are suspected. Foundation Earth Sciences QA/QC procedures

for the collection of environmental samples involves the collection of trip blanks, trip spikes and duplicate samples both intra and inter laboratory.

12.7 Trip Blank

A trip blank accompanied the sampling for the sampling process and is not separated from the sample collection and transportation process. The purpose of the trip blank is to identify whether cross-contamination is occurring during the sample collection and transport process.

12.8 Field Duplicate Samples

The tables below list the duplicate soil samples collected with their corresponding primary samples.

Table 15: Soil Field Duplicate Samples

Primary Sample	Sample Depth (m BGL)	Intra Duplicate	Inter Duplicate	Date Sampled
BH109	0.3-0.4	D101	SS101	17.2.2022

Table 16: Groundwater Field Duplicate Samples

Primary Sample	Screen Zone (m bgl)	Intra Duplicate	Inter Duplicate	Date Sampled
BH1/GW1	2.5-5.5	GWD101	GWSS101	24.2.2022

Field duplicate samples for soil were prepared in the field through the following process:

- A larger than normal quantity of soil is recovered from the sample location selected for duplication.
- Two Portions of the sub-sample are immediately transferred, one for an intra-laboratory duplicate and another as a sample.
- Samples are placed into a labelled, laboratory supplied 250ml glass jar and sealed with an airtight, Teflon screw top lid. The fully filled jars are labelled as the sample and duplicate and immediately placed in a chilled esky.

Soil Intra-Laboratory duplicate samples were sent to Envirolab while Inter-Laboratory duplicate samples were sent to Eurofins.

A summary of the test results with the Relative Percentage Difference (RPD) is presented in the following tables.

The comparisons between the duplicates and original samples indicate acceptable RPDs when they comply with criteria which are commonly set at:

- less than 30% for inorganics and 50% for organics
- greater than five (5) times the laboratory limit of recording (LOR)
- greater than 50% of the relevant health investigation level (HIL) concentration.

The tables, below, give details of intra laboratory and inter laboratory duplicates.

Table 17: Intra-lab Soil Sample D101 RPDs

ANALYTE	BH109 0.3-0.4 mg/kg	EnviroLab D101 mg/kg	RELATIVE PERCENTAGE DIFFERENCE %
HEAVY METALS			
Arsenic	<4	<4	-
Cadmium	<0.4	<0.4	-
Chromium	22	9	84
Copper	20	43	73
Lead	15	3	133
Mercury	<0.1	<0.1	-
Nickel	35	95	92
Zinc	30	30	0
TRH			
F2 C10-C16	<25	<25	-
F3 C16C34	<50	<50	-
F4 C34-C40	<50	<50	-
BTEX			
Benzene	<0.2	<0.2	-
Toulene	<0.5	<0.5	-
Ethylbenzene	<1	<1	-
Xylenes - Total	<1	<1	-
POLYCYCLIC HYDROCARBONS (PAH)			
Benzo(a)pyrene	<0.05	<0.05	-
Total PAH	<0.05	<0.05	-
ORGANOCHLORINE PESTICIDES			
Heptachlor	<0.1	<0.1	-
Aldrin+Dieldrin	<0.1	<0.1	-
DDD	<0.1	<0.1	-
DDE	<0.1	<0.1	-
DDT	<0.1	<0.1	-
Chlordane (trans & cis)	<0.1	<0.1	-
POLYCHLORINATED BIPHENYLS			
Total PCB	<0.1	<0.1	-

Table 18: Intra-lab Groundwater Sample GWD101 RPDs

ANALYTE	Envirolab GW101 ug/l	Envirolab GWD101 ug/l	RELATIVE PERCENTAGE DIFFERENCE %
HEAVY METALS			
Arsenic	1	1	0
Cadmium	<0.1	<0.1	-
Chromium	<1	<1	-
Copper	<1	<1	-
Lead	<1	<1	-
Mercury	<0.05	<0.05	-
Nickel	3	3	0
Zinc	3	3	0
TRH			
C6-C10 (F1)	<10	<10	-
C10-C16 (F2)	<50	<50	-
BTEX			
Benzene	<1	<1	-
Toulene	<1	<1	-
Ethylbenzene	<1	<1	-
Xylenes - Total	<3	<3	-
POLYCYCLIC HYDROCARBONS (PAH)			
Benzo(a)pyrene	<0.1	<0.1	-
Naphthalene	<0.2	<0.2	-
VOC			
Chloroform	<1	<1	-

The comparisons between the intra-laboratory duplicates and corresponding original samples for soil and groundwater indicated generally acceptable RPD with the exception of chromium, copper, lead & nickel in soil sample D101 which exceeded the DQOs for this project, however, these exceedances are not considered significant because they are most likely due to the heterogeneity of the sample or low concentrations within the sample.

Table 19: Inter-lab Soil Sample SS101 RPDs

ANALYTE	BH109 0.3-0.4 mg/kg	Eurofins SS101 mg/kg	RELATIVE PERCENTAGE DIFFERENCE %
HEAVY METALS			
Arsenic	<4	<2	-
Cadmium	<0.4	<0.4	-
Chromium	22	46	71
Copper	20	45	77
Lead	15	<5	-
Mercury	<0.1	<0.1	-
Nickel	35	150	124
Zinc	30	64	72
TRH			
F2 C10-C16	<25	<50	-
F3 C16C34	<50	<100	-
F4 C34-C40	<50	<100	-
BTEX			
Benzene	<0.2	<0.1	-
Toulene	<0.5	<0.1	-
Ethylbenzene	<1	<0.1	-
Xylenes - Total	<1	<0.3	-
POLYCYCLIC HYDROCARBONS (PAH)			
Benzo(a)pyrene	<0.05	<0.5	-
Total PAH	<0.05	<0.5	-
ORGANOCHLORINE PESTICIDES			
Heptachlor	<0.1	<0.05	-
Aldrin+ Dieldrin	<0.1	<0.05	-
DDD	<0.1	<0.05	-
DDE	<0.1	<0.05	-
DDT	<0.1	<0.05	-
Chlordane (trans & cis)	<0.1	<0.05	-
POLYCHLORINATED BIPHENYLS			
Total PCB	<0.1	<0.1	-

Table 20: Inter-lab Groundwater Sample GWSS101 RPDs

ANALYTE	Envirolab GW101 ug/l	Eurofins GWSS101 ug/l	RELATIVE PERCENTAGE DIFFERENCE %
HEAVY METALS			
Arsenic	1	5	133
Cadmium	<0.1	<0.2	-
Chromium	<1	3	-
Copper	<1	4	-
Lead	<1	2	-
Mercury	<0.05	<0.1	-
Nickel	3	7	80
Zinc	3	11	114
TRH			
C6-C10 (F1)	<10	<20	-
C10-C16 (F2)	<50	<50	-
BTEX			
Benzene	<1	<1	-
Toulene	<1	<1	-
Ethylbenzene	<1	<1	-
Xylenes - Total	<3	<3	-
POLYCYCLIC HYDROCARBONS (PAH)			
Benzo(a)pyrene	<0.1	<1	-
Naphthalene	<0.2	<1	-
VOC			
Chloroform	<1	<5	-

The comparisons between the inter-laboratory duplicates and corresponding original samples for soil and groundwater indicated generally acceptable RPD with the exception of chromium, copper, nickel & zinc in soil sample of SS101; and arsenic, nickel & zinc in water sample GWSS101 which exceeded the DQOs for this project, however, these exceedances are not considered significant because they are most likely due to the heterogeneity of the sample or low concentrations within the sample.

Field duplicates provide an indication of the whole investigation process, including the sampling process, sample preparation and analysis. The accuracy of the data is considered to be adequate due to the effect on confidence intervals with low concentrations in the samples and their duplicates.

12.9 Trip Spike and Trip Blank Results

Trip Spike samples were obtained from the laboratory prior to conducting field sampling where volatile substances are suspected. Trip spike and trip blank samples were collected to assess the effect of sample handling on volatile concentrations in the samples collected and the results are listed in the tables below:

Table 21: Trip Spike

ANALYTE	TS1 Trip Spike % Soil (mg/kg) 17.2.2022	ANALYTE	TS1 Trip Spike % water (ug/L) 24.2.2022
BTEX		BTEX	
Benzene	110%	Benzene	100%
Toluene	111%	Toluene	99%
Ethyl Benzene	116%	Ethyl Benzene	98%
O-Xylenes	119%	O-Xylenes	103%
M & P Xylenes	116%	M & P Xylenes	94%

Results discussed in Section 12.11

Table 22: Trip Blank

ANALYTE	Trip Blank Soil (TB1) mg/kg 17.2.2022	ANALYTE	Trip Blank water (TB2) mg/kg 29/08/1900
TRH		TRH	
C6-C10	<25	C6-C10	<10
BTEX		BTEX	
Naphthalene	<1	Naphthalene	<1
Benzene	<0.2	Benzene	<1
Toluene	<0.5	Toluene	<1
Ethyl Benzene	<1	Ethyl Benzene	<1
Total Xylenes	<3	Total Xylenes	<3

Results discussed in Section 12.11

12.10 Laboratory QA/QC

The integrity of analytical data provides the second step in the QA/QC process for total data compliance. The data validation techniques adopted by Foundation Earth Sciences are based upon techniques published by the US EPA and in line with methods and guidelines adopted by the NSW EPA and outlined in the NEPM, 2013.

Descriptions are provided of the specific mechanisms used in the assessment of accuracy, precision and useability of analytical data within the project.

Refer to **Appendix H-** NATA Accredited Laboratory Certificates.

12.11 QA/QC Results

The QA/QC results for soil collected at the site are summarised in the table below:

Table 23: QA/QC Results Summary

Data Quality Indicator	Results	DQI Met
Completeness		
<i>Soil & Groundwater</i>		
Data from critical samples is considered valid	Data is considered valid	Yes
Satisfactory frequency / result for QC samples	The QC results are considered adequate for the purpose of the investigation.	Yes

Field documentation completed	Field records are complete	Yes
Boreholes logs & COCs completed and holding times complied with	Logs, COCs and holding times have been completed and complied with	Yes
Comparability		
Soil & Groundwater		
Standard operating procedures used	Yes	Yes
Consistent field conditions, sampling staff and laboratory analysis	Sampling was conducted by Foundation Earth Sciences scientists operating under the SOPs. The laboratories remained consistent throughout the investigation	Yes
Same analytical methods used	All analytical methods used between laboratories were based on the USEPA/APHA methods	Yes
Limit of reporting appropriate and consistent	The LORs were the same within each laboratory but differed between the primary and secondary laboratories. The LORs were considered appropriate based on the results.	Yes
Representativeness		
Soil & Groundwater		
Sampling appropriate for media and analytes	All sampling was conducted in accordance with Foundation Earth Sciences SOPs.	Yes
Samples adequately preserved	The majority of samples collected were received by laboratories at the correct temperature. Where relevant, samples were stored in acid-preserved containers supplied by laboratories.	Yes
Precision		
Soil & Groundwater		

SOPs appropriate and complied with in relation to field duplicates	The recovery of field duplicates was conducted in accordance with Foundation Earth Sciences SOPs to allow for the assessment of field precision.	Yes
RPDs of the field duplicates within control limits	The RPDs were <50%, the data set was considered to be adequately precise with the exceptions of - Chromium, Copper, Lead & Nickel in soil sample D101 which exceeded the DQOs for this project - Chromium, Copper, Nickel & Zinc in soil sample SS101 and zinc & arsenic, nickel & Zinc in sample GWSS101 which exceeded the DQOs for this project, - However, these exceedances are not considered significant because they are most likely due to the heterogeneity of the sample or low concentrations within the sample.	Partial
RPDs of the laboratory duplicates within control limits	RPDs of the laboratory duplicates were within control limits with the exception of In envirolab laboratory certificate 289229, the laboratory RPD acceptance as been exceed for Cr in sample 289229-12 for Cu & Ni. Therefore, a triplicate result has been issued.	Partial

	laboratory certificate 864760-S, lab sample S22-Fe38590 for zinc. The RPDs reported passes Eurofins Environment Testing QC Metals.	
Accuracy		
Soil & Groundwater		
SOPs appropriate and complied with in relation to field blanks	Yes	Yes
Rinsate Blanks, trip blanks & laboratory blanks free of contaminants	Laboratory blanks & trip blanks were free of contaminants.	Yes
Surrogate spikes within control limits	Surrogate spikes were within control limits	Yes
Laboratory control spikes within control limits	Laboratory Control Spike recoveries were within control limits with the exception of - In envirolab laboratory certificate 289229, percent recovery is not possible to report due to the inhomogeneous nature of the element/s in the sample/s. However, an acceptable recovery was obtained for the LCS.	Partial
Matrix Spike recoveries within control limits	Yes	Yes
Trip spike recoveries within control limits	Yes	Yes

12.12QA/QC Evaluation / Conclusion

In summary, the findings of the QA/QC evaluation indicated the following:

- Data Completeness – The data is considered completed.
- Data Comparability – The data set is considered comparable.
- Data Representativeness – The data set is considered representable with the exception of the following:
 - The RPDs were <50%, the data set was considered to be adequately precise with the exceptions of Chromium, Copper, Lead & Nickel in soil sample D101 which exceeded the DQOs for this project; Chromium, Copper, Nickel & Zinc in soil sample SS101 and zinc & arsenic, nickel & Zinc in sample GWSS101 which exceeded the DQOs for this project. However, these exceedances are not considered significant because they are most likely due to the heterogeneity of the sample or low concentrations within the sample.
- Data Precision – The data set is considered precise with the exception of the following:
 - RPDs of the laboratory duplicates were within control limits with the exception of In envirolab laboratory certificate 289229, the laboratory RPD acceptance as been exceed for Cr in sample 289229-12 for Cu & Ni. Therefore, a triplicate result has been issued. laboratory certificate 864760-S, lab sample S22-Fe38590 for zinc. The RPDs reported passes Eurofins Environment Testing QC Metals.
- Data Accuracy – The data set is considered accurate with the exception of the following:
 - In envirolab laboratory certificate 289229, percent recovery is not possible to report due to the inhomogeneous nature of the element/s in the sample/s. However, an acceptable recovery was obtained for the LCS.

It is therefore considered that the data is sufficiently reliable and that the results can be used for the purpose of this project.

13.0 SITE ASSESSMENT CRITERIA

13.1 SOILS

13.1.1 Health Investigation Levels (HILs)

To assess the contamination status of soils at a site, the NSW EPA refers to the document entitled National Environmental Protection (Assessment of Site Contamination) Measure (NEPM) (Amendment 2013).

During any future soil investigations, the site will be assessed against the NEPM exposure scenario 'Residential A' Health Investigation Levels of the above-mentioned guidelines and specifically refers to the following:

HIL 'A' Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.

The soil regulatory guidelines are presented in the table below.

Table 24: Health Investigation Levels (HIL) Criteria for Soil Contaminants

	Residential A	Reference
Heavy Metals		
Arsenic	100	NEPM 2013 - Table 1(A)1 HILs
Beryllium	60	NEPM 2013 - Table 1(A)1 HILs
Boron	4500	NEPM 2013 - Table 1(A)1 HILs
Cadmium	20	NEPM 2013 - Table 1(A)1 HILs
Chromium (VI)	100	NEPM 2013 - Table 1(A)1 HILs
Cobalt	100	NEPM 2013 - Table 1(A)1 HILs
Copper	6000	NEPM 2013 - Table 1(A)1 HILs
Lead	300	NEPM 2013 - Table 1(A)1 HILs
Manganese	3800	NEPM 2013 - Table 1(A)1 HILs
Mercury (Inorganic)	40	NEPM 2013 - Table 1(A)1 HILs
Methyl Mercury	10	NEPM 2013 - Table 1(A)1 HILs
Nickel	400	NEPM 2013 - Table 1(A)1 HILs
Selenium	200	NEPM 2013 - Table 1(A)1 HILs
Zinc	7400	NEPM 2013 - Table 1(A)1 HILs
Cyanide (Free)	250	NEPM 2013 - Table 1(A)1 HILs
Polycyclic Aromatic Hydrocarbons (PAHs)		
Carcinogenic PAHs (as Bap TE Q)	3	NEPM 2013 - Table 1(A)1 HILs
Total PAHs	300	NEPM 2013 - Table 1(A)1 HILs
Organochlorine Pesticides		
DDT + DDE + DDD	240	NEPM 2013 - Table 1(A)1 HILs
Aldrin + Dieldrin	6	NEPM 2013 - Table 1(A)1 HILs
Chlordane	50	NEPM 2013 - Table 1(A)1 HILs
Endosulfan	270	NEPM 2013 - Table 1(A)1 HILs
Heptachlor	6	NEPM 2013 - Table 1(A)1 HILs
HCB	10	NEPM 2013 - Table 1(A)1 HILs
Phenols		
Phenols	3000	NEPM 2013 - Table 1(A)1 HILs
Pentachlorophenol	100	NEPM 2013 - Table 1(A)1 HILs
Cresols	400	NEPM 2013 - Table 1(A)1 HILs
Polychlorinated Biphenyls (PCBs)		
PCBs	1	NEPM 2013 - Table 1(A)1 HILs
Other Pesticides		
Atrazine	320	NEPM 2013 - Table 1(A)1 HILs
Chlorpyrifos	160	NEPM 2013 - Table 1(A)1 HILs
Bifenthrin	600	NEPM 2013 - Table 1(A)1 HILs
Herbicides		
2,4,5-T	600	NEPM 2013 - Table 1(A)1 HILs
2,4-D	900	NEPM 2013 - Table 1(A)1 HILs
MCPA	600	NEPM 2013 - Table 1(A)1 HILs
MCPB	600	NEPM 2013 - Table 1(A)1 HILs
Mecoprop	600	NEPM 2013 - Table 1(A)1 HILs
Picloram	4500	NEPM 2013 - Table 1(A)1 HILs
Other Organics		
PDBe (Bri-Br9)	1	NEPM 2013 - Table 1(A)1 HILs

