Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Detailed Site Investigation

Proposed Administration Building
High Street Maitland

Prepared for
Maitland City Council

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

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Report on Detailed Site Investigation
Proposed Administration Building
High Street Maitland

1. Introduction

This report presents the results of a detailed site investigation (DSI) for contamination, undertaken for a proposed administration building at High Street Maitland. The investigation was commissioned by Aaron Cook of Maitland City Council and was undertaken with reference to Douglas Partners Pty Ltd (DP) proposal NCL180163 dated 17 April 2018 and revised schedule dated 7 May 20187 May 2018.

It is understood that the development of the site will include construction of a four-level commercial building with associated pavements and car parking.

The DSI was undertaken to further assess the identified past and present contaminating activities, report on site condition and provide an assessment of site contamination conditions to support a development application to Council.

The DSI comprised the following:

- Brief review of a previous assessment conducted by DP on a part of the site (Ref 1);
- Review of additional site history information for the site, including historical aerial photos, historical title deeds search, on-line searches of registered groundwater wells and NSW EPA contaminated land registers;
- Excavation of nine test pits across the site;
- Laboratory testing of selected soil samples for a range of potential organic and inorganic contaminants; and
- Preparation of this reporting presenting the results of the assessment.

It is noted that the work was undertaken concurrently with a geotechnical investigation for the site which was reported separately (Ref 2).

The contamination assessment was undertaken with reference to NSW EPA “Guidelines for Consultants Reporting on Contaminated Sites” (Ref 3) and NEPC 2013 (Ref 4).

2. Site Description

The site comprises 13 lots between High Street, Grant Street and Devonshire Street Maitland, as shown in Figure 1 below (supplied by the client).

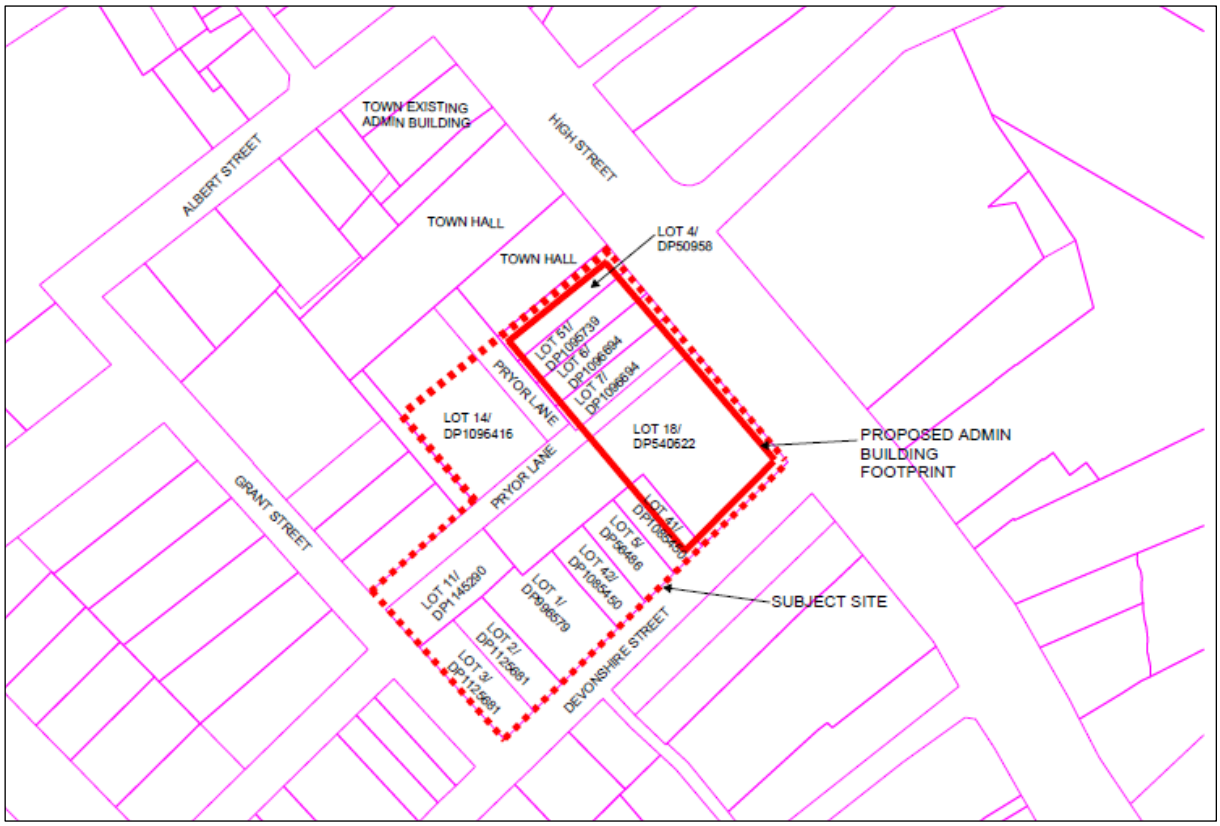


Figure 1: Site extent (dashed red line) and proposed building footprint (solid red line)

The site comprises an L-shaped area of approximately 8130 m^2, bound to the north-east by High Street, to the south-east by Devonshire Street and existing commercial and residential properties, to the south-west by an existing community hall and to the north-west by Maitland Town Hall.