Note - All values are in mg/kg

13.1.2 Health Screening Levels (HSLs)

The HSLs are applicable to generic land uses such as residential, commercial/industrial or recreational/public open space and different soil types between the ground surface and soils >4 metres below ground level. The HSLs have been applied to assess human health risks via the inhalation and direct contact pathways of exposure. For selection of the health screening criteria an assessment of the in-situ soil profile should be undertaken. The soil profile consisted of predominantly **Clay, Silt**

Table 25: Health Screening Levels (HSL) Criteria

	HSL A & HSL B	HSL A & HSL B	HSL A & HSL B	HSL A & HSL B	Soil Saturation Concentration (C _{sat})	Reference
	0m to <1m	1m to <2m	2m to <4m	4m+		
SAND						
Toluene	160	220	310	540	560	NEPM 2013 - Table 1(A) 3 HSLs
Ethylbenzene	55	NL	NL	NL	64	NEPM 2013 - Table 1(A) 3 HSLs
Xylenes	40	60	95	170	300	NEPM 2013 - Table 1(A) 3 HSLs
Naphthalene	3	NL	NL	NL	9	NEPM 2013 - Table 1(A) 3 HSLs
Benzene	0.5	0.5	0.5	0.5	360	NEPM 2013 - Table 1(A) 3 HSLs
F1	45	70	110	200	950	NEPM 2013 - Table 1(A) 3 HSLs
F2	110	240	440	NL	560	NEPM 2013 - Table 1(A) 3 HSLs
SILT						
Toluene	480	NL	NL	NL	640	NEPM 2013 - Table 1(A) 3 HSLs
Ethylbenzene	NL	NL	NL	NL	69	NEPM 2013 - Table 1(A) 3 HSLs
Xylenes	110	310	NL	NL	330	NEPM 2013 - Table 1(A) 3 HSLs
Naphthalene	5	NL	NL	NL	10	NEPM 2013 - Table 1(A) 3 HSLs
Benzene	0.7	1	2	3	440	NEPM 2013 - Table 1(A) 3 HSLs
F1	50	90	150	290	910	NEPM 2013 - Table 1(A) 3 HSLs
F2	280	NL	NL	NL	570	NEPM 2013 - Table 1(A) 3 HSLs
CLAY						
Toluene	480	NL	NL	NL	630	NEPM 2013 - Table 1(A) 3 HSLs
Ethylbenzene	NL	NL	NL	NL	68	NEPM 2013 - Table 1(A) 3 HSLs
Xylenes	110	310	NL	NL	330	NEPM 2013 - Table 1(A) 3 HSLs
Naphthalene	5	NL	NL	NL	10	NEPM 2013 - Table 1(A) 3 HSLs
Benzene	0.7	1	2	3	430	NEPM 2013 - Table 1(A) 3 HSLs
F1	50	90	150	290	850	NEPM 2013 - Table 1(A) 3 HSLs
F2	280	NL	NL	NL	560	NEPM 2013 - Table 1(A) 3 HSLs

Note - All values are in mg/kg

13.1.3 (EILs) and (ESLs)

Ecological Investigation Levels (EILs) -

The NEPM 2013 states that “Ecological investigation levels” (EILs) for the protection of terrestrial ecosystems have been derived for common contaminants in soil based on a species sensitivity distribution (SSD) model developed for Australian conditions. EILs have been derived for As, Cu, CrIII, DDT, naphthalene, Ni, Pb and Zn

Insufficient data was available to derive ACLs for arsenic (As), DDT, lead (Pb) and naphthalene. As a result, the derived EILs are generic to all soils and are presented as total soil contaminant concentrations in Tables 1B (4) and 1B (5) within the NEPM 2013.

For the purposes of EIL derivation, a contaminant incorporated in soil for at least two years is considered to be aged for the purpose of EIL derivation. The majority of contaminated sites are likely to be affected by aged contamination. Fresh contamination is usually associated with current industrial activity and chemical spills.

The following process describes the method for calculation of site specific EILs.

A. EILs for Ni, Cr III, Cu, Zn and Pb aged contamination (>2 years)

Steps 1–4 below describe the process for deriving site-specific EILs for the above elements using Tables 1B (1) – 1B (4), which can be found at the end of the NEPM 2013.

1. Measure or analyse the soil properties relevant to the potential contaminant of concern (pH, CEC, organic carbon, clay content). Sufficient samples need to be taken for these determinations to obtain representative values for each soil type in which the contaminant occurs.

2. Establish the sample ACL for the appropriate land use and with consideration of the soil-specific pH, clay content or CEC. The ACL for Cu may be determined by pH or CEC and the lower of the determined values should be selected for EIL calculation. Note that the ACL for Pb is taken directly from Table 1(B) 4.
3. Calculate the contaminant ABC in soil for the particular contaminant and location from a suitable reference site measurement or other appropriate method.
4. Calculate the EIL by summing the ACL and ABC:

$$\text{EIL} = \text{ABC} + \text{ACL}$$

B. EILs for As, DDT and naphthalene

EILs for aged contamination for DDT and naphthalene are not available and the adopted EIL is based on fresh contamination taken directly from Table 1B (5). The EILs for As, DDT and naphthalene are generic i.e. they are not dependent on soil type and are taken directly from Table 1B (5). Only EILs for fresh contamination are available for As, DDT and naphthalene due to the absence of suitable data for aged contaminants.

Ecological Screening Levels (ESLs) -

Ecological screening levels (ESLs) are presented based on a review of Canadian guidance for petroleum hydrocarbons in soil and application of the Australian methodology (Schedule B5b) to derive Tier 1 ESLs for BTEX, benzo(a)pyrene and F1 and F2 (Warne 2010a, 2010b)

The Canadian Council of the Ministers of the Environment (CCME) has adopted risk-based TPH standards for human health and ecological aspects for various land uses in the *Canada-wide standard for petroleum hydrocarbons (PHC) in soil* (CCME 2008) (CWS PHC). The standards established soil values including ecologically based criteria for sites affected by TPH contamination for coarse- and fine-grained soil types.

Table 26: Ecological Investigation Levels (EIL) and Ecological Screening Levels (ESL)**Criteria**

	Contaminant Age/Soil Texture	National parks and areas of high conservation value	Urban residential and open public spaces	Commercial and industrial	Reference
Ecological Investigation Levels (EILs)					
Heavy Metals					
Arsenic	Fresh	20	50	80	NEPM 2013 - Table 1(B) 1-5 EILs
	Aged	40	100	160	NEPM 2013 - Table 1(B) 1-5 EILs
Chromium (III)	Fresh	Site Specific Calculation Required			NEPM 2013 - Table 1(B) 1-5 EILs
	Aged				NEPM 2013 - Table 1(B) 1-5 EILs
Copper	Fresh	Site Specific Calculation Required			NEPM 2013 - Table 1(B) 1-5 EILs
	Aged				NEPM 2013 - Table 1(B) 1-5 EILs
Lead	Fresh	110	270	440	NEPM 2013 - Table 1(B) 1-5 EILs
	Aged	470	1100	1800	NEPM 2013 - Table 1(B) 1-5 EILs
Nickel	Fresh	Site Specific Calculation Required			NEPM 2013 - Table 1(B) 1-5 EILs
	Aged				NEPM 2013 - Table 1(B) 1-5 EILs
Zinc	Fresh	Site Specific Calculation Required			NEPM 2013 - Table 1(B) 1-5 EILs
	Aged				NEPM 2013 - Table 1(B) 1-5 EILs
Polycyclic Aromatic Hydrocarbons (PAHs)					
Naphthalene	Fresh	10	170	370	NEPM 2013 - Table 1(B) 1-5 EILs
	Aged	10	170	370	NEPM 2013 - Table 1(B) 1-5 EILs
Organochlorine Pesticides					
Ecological Screening Levels (ESLs) and Management Limits					
F1 (C ₆ -C ₁₀)	Coarse	125*	180*	215*	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine				NEPM 2013 - Table 1(B) 6-7 EILs
F1 (C ₆ -C ₁₀) (Management Limits)	Coarse	-	700	700	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine		800	800	NEPM 2013 - Table 1(B) 6-7 EILs
F2 (>C ₁₀ -C ₁₆)	Coarse	25*	120*	170*	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine				NEPM 2013 - Table 1(B) 6-7 EILs
F2 (>C ₁₀ -C ₁₆) (Management Limits)	Coarse	-	1000	1000	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine		1000	1000	NEPM 2013 - Table 1(B) 6-7 EILs
F3 (>C ₁₆ -C ₃₄)	Coarse	-	300	1700	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine		1300	2500	NEPM 2013 - Table 1(B) 6-7 EILs
F3 (>C ₁₆ -C ₃₄) (Management Limits)	Coarse	-	2500	3500	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine		3500	5000	NEPM 2013 - Table 1(B) 6-7 EILs
F4 (>C ₃₄ -C ₄₀)	Coarse	-	2800	3300	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine		5600	6600	NEPM 2013 - Table 1(B) 6-7 EILs
F4 (>C ₃₄ -C ₄₀) (Management Limits)	Coarse	-	10000	10000	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine		10000	10000	NEPM 2013 - Table 1(B) 6-7 EILs
Benzene	Coarse	10	50	75	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine	10	65	95	NEPM 2013 - Table 1(B) 6-7 EILs
Toluene	Coarse	10	85	135	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine	65	105	135	NEPM 2013 - Table 1(B) 6-7 EILs
Ethylbenzene	Coarse	1.5	70	165	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine	40	125	185	NEPM 2013 - Table 1(B) 6-7 EILs
Xylenes	Coarse	10	105	180	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine	1.6	45	95	NEPM 2013 - Table 1(B) 6-7 EILs
Benzo(a)pyrene	Coarse	0.7	0.7	1.4	NEPM 2013 - Table 1(B) 6-7 EILs
	Fine	0.7	0.7	1.4	NEPM 2013 - Table 1(B) 6-7 EILs

Notes

- Urban residential/public open space is broadly equivalent to the HIL-A, HIL-B and HIL-C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.
- Aged values are applicable to arsenic contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
- Insufficient data was available to calculate aged values for DDT and naphthalene, consequently the values for fresh contamination should be used.
- Insufficient data was available to calculate ACLs for As, DDT and naphthalene. The EIL should be taken directly from Table 1B(5).
- ESLs are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability.
- '-' indicates that insufficient data was available to derive a value.
- To obtain F1, subtract the sum of BTEX concentrations from C₆-C₁₀ fraction and subtract naphthalene from >C₁₀-C₁₆ to obtain F2.
- Management limits are applied after consideration of relevant ESLs and HSLs
- Separate management limits for BTEX and naphthalene are not available hence these should not be subtracted from the relevant fractions to obtain F1 and F2.

13.2 Asbestos

Health screening for asbestos in soil, which are based on scenario-specific likely exposure levels, are adopted from the WA DoH guidelines and are referred in Table 7 in Schedule B1. The following health screening levels for asbestos can be seen below:

Table 27: Health Screening Levels for Asbestos

	Health Screening Levels (w/w)			
Form of Asbestos	Residential A	Residential B	Recreational C	Commercial/Industrial D
Bonded ACM	0.01%	0.04%	0.02%	0.05%
FA and AF (Friable Asbestos)	0.001%			
All forms of asbestos	No visible asbestos for surface soil			

13.3 Aesthetic Considerations

Schedule B1 in NEPC (2013) requires the consideration of aesthetic issues arising from soils and groundwater within the site. The following assessment criteria were adopted when considering aesthetics:

- no persistently malodourous soils or extracted groundwater;
- no persistent hydrocarbon sheen on surface water;
- no staining or discolouration in soils, taking into consideration the natural state of the soil; and
- no large or frequently occurring anthropogenic materials present (to the extent practicable).

13.4 Groundwater

The NSW DECC has endorsed the use of the Groundwater Investigation Levels (GILs) given in the 1999 NEPM '*Schedule B(1) Guideline on the Investigation Levels for Soil and Groundwater*' (Amendment 2013) and the water quality trigger levels given in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC & ARMCANZ, 2000) and recently updated to ANZG (2018). These Guidelines provide criteria for:

- Aquatic ecosystems – both marine and fresh waters

The NEPM advises that 'when assessing groundwater contamination, the GILs are to be applied at the point of extraction and as response levels at the point of use, or where there is a likelihood of an adverse environmental effect at the point of discharge'.

For assessing groundwater quality, it is first necessary to assess the potential uses of groundwater downgradient of the site being assessed.

Potential uses of groundwater downgradient of the site include:

- Discharge to water bodies sustaining aquatic ecosystems particularly Fresh Water.
- Extraction of groundwater by local users.

The threshold concentrations presented in the ANZG (2018) Fresh and Marine Waters Quality Guidelines are considered applicable for the protection of aquatic ecosystems of the receiving waters. As these guidelines apply to receiving waters, it is generally conservative to apply these to groundwater discharging to receiving waters. It is important to note that these are not threshold values at which an environmental problem is likely to occur if exceeded, rather, if the trigger values are exceeded, then further action

is required which may include either further site-specific investigations to assess whether or not there is an actual problem or management / remedial action should be undertaken.

It is considered that **Fresh Water trigger** values are applicable for investigating chemical concentrations in groundwater at the site. The nearest downgradient watercourse is a stormwater channel that is located beneath the site running through the central portion of the site in east west direction and along the western boundary in a north south direction. The stormwater channels appear to drain into Salt Pan Creek located approximately 531m south west of the site, which eventually discharges into the Georges River. It is understood that the NSW EPA policy is that the trigger values for the protection of 95% of aquatic ecosystems should be used as groundwater assessment criteria when considering moderately or highly disturbed receiving environments. The receiving waters for groundwater at the site are considered to be moderately disturbed ecosystems and the ANZG (2018) 95% protection values are therefore considered appropriate groundwater assessment criteria for the site.

14.0 SOIL RESULTS

The laboratory certificates are presented in **Appendix H** – NATA Accredited Laboratory Certificates.

A summary of the results together with the assessment criteria adopted are provided in **Appendix K** – Summary Tables.

14.1 HEAVY METALS

14.1.1 Heath Investigation Levels

As indicated in Table K1&K2 all the heavy metals were below the respective LOR and/or the Health Investigation Level (HIL) for a residential development, that being the HIL 'A' with the exception of

- Previous Benviron Group BH23 (0.2m) has Chromium at 110mg/kg which exceed the criteria of 100mg/kg
- Previous Benviron Group BH24 (0.3m) has Chromium at 120mg/kg which exceed the criteria of 100mg/kg
- Previous Benviron Group SS2 (Split of BH11) has Chromium at 110mg/kg which exceed the criteria of 100mg/kg

The Chromium data from has been assessed statistically against the relevant assessment criteria. As shown in Table K1. The 95% UCL of the mean concentrations of chromium from the fill soil material, **was below the HIL A criteria** and the ***standard deviation was***

less than 50% of the HIL A criteria and no single concentration exceeded the HIL A criteria by more than 250%.

14.1.2 Ecological Investigation Levels

The EILs for Copper, Zinc, Lead, Nickel and Chromium III were derived by adding the Ambient Background Concentration (ABC) to the Added Contaminant Limits (ACL), as per the following formula:

$$\text{EIL} = \text{ABC} + \text{ACL}$$

The ABC for the site has been determined by recovering a sample from an appropriate reference point, that being:

- Previous Benviron Group EIL BH31/BH5 (0.2m)
- Previous Benviron Group EIL BH31/BH5 (0.5m)

The soil samples collected from BH31/BH5 were analysed for pH, CEC & %CLAY to provide the background parameters for the soil on the site.

As shown in Table K1&K2 all of the locations were below the site derived EILs for a urban residential and public open space development.

14.2 TRH, BTEX, NAPHTHALENE &/OR BENZO (A) PYRENE

14.2.1 Heath Screening Levels & Management Limits

As indicated in Table K1&K2, the F1 (C₆-C₁₀), F2 (>C₁₀-C₁₆), benzene, toluene, ethyl benzene, xylenes and naphthalene concentrations were below the HSL 'A' for a Clay and Silt soil profile with a source depth of "0m to <1m" .

As shown in Table K1&K2, the F1 (C₆-C₁₀), F2 (>C₁₀-C₁₆), F3 (C₁₆-C₃₄), F4 (C₃₄-C₄₀), concentrations were below the Management Limits for fine-grained soil in an urban residential and public open space development.

14.2.2 Ecological Screening Levels

As indicated in Table K1, the F1 (C₆-C₁₀), F2 (>C₁₀-C₁₆), F3 (C₁₆-C₃₄), F4 (C₃₄-C₄₀), benzene, toluene, ethyl benzene, xylenes and benzo(a)pyrene concentrations were below the ESLs for fine soil in a residential development.

14.3 PAH, OCP & PCB

14.3.1 Heath Investigation Levels

As indicated in Table K1&K2, the concentrations of the benzo(a)pyrene (as TEQ), PAH, OCP & PCB were below the Health Investigation Level (HIL) for a residential, parkland and public open space development, that being the HIL 'A' and/or the limit of reporting (LOR).

14.3.2 EILs & ESLs

As indicated in Table K1&K2, the concentrations of arsenic, naphthalene and DDT were below the EILs & ESLs for a residential, parkland and public open space development.

14.4 Asbestos

As shown in Table K1&K2, no asbestos was detected in the soil samples tested

15.0 GROUNDWATER RESULTS

The laboratory certificates are presented in **Appendix H** – NATA Accredited Laboratory Certificates.

A summary of the results together with the assessment criteria adopted are provided in **Appendix K** – Summary Tables.

15.1 HEAVY METALS

As indicated in Table K3, dissolved chromium, copper, nickel & zinc was marginally detected at concentrations above/ or equal the respective groundwater investigation level for the 95% protection of fresh water aquatic ecosystems in GW1, GW2 & GW3 and/or the associated field duplicate samples.

The remaining metals concentrations were either below the laboratory limits of reporting (LOR) or their respective assessment criteria.

15.2 TRH & BTEXN

As shown In Table K3, the BTEXN concentrations were either less than the laboratory limit of reporting (LOR) and/or below the assessment criteria.

As indicated in Table K3, the TRH F1 (C₆-C₁₀), F2 (>C₁₀-C₁₆), benzene, toluene, ethyl benzene, xylenes and naphthalene concentrations were below the HSL 'A' for a Clay and Silt profile with a source depth of "2m to <4m".

15.3 PAH, OCP & PCB

As indicated in Table K3, the PAH, OCP & PCB concentrations were either less than the laboratory limit of reporting (LOR) and/or below the assessment criteria.

15.4 VOCs in Groundwater

As indicated in Table K4, the VOC concentrations were either less than the laboratory limit of reporting (LOR) and/or below the adopted assessment.

Refer to **Appendix K** – Summary Tables.

16.0 PRELIMINARY SOIL CLASSIFICATION

A preliminary soil classification on the sampling completed during the DSI has been completed Previous Benviron Group DSI and FES update DSI. This preliminary soil classification refers to forty (40) borehole locations spread across the site and were labelled BH1 to BH30 and BH101 to BH110.

Based on the previous & current site uses the samples were analysed for a selection of Heavy Metals, Total Petroleum Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Polycyclic Aromatic Hydrocarbons (PAH), Organochlorine Pesticides (OC), Polychlorinated Biphenyls (PCB) & Asbestos.

With reference to the site figures, laboratory analysis, table K5 and with reference to NSW EPA guidelines, the insitu fill soil materials found within the site have been classified as follows;

- Soil fill material located within the vicinity of Benviron Group borehole locations BH1, BH2, BH6, BH16, BH18, BH26 to BH30 (Benviron Group) and BH101 to BH105, BH107 & BH110 (FES) & are classified as **General Solid Waste (non-putrescible)**.
- Soil fill material located within the vicinity of Benviron Group borehole locations BH5, BH7 to BH15, BH17, BH19 to BH25 (Benviron Group) and BH106, BH108, BH109 are classified as **Restricted Solid Waste**.
- This soil classification is preliminary in nature and is recommended that further works (TCLP analysis) are undertaken during the excavation phase of the building to further classify soils for offsite disposal.

Refer to **Appendix K** – Summary Tables.

17.0 DISCUSSION

17.1 SOILS

The soil laboratory results were below the adopted detection limits and/or the relevant guideline criteria.

No identified asbestos was detected in the soil samples analysed. No fibro cement fragments were observed in the fill material located within the boreholes. The assessment is limited to the boreholes.

Reference should be made to Figure 2 for a copy of the site plans.

17.2 GROUNDWATER QUALITY

The following lines of evidence support the low-risk conclusion in relation to groundwater and site suitability:

- The groundwater monitoring undertaken by Foundation Earth Sciences has indicated levels of dissolved metals marginally above groundwater investigation levels for chromium, copper, nickel and zinc. The elevated levels are considered to be related to offsite regional contaminant concentrations and/or background levels & therefore of limited concern in relation to the proposed development. The levels of dissolved metals detected by FES have reduced from the Benviron Group DSI monitoring in 2016;

- Results for groundwater samples did indicate that levels were above water quality guidelines for ecosystem protection but in compliance with guidelines related to the protection of human health.
- The results for the groundwater wells are similar and indicate that the site is not contributing to the quality of groundwater in the area. It is likely that the quality of the groundwater at this site is similar to the entire area and may be a result of the geology.
- During construction of the proposed development, management of any water that seeps into the excavation will need to be considered as the quality of groundwater means it cannot be discharged directly to the stormwater system. It will need to be managed through treatment or via appropriate disposal techniques.

17.3 DUTY TO REPORT

Under Section 60 of the Contaminated Land Management Act 1997, the owner of the land is required to notify contamination in circumstances as indicated in the NSW EPA (2015) *Guidelines on Duty to Report Contamination under the Contaminated Land Management Act 1997*.

Sites that are significantly impacted by soil, groundwater and ground gases are likely to require notification to the NSW EPA under section 60 of the CLM Act. A decision process for use by site owners or responsible persons considering reporting contamination under section 60 is provided in Appendix 1 (Figure 1) of the aforementioned guidelines.

No notification to NSW EPA is recommended based on the sampling and investigation to date.

18.0 CONCLUSION

Based on the historical review, environmental information, proposed development and laboratory results of the investigation, the site is **suitable** for the proposed development, subject to the following:

- Any soil requiring removal from the site, as part of future site works, should be classified in accordance with the “Waste Classification Guidelines, Part 1: Classifying Waste” NSW EPA (2014).
- An unexpected finds protocol has been included in **Appendix M** and should be followed during the construction phase of the development.

Thank you for the opportunity of undertaking this work. We would be pleased to provide further information on any aspects of this report.

19.0 LIMITATIONS

To the best of our knowledge information contained in this report is accurate at the date of issue, however, subsurface conditions, including groundwater levels and contaminant concentrations, can change in a limited time. This should be borne in mind if the report is used after a protracted delay.

There is always some disparity in subsurface conditions across a site that cannot be fully defined by investigation. Hence it is unlikely that measurements and values obtained from sampling and testing during environmental works carried out at a site will characterise the extremes of conditions that exist within the site.

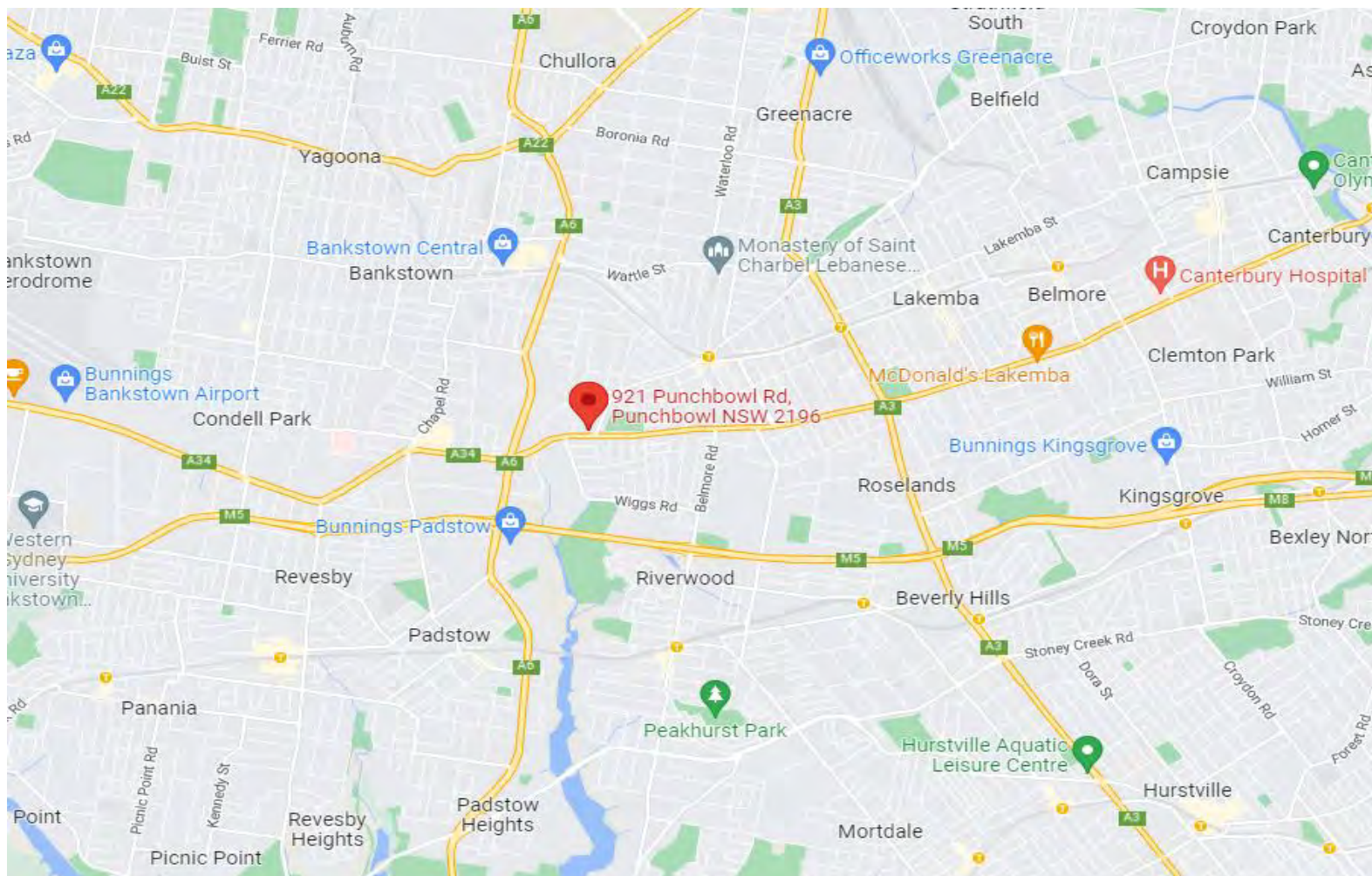
There is no investigation that is thorough enough to preclude the presence of material that presently or in the future, may be considered hazardous at the site. Since regulatory criteria are constantly changing, concentrations of contaminants presently considered low may, in the future, fall under different regulatory standards that require remediation.

Opinions expressed herein are judgements and are based on our understanding and interpretation of current regulatory standards and should not be construed as legal opinions.

REFERENCES

- ANZG (2018) "Australian and New Zealand Guidelines for Fresh and Marine Water Quality", Australian and New Zealand Governments and Australian State and Territory Governments, Canberra ACT.
- Department of Urban Affairs and Planning – EPA (1998) *"Managing Land Contamination – Planning Guidelines – SEPP 55 – Remediation of Land"*.
- HEPA 2020, 'PFAS National Environmental Management Plan', Version 2, 2020.
- National Environmental Protection Council (NEPC) (1999) – *National Environmental Protection (Assessment of Site Contamination) Measure. Amendment 2013*
- National Health and Medical Research Council (NHMRC) & National Resource Management Ministerial Council (NRMMC) "National Water Quality Management Strategy, Australian Drinking Water Guidelines" (2011)
- NSW EPA (2014) *"Technical Note: Investigation of Service Station Sites"*.
- NSW EPA (2020), "Consultants Reporting on Contaminated Land". NSW Environment Protection Authority, Parramatta
- NSW DEC "Guidelines for the NSW Site Auditor Scheme" (2017, 3rd edition). NSW Environment Protection Authority, Sydney.
- NSW EPA (2014) – "Waste Classification Guidelines, Part 1: Classifying Waste";
- NSW EPA (2015) "Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997";
- NSW EPA "Sampling Design Guidelines" (1995). NSW Environment Protection Authority, Sydney.
- US EPA "Regional Screening Level (RSL) Summary Tables" (2016). United States Environment Protection Authority.

FIGURE 1: SITE LOCATION



Key

Site Location



DRAWN
BY

FIGURE
1

Job #

E2232-2

SITE LOCATION

Westwood Pty Ltd

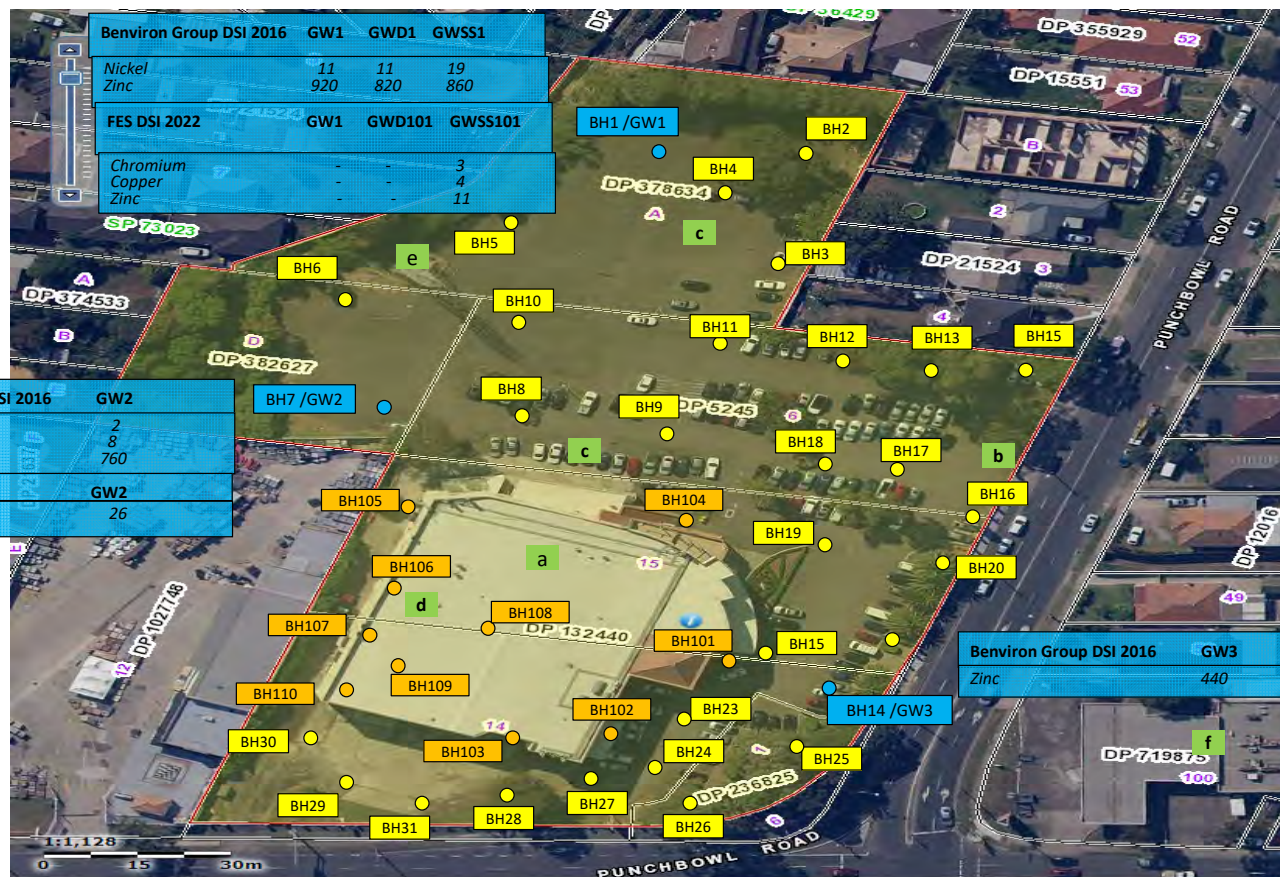
921 Punchbowl Road, Punchbowl NSW

**FIGURE 2: SITE FEATURES, BOREHOLE LOCATIONS & EXCEEDANCE
PLAN**

Feature No	Details
a	Club/Commercial
b	Driveway
c	Car park
d	Loading Dock
e	Transmission Tower
f	Service Station

Benviron Group DSI 2016	GW2
Copper	2
Nickel	8
Zinc	760
FES DSI 2022	GW2
Copper	26

Groundwater Exceedance (ug/L)



Key
Site Location
Previous Benviron Group DSI 2016
Previous BG DSI Soil & Water 2016
FES DSI BHs 2022



DRAWN
EY
Figure
2
Job #
E2232-2

Site Features, Borehole Locations & Exceedance Plan
Westwood Pty Ltd
921 Punchbowl Road, Punchbowl NSW

APPENDIX A: DBYD PLANS



Date: 15/02/2022

Enquirer Name: Emerson You
Enquirer Address: 119/14 Loyalty Road
Email: emerson@foundationes.com.au
Phone: +61409784783

Dear Emerson You

The following is our response on behalf of each of the TPG carriers (listed below) to your Dial Before You Dig enquiry – Sequence 208140808. It is provided to you on a confidential basis under the following conditions and must be shredded or securely disposed of after use.

Assets Affected:

Carriers (each a "TPG carrier") and assets affected:

PIPE Networks

Location: 921 Punchbowl Road

According to our records, the underground assets in the vicinity of the location stated in your enquiry are **AFFECTED**. Please read the below information and disclaimers in addition to the any attached plans provided prior to any construction activities.

IMPORTANT INFORMATION

- The information provided is valid for 30 days from the date of this response. If your work site area changes or your construction activity is beyond 30 days please contact Dial Before You Dig on 1100 or www.1100.com.au to re-submit a new enquiry.
- Due to the nature of underground assets and the age of some assets and records, our plans are indicative of the general location only and may not show all assets in the location. You should not solely rely on these plans when undertaking construction works. It is also inaccurate to assume depth or that underground network conduit and cables follow straight lines, and careful on-site investigations are essential to locate an asset's exact position prior to excavation. It is your responsibility to locate and confirm the exact location of our infrastructure using non-destructive techniques. We make no warranty or guarantee that our plans are complete, current or error free, and to the maximum extent permitted by law we exclude all liability to you, your employees, agents and contractors for any loss, damage or claim arising out of or in connection with using our plans.
- Please note that some of our conduits carry electrical cables and gas pipes. Please exercise extreme care when working within the vicinity of these conduit and take into account the minimum clearance distances under Duty Of Care below.
- You (and your employee and contractors) must not open, move, interfere, alter or relocate any of our assets without our prior approval.
- **Note** It is a criminal offence under the *Criminal Code Act 1995 (Cth)* to tamper or interfere with communication facilities owned by a carrier. Heavy penalties may apply for breach of this prohibition, and any damages suffered, or costs incurred by us as a result of such unauthorised works may be claimed against you.

DAMAGE

- You must report immediately any damage to our network on **1800 786 306** (24hrs). We will hold you liable and seek compensation for any loss or damage to our network, our property and our customers that is caused by or arises out of your activities.

DUTY OF CARE

You have a duty of care to carefully locate, validate and protect our assets when carrying out works near our infrastructure. For construction activities that may impact on or interfere with our network, you will need to call us on **1800 786 306** to discuss a suitable engineering solution, lead time and cost involved. The below precautions must be taken when working in the vicinity of our network:

- Contact us on **1800 786 306** to discuss and obtain relevant information and plans on our infrastructure in a particular location if the information provided in this response is insufficient.
- Physically locate and mark on-site our network infrastructure using non-destructive techniques i.e. pot holing or hand digging every 5 metres prior to commencing any construction activities. Assets located must be marked to AS5488 standard. **NO CONSTRUCTION WORK IS ALLOWED UNTIL THIS STEP IS COMPLETED.** You must use an approved telecommunications accredited locator, or we can provide a locator for you at your expense. If we provide you with a locator, and this locator attended the site and is proven to be grossly negligent in physically locating and marking our infrastructure, then to the extent any TPG carrier is liable for this locator's negligence, acts and omissions, the total liability aggregated for all TPG carriers is limited, at our option, to attend the site and re-mark the infrastructure or to pay for a third party to re-mark the infrastructure.
- If you require us to locate or monitor our infrastructure, please allow five business days' notice for us to respond.
- Ensure all information, including our network requirements and any associated plans provided by us are kept confidential and remain on-site throughout your construction works.

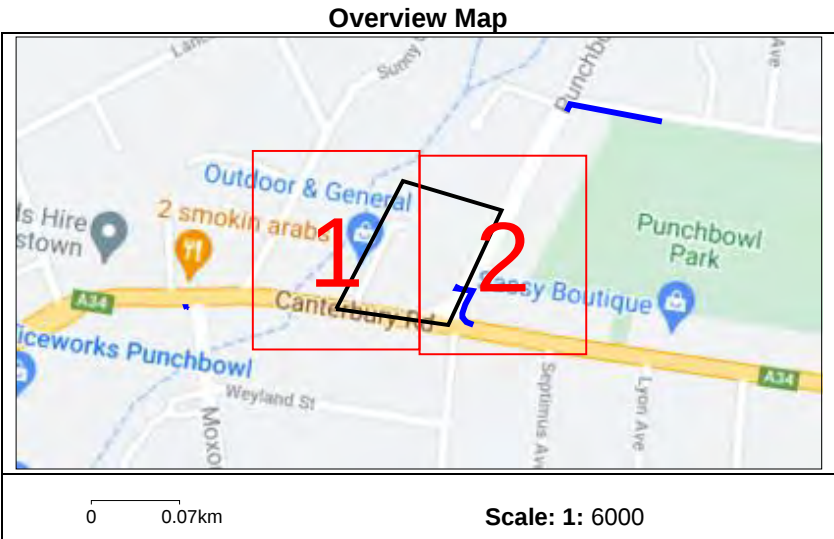
- Use suitably qualified and supervised professionals, particularly if you are working near assets that contain electricity cables or gas pipes.
- Ensure the below minimum clearance distances between the construction activities and the actual location of our assets are met. If you need clearance distances for our above ground assets, or if the below distances cannot be met, call **1800 786 306** to discuss.

Minimum assets clearance distances.

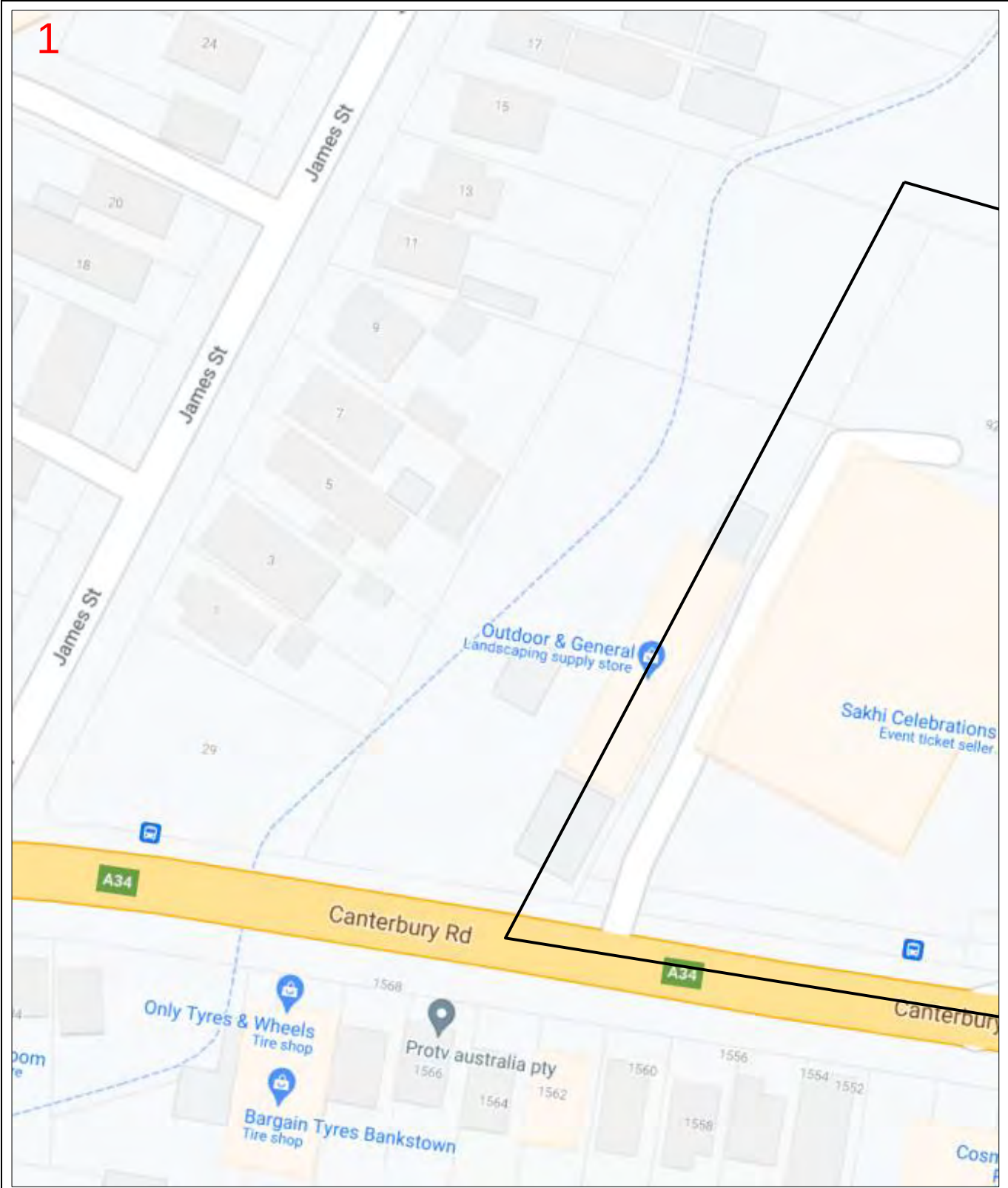
- o 300mm when laying asset inline, horizontal or vertical.
 - o 1000mm when operating vibrating equipment. Eg: vibrating plates. No vibrating equipment on top of asset.
 - o 1000mm when operating mechanical excavators or jackhammers/pneumatic breakers.
 - o 2000mm when performing directional bore in-line, horizontal and vertical.
 - o No heavy vehicle over 3 tonnes to be driven over asset with less than 600mm of cover.
- Reinstate exposed TPG network infrastructure back to original state.

PRIVACY & CONFIDENTIALITY

- Privacy Notice – Your information has been provided to us by Dial Before You Dig to respond to your Dial Before You Dig enquiry. We will keep your personal information in accordance with TPG's privacy policy, see www.tpg.com.au/about/privacy.
- Confidentiality – The information we have provided to you is confidential and is to be used only for planning and designing purposes in connection with your Dial Before You Dig enquiry. Please dispose of the information by shredding or other secure disposal method after use. We retain all intellectual property rights (including copyrights) in all our documents and plans.



TPG Corporation Limited



Enquiry Number: 208140808

Map Sheet: 1

Scale: 1: 750

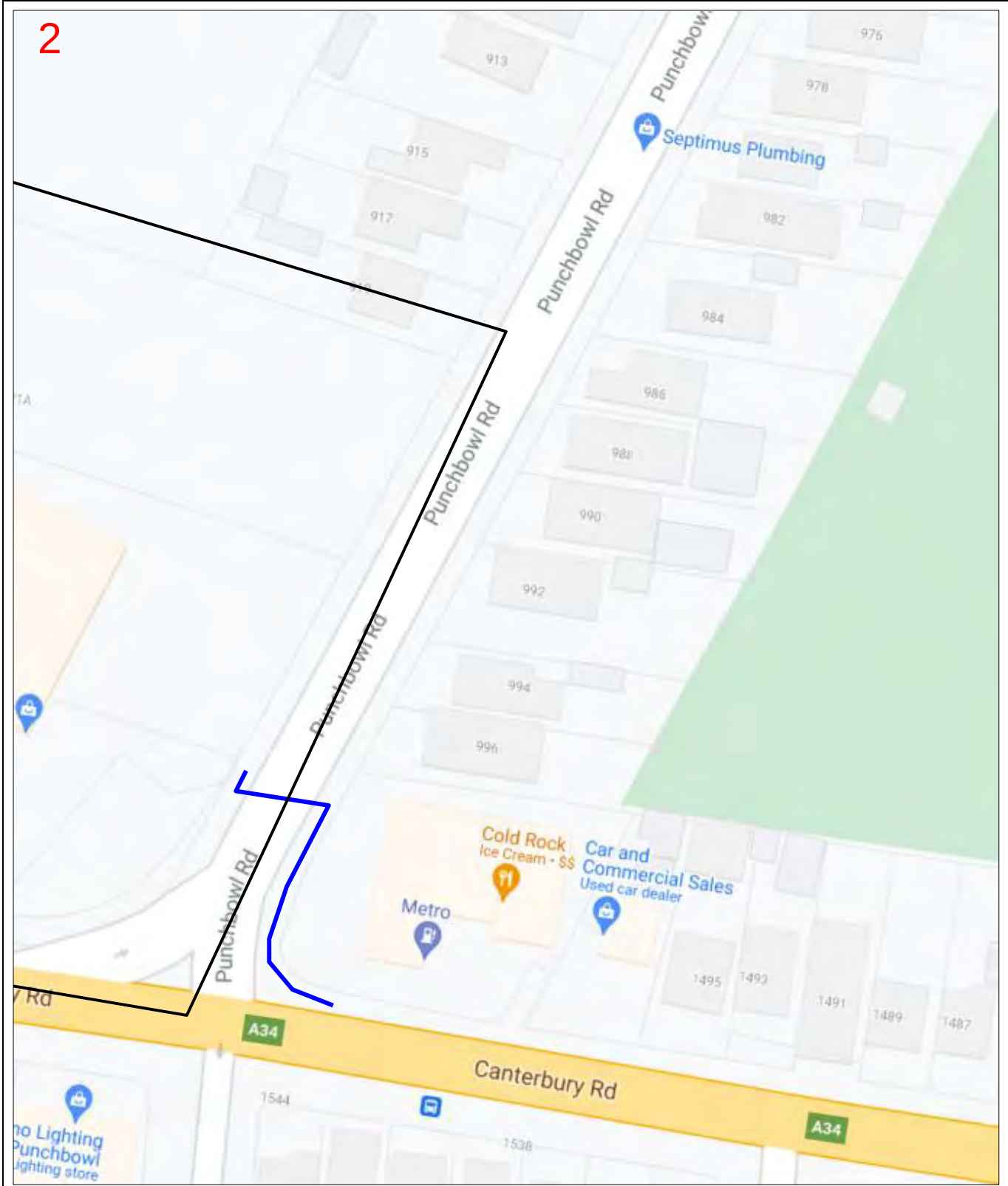
0 0.008km

LEGEND

DBYD Work Area

AAPT/PowerTel Pit		TransACT Pit	
AAPT/PowerTel Duct		TransACT Duct	
DDA Pit		SOUL Pattinson Telecoms Pit	
DDA Duct		SOUL Pattinson Telecoms Duct	
Agile/Adam Pit		PIPE Networks Pit	
Agile/Adam Duct		PIPE Networks Duct	

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Enquiry Number: 208140808

Map Sheet: 2

Scale: 1: 750

0 0.008km

LEGEND

DBYD Work Area

AAPT/PowerTel Pit		TransACT Pit	
AAPT/PowerTel Duct		TransACT Duct	
DDA Pit		SOUL Pattinson Telecoms Pit	
DDA Duct		SOUL Pattinson Telecoms Duct	
Agile/Adam Pit		PIPE Networks Pit	
Agile/Adam Duct		PIPE Networks Duct	

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To: Emerson You
Phone: Not Supplied
Fax: Not Supplied
Email: emerson@foundationes.com.au

Dial before you dig Job #:	31394406	 DIAL BEFORE YOU DIG www.1100.com.au
Sequence #	208140809	
Issue Date:	15/02/2022	
Location:	921 Punchbowl Road , Punchbowl , NSW , 2196	

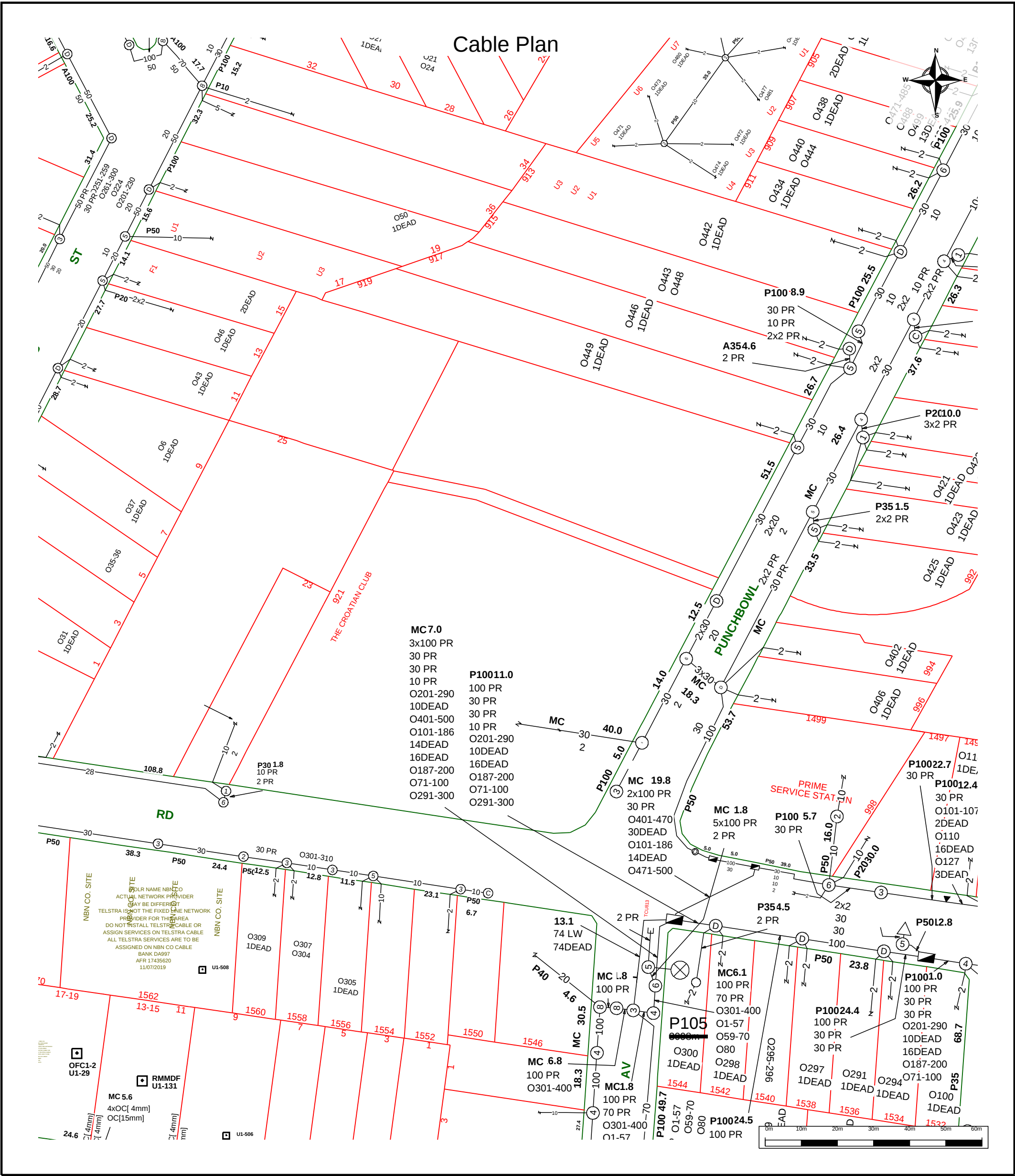
Indicative Plans



LEGEND



	Parcel and the location
	Pit with size "5"
	Power Pit with size "2E". Valid PIT Size: e.g. 2E, 5E, 6E, 8E, 9E, E, null.
	Manhole
	Pillar
	Cable count of trench is 2. One "Other size" PVC conduit (PO) owned by Telstra (-T-), between pits of sizes, "5" and "9" are 25.0m apart. One 40mm PVC conduit (P40) owned by NBN, between pits of sizes, "5" and "9" are 20.0m apart.
	2 Direct buried cables between pits of sizes, "5" and "9" are 10.0m apart.
	Trench containing any INSERVICE/CONSTRUCTED (Copper/RF/Fibre) cables.
	Trench containing only DESIGNED/PLANNED (Copper/RF/Fibre/Power) cables.
	Trench containing any INSERVICE/CONSTRUCTED (Power) cables.
	Road and the street name "Broadway ST"
Scale	0 20 40 60 Meters 1:2000 1 cm equals 20 m





For all Telstra DBYD plan enquiries -
email - Telstra.Plans@team.telstra.com
For urgent onsite contact only - ph 1800 653 935 (bus hrs)

TELSTRA CORPORATION LIMITED A.C.N. 051 775 556

Generated On 15/02/2022 10:13:38

Sequence Number: 208140810

CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.

The above plan must be viewed in conjunction with the Mains Cable Plan on the following page

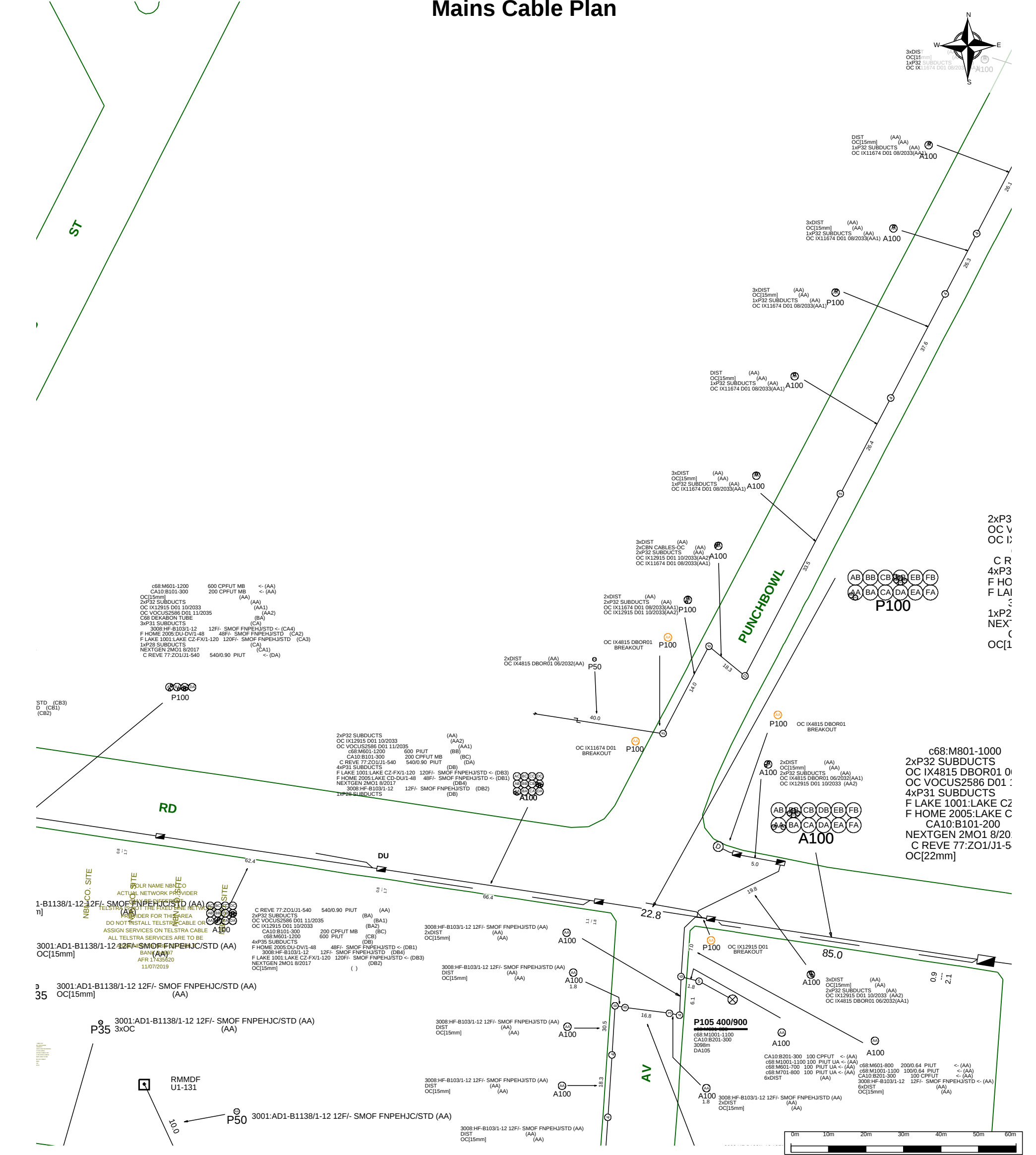
WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the precise location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information supplied can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

It is your responsibility to locate Telstra's underground plant by careful hand pot-holing prior to any excavation in the vicinity and to exercise due care during that excavation.

Please read and understand the information supplied in the duty of care statement attached with the Telstra plans. TELSTRA WILL SEEK COMPENSATION FOR LOSS CAUSED BY DAMAGE TO ITS PLANT.

Telstra plans and information supplied are valid for 60 days from the date of issue. If this timeframe has elapsed, please reapply for plans.

Mains Cable Plan



For all Telstra DBYD plan enquiries -
email - Telstra.Plans@team.telstra.com
For urgent onsite contact only - ph 1800 653 935 (bus hrs)

TELSTRA CORPORATION LIMITED A.C.N. 051 775 556

Generated On 15/02/2022 10:13:40

Sequence Number: 208140810

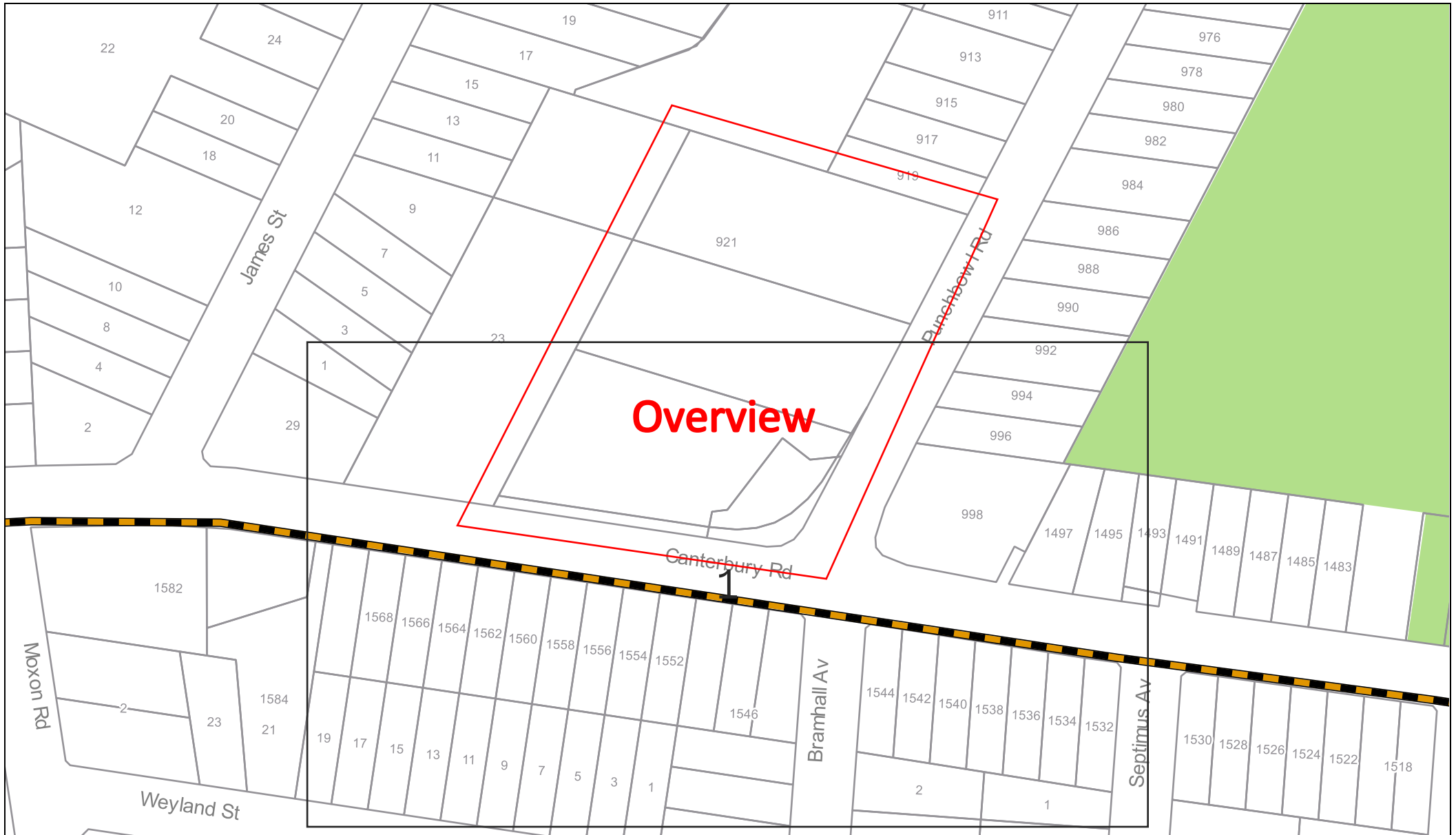
CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.

WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the precise location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information supplied can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

It is your responsibility to locate Telstra's underground plant by careful hand pot-holing prior to any excavation in the vicinity and to exercise due care during that excavation.

Please read and understand the information supplied in the duty of care statement attached with the Telstra plans. TELSTRA WILL SEEK COMPENSATION FOR LOSS CAUSED BY DAMAGE TO ITS PLANT.

Telstra plans and information supplied are valid for 60 days from the date of issue. If this timeframe has elapsed, please reapply for plans.



Sequence Number: 208140811

Date: 15/02/2022

DISCLAIMER: THIS DRAWING SHOULD NOT BE SCALED TO LOCATE CABLES. NO WARRANTY IS GIVEN THAT THE INFORMATION IS ACCURATE OR COMPLETE. IF YOU REQUIRE INFORMATION REGARDING LOCATING THE CABLE PLEASE CALL NEXTGEN. THIS DOCUMENT HAS BEEN PREPARED SOLELY FOR DIAL BEFORE YOU DIG USE. THIS PLAN CONTAINS COMMERCIAL SENSITIVE INFORMATION AND IS TO BE TREATED ACCORDINGLY. NO SUCH INFORMATION IS TO BE PASSED ONTO OTHER PARTIES WITHOUT WRITTEN CONSENT FROM NEXTGEN PTY LTD.



LEGEND

Digsite



Area

Assets



Cable



3rd Party Duct



Marker Post



Sequence Number: 208140811

Date: 15/02/2022

DISCLAIMER: THIS DRAWING SHOULD NOT BE SCALED TO LOCATE CABLES. NO WARRANTY IS GIVEN THAT THE INFORMATION IS ACCURATE OR COMPLETE. IF YOU REQUIRE INFORMATION REGARDING LOCATING THE CABLE PLEASE CALL NEXTGEN. THIS DOCUMENT HAS BEEN PREPARED SOLELY FOR DIAL BEFORE YOU DIG USE. THIS PLAN CONTAINS COMMERCIAL SENSITIVE INFORMATION AND IS TO BE TREATED ACCORDINGLY. NO SUCH INFORMATION IS TO BE PASSED ONTO OTHER PARTIES WITHOUT WRITTEN CONSENT FROM NEXTGEN PTY LTD.



LEGEND

Digsite



Area

Assets



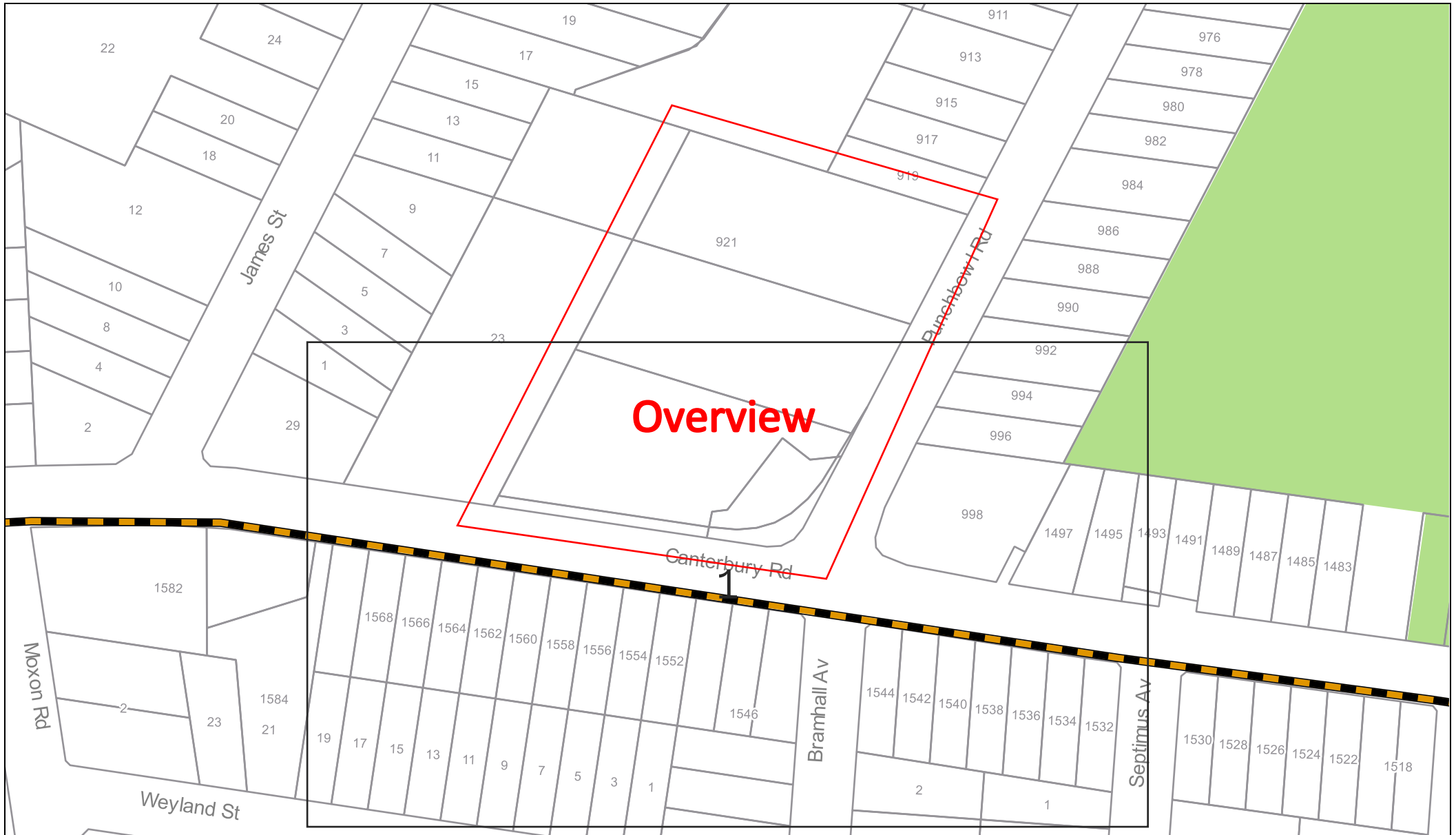
Cable



3rd Party Duct



Marker Post



Sequence Number: 208140811

Date: 15/02/2022

DISCLAIMER: THIS DRAWING SHOULD NOT BE SCALED TO LOCATE CABLES. NO WARRANTY IS GIVEN THAT THE INFORMATION IS ACCURATE OR COMPLETE. IF YOU REQUIRE INFORMATION REGARDING LOCATING THE CABLE PLEASE CALL NEXTGEN. THIS DOCUMENT HAS BEEN PREPARED SOLELY FOR DIAL BEFORE YOU DIG USE. THIS PLAN CONTAINS COMMERCIAL SENSITIVE INFORMATION AND IS TO BE TREATED ACCORDINGLY. NO SUCH INFORMATION IS TO BE PASSED ONTO OTHER PARTIES WITHOUT WRITTEN CONSENT FROM NEXTGEN PTY LTD.



LEGEND

Digsite



Area

Assets



Cable



3rd Party Duct



Marker Post



Sequence Number: 208140811

Date: 15/02/2022

DISCLAIMER: THIS DRAWING SHOULD NOT BE SCALED TO LOCATE CABLES. NO WARRANTY IS GIVEN THAT THE INFORMATION IS ACCURATE OR COMPLETE. IF YOU REQUIRE INFORMATION REGARDING LOCATING THE CABLE PLEASE CALL NEXTGEN. THIS DOCUMENT HAS BEEN PREPARED SOLELY FOR DIAL BEFORE YOU DIG USE. THIS PLAN CONTAINS COMMERCIAL SENSITIVE INFORMATION AND IS TO BE TREATED ACCORDINGLY. NO SUCH INFORMATION IS TO BE PASSED ONTO OTHER PARTIES WITHOUT WRITTEN CONSENT FROM NEXTGEN PTY LTD.



LEGEND

Digsite



Area

Assets



Cable



3rd Party Duct



Marker Post



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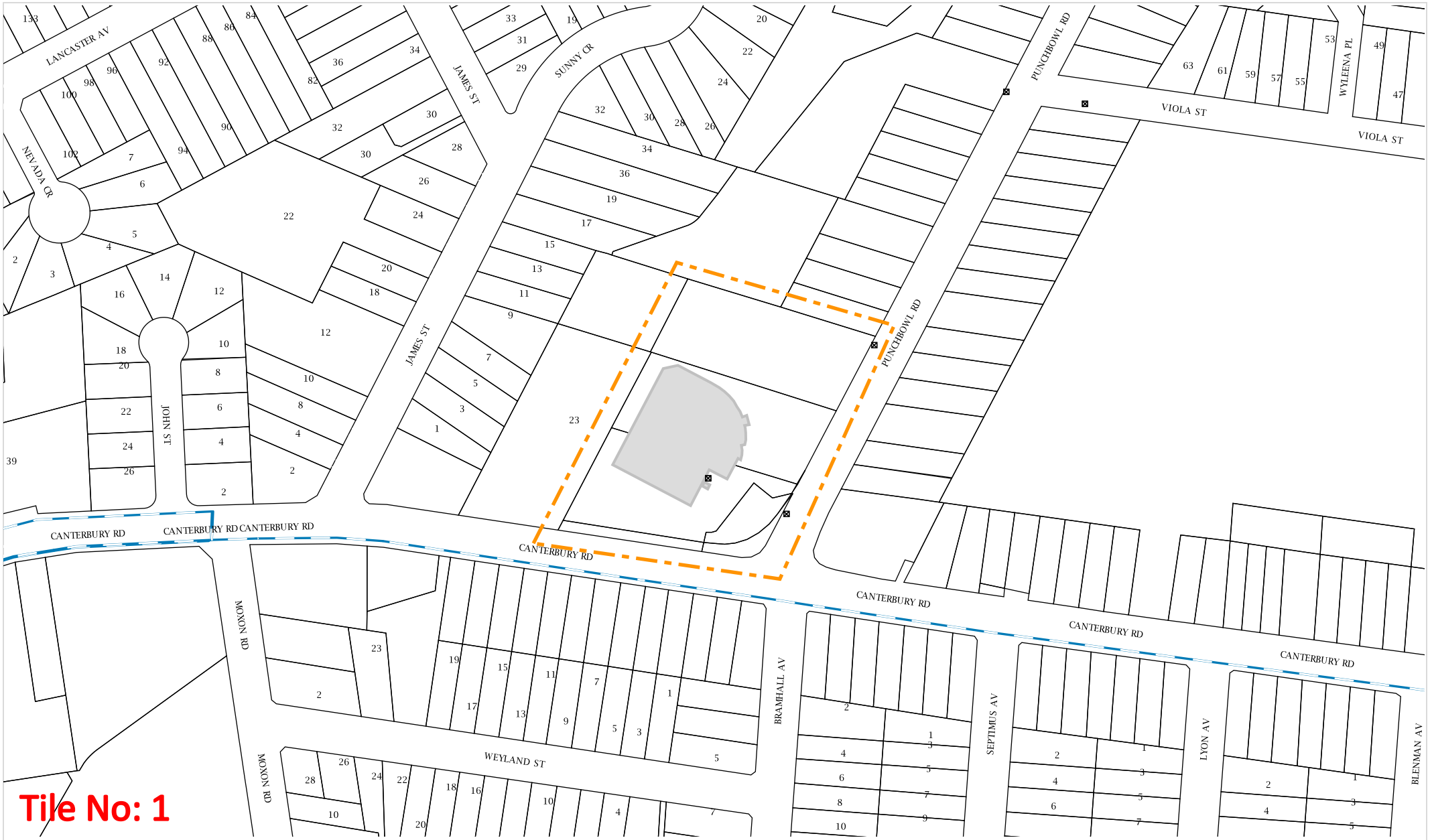
Sequence Number: 208140813

Date Generated: 15 Feb 2022



For all Optus DBYD plan enquiries –
 Email: Fibre.Locations@optus.net.au
 For urgent onsite assistance contact 1800 505 777
 Optus Limited ACN 052 833 208





Uecomm Underground Cable

Scale: 1:2500

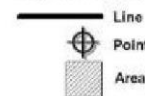
Printed on: 15 Feb 2022

Sequence Number: 208140813

Location: 921 Punchbowl Road, Punchbowl, NSW 2196



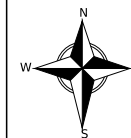
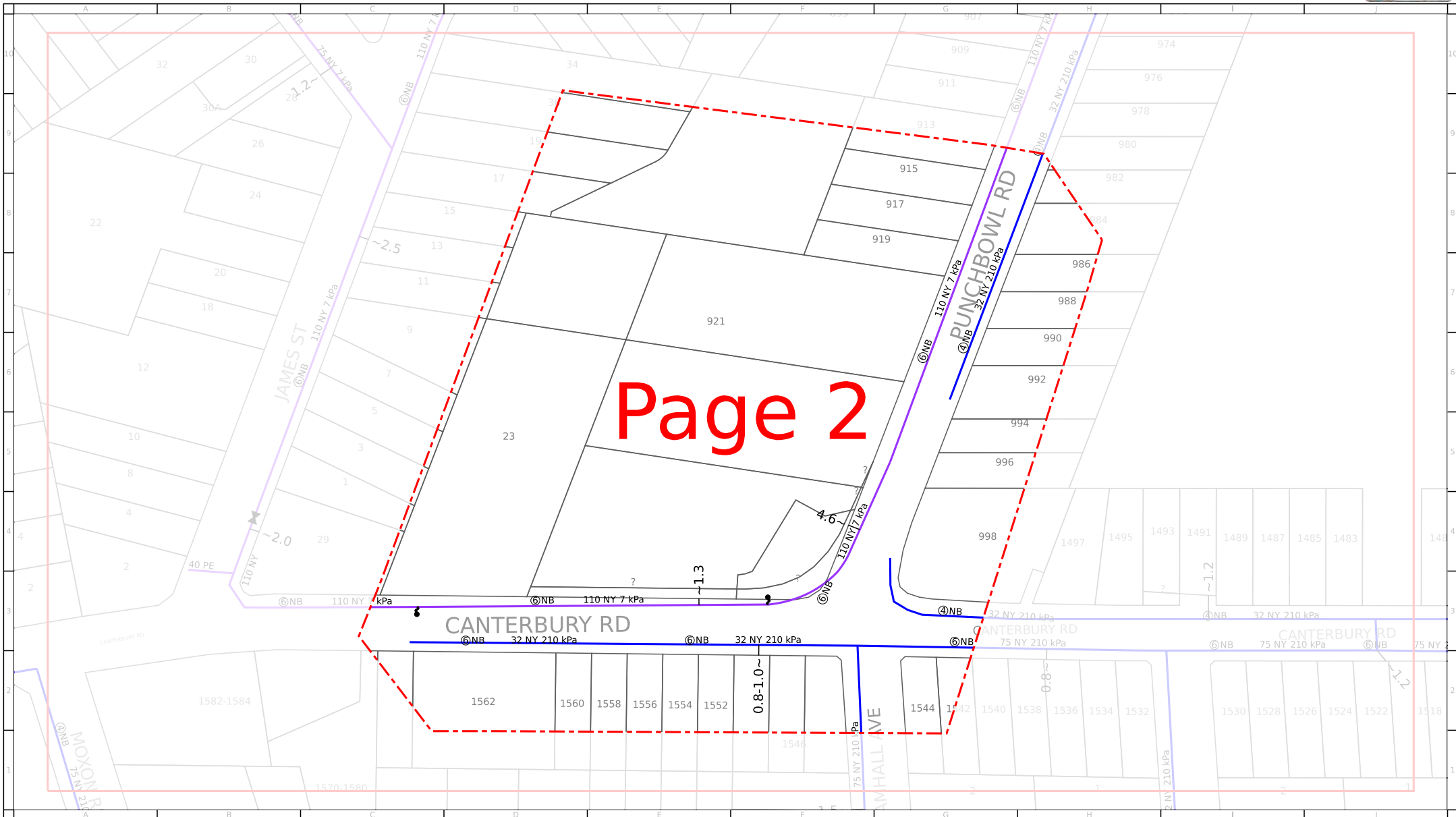
Job Location

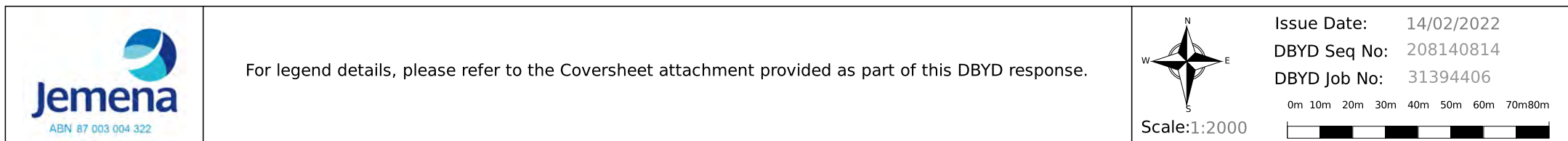


Underground Asset

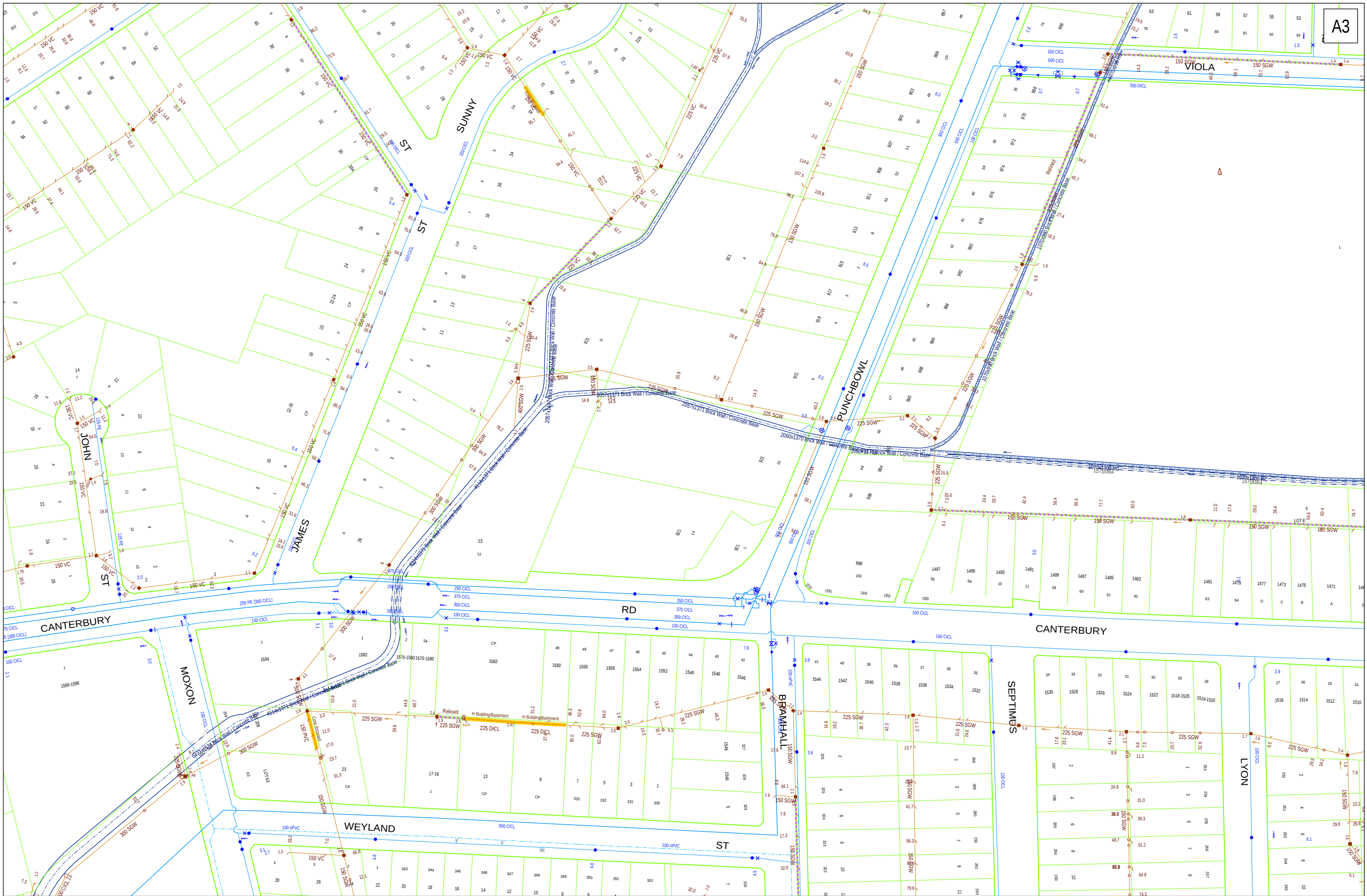


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WARNING: This is a representation of Jemena Gas Networks underground assets only and may not indicate all assets in the area. It must not be used for the purpose of exact asset location in order to undertake any type of excavation. This plan is diagrammatic only, and distances scaled from this plan may not be accurate. Please read all conditions and information on the attached information sheet. This extract is subject to those conditions. The information contained on this plan is only valid for 28 days from the date of issue.



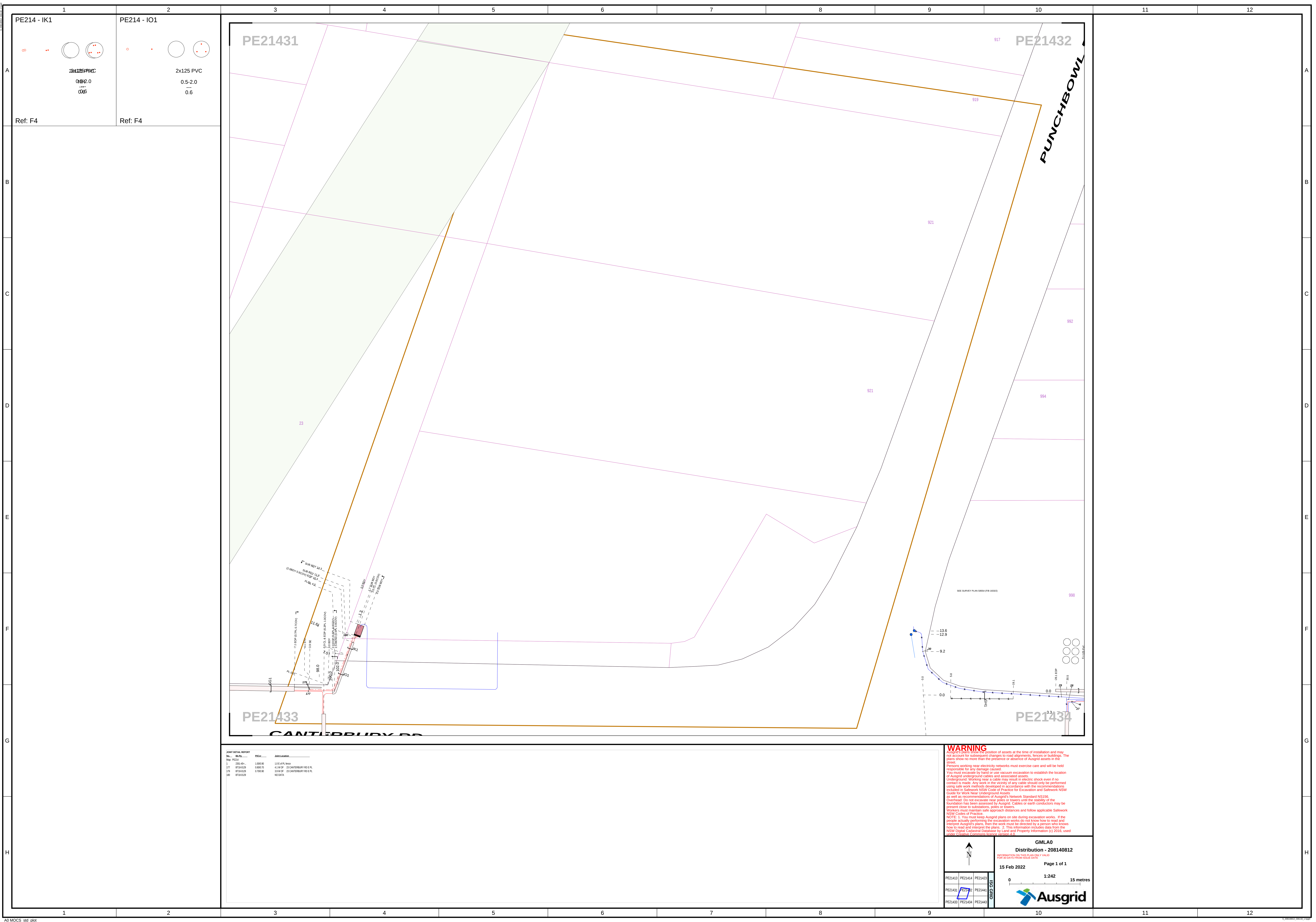
DBYD Address:
921 Punchbowl Road
Punchbowl NSW 2196

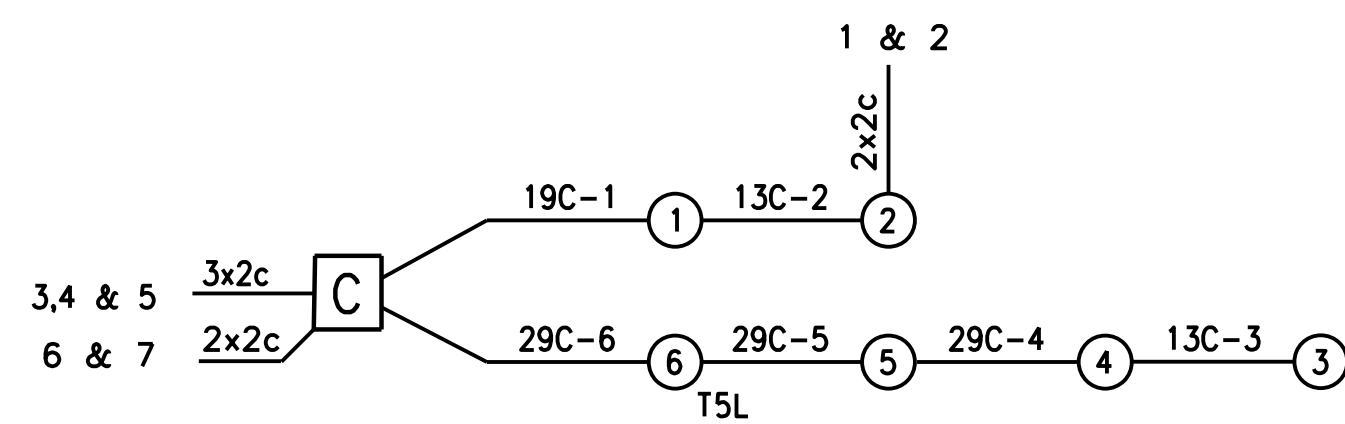
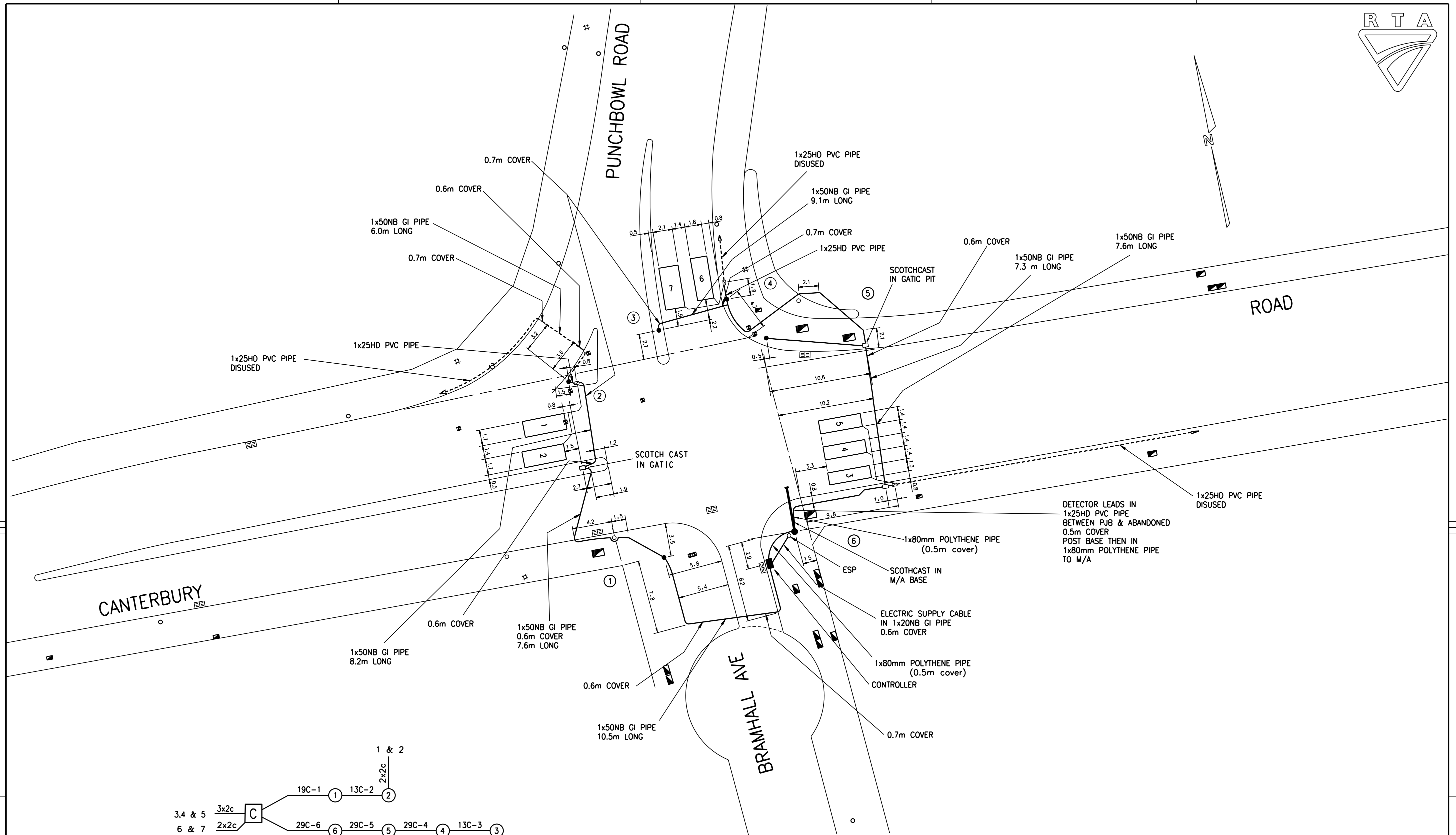
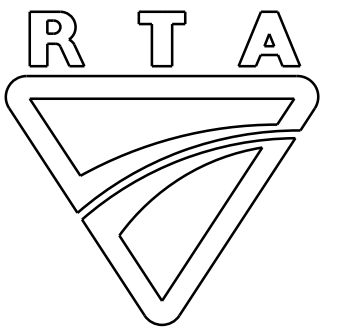
DBYD Job No: 31394406
DBYD Sequence No: 208140815

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No warranty is given that the information shown is complete or accurate.
SYDNEY WATER CORPORATION

Scale: 1:1500
Date of Production: 15/02/2022

Plan 1 of 1
0m 9m 18m 27m 36m





CABLE LAYOUT

NOTES:

1. CABLE COVER: IN ROADWAYS: 0.6m ABOVE GI PIPES;
IN FOOTPATHS & MEDIANS: 0.45m ABOVE ELECTRIC BRICKS,
UNLESS OTHERWISE STATED.

A ORIGINAL ISSUE REDRAWN AS PER MAINTENANCE COPY T.U.P.A. 12.12.94 B ISSUE 17/11/97 AMENDED TO SUIT N.A.E. DETS NOW HOUSING MOUNTED R.N.A. C.L.Z. C ISSUE N.A.E. COMPLETED M.M. 30/07/01 L.C. D ISSUE 18-11-2008 N.A.E. CHANGED TO 29C DETECTORS 1&2 RUN ALTERED. L.C. E ISSUE N.A.E. COMPLETED S.T. 18/08/2017 M.M. F ISSUE: NAE CABLE LAYOUT ALTERED S.T. 30/07/01 M.M.	PUBLIC UTILITY LEGEND HYDRANT STOP VALVE GAS VALVE SEWER MANHOLE TELECOM PIT ELECT LIGHT POLE POWER POLE STAY POLE TELEPHONE BOX TELECOM PILLAR	REFERENCE PLANS SYMBOLS/ABBS. STD POSIT DET SCHED EXP PRES. DETECT SSG DIS. SEQ. DESIGN LAYOUT CABLE CHART	U.B.D. Ref. I.S.C. E: CO-ORDS N: DRAWN: T.U.P.A. 12.12.94 CHECKED C.AYO 01/95 SITE CHECKED M.MAHNINTHAN RECOMMENDED	APPROVED <i>R.Bid.</i> R.C. BIRD ELECTRICAL DESIGN MANAGER 10/02/95 DATE	Roads and Traffic Authority,N.S.W CANTERBURY ROAD AND PUNCHBOWL ROAD PUNCHBOWL CABLE INSTALLATION	DESIGN OFFICE PARRAMATTA SYDNEY TECHNICAL SERVICES. LOGIN: ELECT CADD DRAWING FILE: W0813_7E_INS.dgn SCALE 5 0 (1:200) 5 10 FILE 78TS174 SUPERSEDES SHEET/ISSUE 2C REGN. 0167.078.W.0813 TCS No 813	ISSUE E SHEET 7 © COPYRIGHT ROADS AND TRAFFIC AUTHORITY
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APPENDIX B: NSW EPA RECORDS

Suburb	SiteName	Address	ContaminationActivityType	ManagementClass	Latitude	Longitude
PROSPECT	Cottage 3, William Lawson Drive	William Lawson DRIVE	Unclassified	Regulation under CLM Act not required	-33.81490331	150.9149885
PUNCHBOWL	Former BP Service Station	1375 Canterbury Road, corner Victoria ROAD	Service Station	Regulation under CLM Act not required	-33.93170424	151.0537302
PUNCHBOWL	Punchbowl Laundry	42-44 Belmore ROAD	Chemical Industry	Contamination currently regulated under CLM Act	-33.93582701	151.0562638
PUNCHBOWL	Caltex Service Station Punchbowl	1285-1289 Canterbury ROAD	Service Station	Regulation under CLM Act not required	-33.93146308	151.0596348
PUTNEY	Putney Marina	20 Waterview STREET	Other Industry	Regulation under CLM Act not required	-33.82608091	151.1003966

Public registers

+ POEO Public Register

- Contaminated land record of notices

[About the record of notices](#)

[List of notified sites](#)

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[Dangerous goods licences](#)

[Pesticide licences](#)

[Radiation licences](#)

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Search results

Your search for: Suburb: PUNCHBOWL

Matched 3 notices relating to 1 site.

[Search Again](#)

[Refine Search](#)

Suburb	Address	Site Name	Notices related to this site
PUNCHBOWL	42-44 Belmore ROAD	Punchbowl Laundry	3 current

Page 1 of 1

23 February 2022

Number	Name	Location	Type	Status	Issued date
2240	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	POEO licence	Issued	26-Nov-99
1015590	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	8-May-02
1021601	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	19-Dec-02
1026935	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	4-Jul-03
1035688	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	1-Jun-04
1040330	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	22-Sep-04
1042309	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	17-Dec-04
1044737	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	22-Mar-05
1050032	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	15-Aug-05
1051916	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	21-Sep-05
1054742	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	22-Dec-05
1061530	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	20-Jul-06
1072492	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	10-Jul-07
1095346	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	23-Jan-09
1106741	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	16-Jul-10
1121069	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	22-Mar-11
1529802	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	19-Apr-16

1564114	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	30-May-18
1608741	A.C.N. 000 012 340 PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	19-May-21
2805	AVERY DENNISON HOLDINGS LIMITED	95 BONDS ROAD, PUNCHBOWL, NSW 2196	POEO licence	Surrendered	30-Mar-00
1008419	AVERY DENNISON HOLDINGS LIMITED	95 BONDS ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	19-Oct-01
1016363	AVERY DENNISON HOLDINGS LIMITED	95 BONDS ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	27-May-02
1042974	AVERY DENNISON HOLDINGS LIMITED	95 BONDS ROAD, PUNCHBOWL, NSW 2196	s.80 Surrender of a Licence	Issued	8-Dec-04
7060	DONAGHYS SARLON PTY. LTD.	51 MOXON ROAD, PUNCHBOWL, NSW 2196	POEO licence	Surrendered	11-Aug-00
1017826	DONAGHYS SARLON PTY. LTD.	51 MOXON ROAD, PUNCHBOWL, NSW 2196	s.80 Surrender of a Licence	Issued	30-May-02
12572	FINISHED PRODUCTS PTY LTD	31 Moxon Road, PUNCHBOWL, NSW 2196	POEO licence	No longer in force	15-Dec-06
1542066	KIM, PAN	283 the Boulevard, PUNCHBOWL, NSW 2196	s.91 Clean Up Notice	Issued	29-Jun-16
3085781079	M.S PETROLEUM PTY LTD	998 Punchbowl Road, PUNCHBOWL, NSW 2196	Penalty Notice	Issued	23-Dec-16
6471	RESOURCE RECYCLING TECHNOLOGIES PTY. LTD.	3/57 MOXON ROAD, PUNCHBOWL, NSW 2196	POEO licence	Surrendered	28-Apr-00
1012133	RESOURCE RECYCLING TECHNOLOGIES PTY. LTD.	3/57 MOXON ROAD, PUNCHBOWL, NSW 2196	s.80 Surrender of a Licence	Issued	1-Nov-01
1005634	THE AUSTRAL BRICK CO PTY LTD	62 BELMORE ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	28-Aug-01
11737	TRIVAC METALS PTY LTD	11 - 15 MOXON ROAD, PUNCHBOWL, NSW 2196	POEO licence	Surrendered	16-Sep-02
1048532	TRIVAC METALS PTY LTD	11 - 15 MOXON ROAD, PUNCHBOWL, NSW 2196	s.58 Licence Variation	Issued	6-Jun-05
1052973	TRIVAC METALS PTY LTD	11 - 15 MOXON ROAD, PUNCHBOWL, NSW 2196	s.80 Surrender of a Licence	Issued	26-Oct-05



The NSW Government PFAS Investigation Program

View a map of the sites in NSW that may be contaminated with PFAS, learn how to reduce your exposure to these dangerous chemicals, and read about our investigation of the issue.

The EPA is leading an investigation program to assess the legacy of PFAS use across NSW. With the assistance of the NSW PFAS Technical Advisory Group, which includes NSW Health, Department of Primary Industries and the Office of Environment and Heritage, we provide impacted residents with tailored, precautionary dietary advice to help them reduce any exposure to PFAS.

Current investigations are focused on sites where it is likely that large quantities of PFAS have been used. The EPA is currently investigating PFAS at these sites:

[Map view](#)

[List view](#)

List view

▼

Clear filters

☐ Only show sites within current map view

Showing 0 of 49 sites

	Organisation	Address	Status
	**filter by organisation	PUNCHBOWL	☒ PFAS investigation site

Sampling and analysis

The EPA is collecting samples of soils and/or waters for analysis for PFAS. The EPA is also looking for exposure pathways that may increase people's contact with the chemicals, such as bore and surface water usage.

If significant levels are detected and human or ecological exposure is likely, a more detailed assessment will be undertaken.

APPENDIX C: SITE PHOTOGRAPHS

SITE PHOTOGRAPHS

Client:	Westwood Pty Ltd
Project:	DSI
Site Location:	921 Punchbowl Road, Punchbowl NSW
Job No.:	E2232-2



Photo 1



View of the drilling of in vicinity of the building footprint
Inspected 17.2.2022

Photo 2



View of the concrete in side of the building
Inspected 17.2.2022

Photo 3



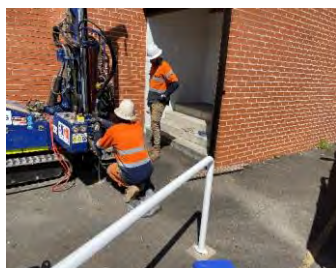
View of the concrete core in bar area, located in the centre of the building
Inspected 17.2.2022

Photo 4



View of the concrete core at loading dock
Inspected 17.2.2022

Photo 5



View of the drilling of the site
Inspected 17.2.2022

Photo 6



View of the drilling of loading dock
Inspected 17.2.2022

APPENDIX D: DPI (OFFICE OF WATER) DATABASE RECORDS

WaterNSW

Work Summary

GW103677

Licence:

Licence Status:

Authorised Purpose(s):

Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:

Completion Date: 27/11/2000

Final Depth: 4.50 m

Drilled Depth: 4.50 m

Contractor Name: HANDEX

Driller:

Assistant Driller:

Property:

GWMA:

GW Zone:

Standing Water Level (m):

Salinity Description:

Yield (L/s):

Site Details

Site Chosen By:

County: CUMBERLAND

Parish: BANKSTOWN

Cadastre: 100//1011185

Form A: Licensed:

Region: 10 - Sydney South Coast

CMA Map:

River Basin: - Unknown

Grid Zone:

Scale:

Area/District:

Elevation: 0.00 m (A.H.D.)

Northing: 6242870.000

Latitude: 33°56'20.5"S

Elevation Source: Unknown

Easting: 318687.000

Longitude: 151°02'17.4"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	4.50	54			Unknown
1	1	Casing	P.V.C.	0.00	0.00	54			

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	FILL,DARK GREY,LOOSE,GRAVEL,SAND	Fill	
1.00	1.70	0.70	FILL,DARK GREY,GRAVEL,SAND,MOIST	Fill	
1.70	3.10	1.40	CLAY,LIGHT GREY,PLASTIC, DRY	Clay	
3.10	4.50	1.40	SATURATED WATER,NO H/C ODOUR	(Unknown)	

Remarks

04/04/2013: Nat Carling, 4-Apr-2013; Added rock type codes to driller's log & added missing information (based on existing data).

WaterNSW

Work Summary

GW103689

Licence:

Licence Status:

Authorised Purpose(s):

Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status:

Construct.Method:

Owner Type:

Commenced Date:

Completion Date: 27/11/2000

Final Depth: 3.50 m

Drilled Depth: 3.50 m

Contractor Name: HANDEX

Driller:

Assistant Driller:

Property:

Standing Water Level (m):

Salinity Description:

Yield (L/s):

GWMA:

GW Zone:

Site Details

Site Chosen By:

County: CUMBERLAND

Parish: BANKSTOWN

Cadastre: 100//1011185

Form A: Licensed:

Region: 10 - Sydney South Coast

CMA Map:

River Basin: - Unknown

Grid Zone:

Area/District:

Scale:

Elevation: 0.00 m (A.H.D.)

Northing: 6242870.000

Latitude: 33°56'20.5"S

Elevation Source: Unknown

Easting: 318687.000

Longitude: 151°02'17.4"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	3.50	54			Unknown
1	1	Casing	P.V.C.	0.00	0.00	54			

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.50	0.50	FILL,MOIST GREY CLAY	Fill	
0.50	1.60	1.10	CLAY,SOFT-FIRM	Clay	
1.60	2.60	1.00	CLAY SILT,STICKY,RED	Clay	
2.60	3.00	0.40	SAND,QUARTZ SAND	Sand	
3.00	3.40	0.40	CLAY, VERY STIFF	Clay	
3.40	3.50	0.10	SHALE AT BASE,WEATHERED BEDROCK	Shale	

APPENDIX E: BUREAU OF METEOROLOGY

Daily Rainfall (millimetres)

CANTERBURY RACECOURSE AWS

Station Number: 066194 · State: NSW · Opened: 1995 · Status: Open · Latitude: 33.91°S · Longitude: 151.11°E · Elevation: 3 m

2022	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	0	0	23.0	8.8								
2nd	0	9.6	30.8									
3rd	0	3.0	70.8									
4th	0	0	32.2									
5th	2.8	9.6	8.2									
6th	18.6	1.2	27.0									
7th	0.2	8.0	50.8									
8th	15.8	10.2	125.2									
9th	0.8	1.8	52.2									
10th	0.2	0	0									
11th	0.6	6.2	0									
12th	0	1.2	0.4									
13th	13.8	18.0	0									
14th	7.8	0	7.6									
15th	0.4	0	0.6									
16th	0.2	0	13.4									
17th	0	0	6.6									
18th	0	1.2	0									
19th	7.2	1.6	33.8									
20th	2.0	0.2	1.2									
21st	0.6	0	0									
22nd	3.0	5.0	0									
23rd	4.8	119.4	0									
24th	1.6	34.4	2.6									
25th	0.2	14.2	11.6									
26th	0	49.8	25.8									
27th	0	36.2	21.2									
28th	0	4.6	12.6									
29th	0		22.4									
30th	0		29.2									
31st	0		17.4									
Highest daily	18.6	119.4	125.2	8.8								
Monthly Total	80.6	335.4	626.6									

↓ This day is part of an accumulated total

Quality control: 12.3 Done & acceptable, 12.3 Not completed or unknown

Product code: IDCJAC0009 reference: 84312073

Daily Rainfall (millimetres)

CANTERBURY RACECOURSE AWS

Station Number: 066194 · State: NSW · Opened: 1995 · Status: Open · Latitude: 33.91°S · Longitude: 151.11°E · Elevation: 3 m

Statistics for this station calculated over all years of data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	78.1	123.6	117.3	94.8	74.1	105.5	56.4	62.9	48.5	63.9	73.8	65.1
Median	59.8	108.6	75.2	65.0	43.4	77.0	49.4	40.9	46.8	37.0	56.6	66.4
Highest daily	128.0	189.2	125.2	123.0	84.8	110.0	88.6	121.0	70.2	121.2	64.6	67.0
Date of highest daily	31st 2001	10th 2020	8th 2022	21st 2015	14th 2003	5th 2016	22nd 2011	31st 1996	7th 2006	15th 2014	5th 2010	11th 2002

1) Calculation of statistics

Summary statistics, other than the Highest and Lowest values, are only calculated if there are at least 20 years of data available.

2) Gaps and missing data

Gaps may be caused by a damaged instrument, a temporary change to the site operation, or due to the absence or illness of an observer.

3) Further information

<http://www.bom.gov.au/climate/cdo/about/about-rain-data.shtml>.

Product code: IDCJAC0009 reference: 84312073 Created on Fri 01 Apr 2022 10:54:52 AM AEDT

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<http://www.bom.gov.au/other/copyright.shtml>

APPENDIX F: PROPOSED DEVELOPMENT PLANS



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Client
TBA

Project
**Residential Development
No. 921 Punchbowl Rd,
Punchbowl NSW 2196**

Drawing Title
Ground Floor Plan

Scale 1:500@ A1 1:1000@ A3	Date 21.07.16	Drawn AS	Checked CT
Job No. 00 00 00	Drawing No. DA 1.02	Issue A	

Design File Ref: Arch/Active/921 Punchbowl Rd/DA

Issue	Date	Description	By

Notes
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Project

Residential Development
No. 921 Punchbowl Rd,
Punchbowl NSW 2196

Drawing Title

Ground: North

Scale
1:250@ A1
1:500 @ A3

Job No.

00 00 00

Date

21.07.16

Drawn

AS

Checked

CT

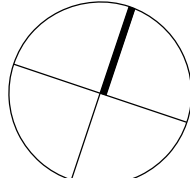
Drawing No.

DA 1.01

Issue

A

Design File Ref: Arch/Active/921 Punchbowl Rd/DA



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Issue	Date	Description	By
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Project
**Residential Development
No. 921 Punchbowl Rd,
Punchbowl NSW 2196**

Drawing Title
Ground: South

Scale 1:250@ A1 1:500 @ A3	Date 21.07.16	Drawn AS	Checked CT
Job No. 00 00 00	Drawing No. DA 1.00	Issue A	
Design File Ref: Arch/Active/921 Punchbowl Rd/DA			

Issue	Date	Description	By

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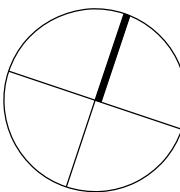
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ACN: 161 791 715

Client	TBA
Project	Residential Development No. 921 Punchbowl Rd, Punchbowl NSW 2196
Drawing Title	First Floor Plan

Scale	Date	Drawn	Checked
1:500@ A1	21.07.16	AS	CT
1:1000@ A3			
Job No.	Drawing No.	Issue	
00 00 00	DA 1.08	A	

Design File Ref: Arch/Active/921 Punchbowl Rd/DA



Issue	Date	Description	By

Notes

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ACN: 161 791 715

Client
TBA

Project
**Residential Development
No. 921 Punchbowl Rd,
Punchbowl NSW 2196**

Drawing Title
First: North

Scale 1:250@ A1 1:500@ A3	Date 21.07.16	Drawn AS	Checked CT
Job No. 00 00 00	Drawing No. DA 1.07	Issue A	

Design File Ref: Arch/Active/921 Punchbowl Rd/DA

Issue	Date	Description	By

Notes
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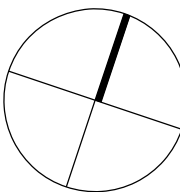
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ACN: 161 791 715

Client	TBA
Project	Residential Development No. 921 Punchbowl Rd, Punchbowl NSW 2196
Drawing Title	Second Floor Plan

Scale	Date	Drawn	Checked
1:500 @ A1	21.07.16	AS	CT
1:1000 @ A3			
Job No.	Drawing No.	Issue	
00 00 00	DA 1.05	A	

Design File Ref: Arch/Active/921 Punchbowl Rd/DA



Issue	Date	Description	By

Notes

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Client

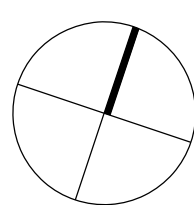
TBA

Project	Residential Development No. 921 Puncbowl Rd, Punchbowl NSW 2196
---------	---

Drawing Title

Second: North

Scale 1:250 @ A1 1:500 @ A3	Date 21.07.16	Drawn AS	Checked CT
Job No. 00 00 00	Drawing No. DA 1.04		Issue A
Design File Ref: Arch/Active/921 Punchbowl Rd/DA			



Issue	Date	Description	By
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Client

TBA

Project

Residential Development
No. 921 Punchbowl Rd,
Punchbowl NSW 2196

Drawing Title

Second: South

Scale
1:250 @ A1
1:500 @ A3

Date

21.07.16

Drawn

AS

Checked

CT

Job No.

00 00 00

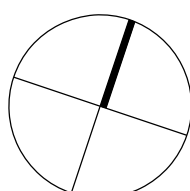
Drawing No.

DA 1.03

Issue

A

Design File Ref: Arch/Active/921 Punchbowl Rd/DA



Notes

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ACN: 161 791 715

Client

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Project

Residential Development
No. 921 Punchbowl Rd,
Punchbowl NSW 2196

Drawing Title

Third Floor Plan

Scale:
1:500@ A1
1:1000@ A3

Date

21.07.16

Drawn

AS

Checked

CT

Job No.

00 00 00

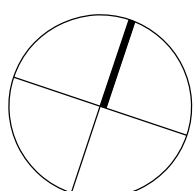
Drawing No.

DA 1.11

Issue

A

Design File Ref: Arch/Active/921 Punchbowl Rd/DA



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Issue	Date	Description	By
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Project
**Residential Development
No. 921 Punchbowl Rd,
Punchbowl NSW 2196**

Drawing Title
Third: North

Scale 1:250@ A1 1:500@ A3	Date 21.07.16	Drawn AS	Checked CT
Job No. 00 00 00	Drawing No. DA 1.10	Issue A	

Design File Ref: Arch/Active/921 Punchbowl Rd/DA

Issue	Date	Description	By

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ACN: 161 791 715

Client
TBA

Project
**Residential Development
No. 921 Punchbowl Rd,
Punchbowl NSW 2196**

Drawing Title
Third: South

Scale 1:250@ A1 1:500@ A3	Date 21.07.16	Drawn AS	Checked CT
Job No. 00 00 00	Drawing No. DA 1.09		
Design File Ref: Arch/Active/921 Punchbowl Rd/DA			

Issue	Date	Description	By

Notes
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ACN: 161 791 715

Client
TBA

Project
**Residential Development
No. 921 Punchbowl Rd,
Punchbowl NSW 2196**

Drawing Title
Fourth Floor Plan

Scale 1:250@ A1 1:500@ A3	Date 21.07.16	Drawn AS	Checked CT
Job No. 00 00 00	Drawing No. DA 1.14	Issue A	

Design File Ref: Arch/Active/921 Punchbowl Rd/DA

Issue	Date	Description	By

Notes
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Web: www.cmtarchitects.com

ACN: 161 791 715

Client	TBA
Project	Residential Development No. 921 Punchbowl Rd, Punchbowl NSW 2196
Drawing Title	Fourth: South

Scale	Date	Drawn	Checked
1:250@ A1 1:500@ A3	21.07.16	AS	CT
Job No.	Drawing No.	Issue	
00 00 00	DA 1.12	A	
Design File Ref: Arch/Active/921 Punchbowl Rd/DA			

Issue	Date	Description	By

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MIXED USE DEVELOPMENT

21 Canterbury Road, Punchbowl

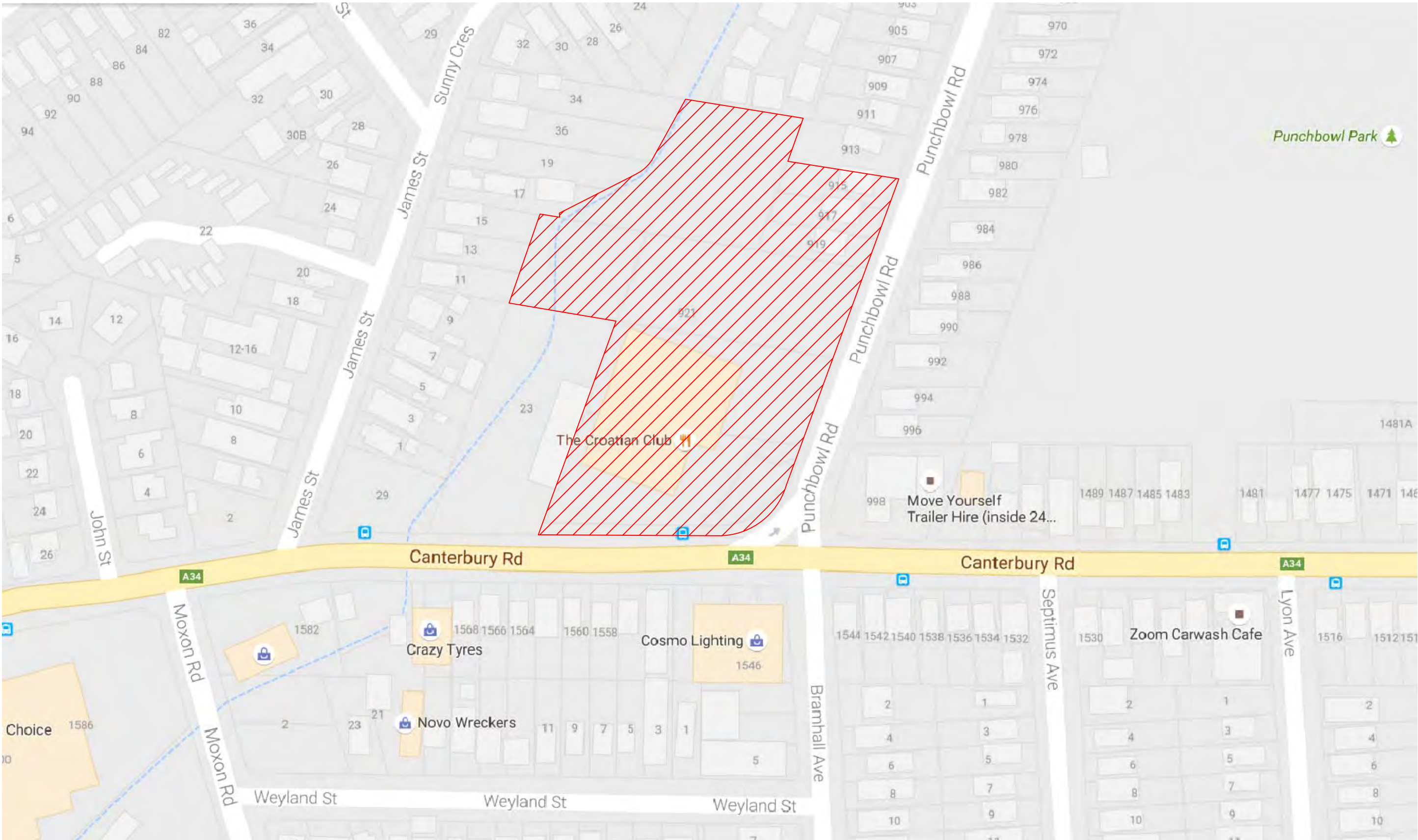
DWG NO.	DRAWING TITLE	SCALE	ISSUE	DATE
000	COVER SHEET & LOCATION PLAN	N.T.S.	E	01.06.2017
100	LANDSCAPE MASTERPLAN	1:400	E	01.06.2017
C100	LANDSCAPE MASTERPLAN RENDER	1:400	E	01.06.2017
101	LANDSCAPE PLAN - CIVIC PLAZA	1:200	E	01.06.2017
102	LANDSCAPE PLAN - RESIDENTIAL	1:200	E	01.06.2017
103	LANDSCAPE PLAN - RESIDENTIAL	1:200	E	01.06.2017
104	LANDSCAPE PLAN - LEVEL 3 TERRACE	1:50	E	01.06.2017
501	LANDSCAPE DETAILS	AS SHOWN	E	01.06.2017
502	LANDSCAPE SPECIFICATION & INDICATIVE PLANT SCHEDULE		E	01.06.2017

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The contractor shall check and verify all work on site (including work by others) before commencing the landscape installation. Any discrepancies are to be reported to the Project Manager or Landscape Architect prior to commencing work. Do not scale this drawing. Any required dimensions not shown shall be referred to the Landscape Architect for confirmation.

E	For DA	PH	RS	01.06.2017
D	For DA	NP	RS	23.01.2017
C	For Approval	PH	RS	13.12.2016
B	For Review	PH	RS	21.11.2016
A	For Review	NH	RS	28.07.2016
Issue	Revision Description	Drawn	Check	Date

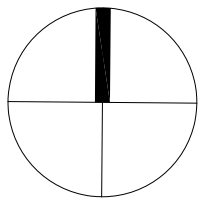
LEGEND



01
000

LOCATION PLAN
N.T.S.

Key Plan:



Client:
Waldron Hill Developments

Architect:
CMT Architects

Project:
21 Canterbury Road
Punchbowl

Level 1, 3-5 Baptist Street
Redfern NSW 2016
Australia

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S I T E I M A G E

Landscape Architects

DEVELOPMENT APPLICATION

Drawing Name:
COVER SHEET

Scale: 1:1000 @ A1
Job Number:
SS16-3349

Sheet _ of _
Drawing Number:
000

Issue:
E

NOT FOR CONSTRUCTION