The current site use includes existing residential development (two dwellings), vacant grassed areas currently used by Council for car parking and asphalt-paved car parking areas.

3. Geology and Hydrogeology

Reference to the 1:100 000 Newcastle Coal Geology sheet indicates that the site is underlain by Quaternary Alluvium deposits generally comprising gravel, sand, silt and clay.

Reference to the Maitland Acid Sulfate Soil Risk Map prepared by the Department of Land & Water Conservation indicates that there is no known occurrence of acid sulfate soil materials at the site. It is noted, however, that there is a high probability of acid sulfate soils at depths greater than 3 m immediately south of the site.

The regional groundwater flow regime is probably towards the Hunter River or former river alignments, about 500 m north or north-east of the site, which is considered to be the nearest sensitive receptor. The depth to the water table is likely to be greater than 2 m based on site observations and the nearby investigations. It should be noted that groundwater levels are affected by climatic conditions, tidal influence and soil permeability and will therefore vary with time.

The surface of the site is relatively flat. The surrounding area slopes gently towards the south-west.

An on-line records search of groundwater wells registered with the NSW Office of Water (NOW) indicated that there are eight registered groundwater wells within 500 m of the site. Bore GW200466 is the closest at approximately 50 m north-west of the site and is licensed as a test bore. The bore logs for this well, drilled and installed to 16 m below ground surface, indicate an alluvial profile (silt overlying sand and gravel). The standing water level was noted at 6.9 m below the ground surface.

4. Background

DP conducted a preliminary geotechnical investigation and contamination testing on a portion of the site in August 2011. The scope of work comprised the following:

- Brief discussions with Council and review of previous development plans for the site;
- Drilling of six boreholes using a truck mounted drilling rig;
- The excavation of two test pits using hand tools;
- Cone penetration testing (CPT) at five locations using a purpose-built CPT rig;
- Laboratory testing of selected samples for a range of organic and inorganic contaminants;
- Preparation of this report.

Discussions with MCC indicated that previous site use included a service station in the north-eastern portion of the site, with residential development across the remainder of the site.

The former service station layout is presented in Appendix D (Ref BP Australia Ltd, Ref 6510), and indicates the approximate location of the former service station building, work bays, amenities, bowser islands and paved areas. The locations of underground storage tanks (USTs) and fuel lines were not indicated on the plan. It is noted that the 1968 drawing used to prepare Drawing 1 was for the “proposed” service station. As-built drawings were not provided to confirm actual building locations.

On the basis of the brief review of information and likely former site activities, the following potential contamination sources were identified for the site:

- Former service station activities and associated infrastructure (underground storage tanks (UST), fuel lines and bowsers), which may have resulted in hydrocarbon and heavy metal impact to soils / groundwater;
- Possibly a former garage / workshop which may have resulted in hydrocarbon, heavy metal, phenol, solvent impact to soils / groundwater;
- Presence of imported filling (source unknown) used to fill / level the site and construct raised garden beds, which may contain a range of potential contaminants;
- Demolition of former structures at the site (service station, former residences) which may be a source of building rubble at the site and associated contaminants (i.e. asbestos, lead, PCB).

Subsurface investigation indicated filling, encountered in the bores / pits to depths of up to 2.8 m and generally comprised clayey silty sand with trace to some building rubble consisting of bricks, tiles, concrete, glass, ceramic.

The subsurface conditions beneath the filling consisted of an alluvial sequence typically comprising stiff to hard clay with variable proportions of silt and sand to depths of between 5 m and 7 m overlying interbedded silty sand and clay to the depth of investigation of 12.33 m to 14.46 m where CPTs refused in a sand / gravel layer.

Free groundwater was observed in all CPTs at 6 m depth, at completion of the test in the remnant cone hole. The measurement of groundwater level by dipping the CPT hole provides a relatively crude indication of groundwater levels. Free groundwater was encountered at depths ranging from 7 m to 7.5 m in Bores 102 to 104. It should be noted that groundwater levels are affected by factors such as climatic conditions and soil permeability and will therefore vary with time.

Observations during the previous fieldwork suggested the absence of gross impact in soil at the sample locations (i.e. absence of gross staining or odours).

The results of laboratory testing indicated the following:

- The absence of gross contamination in the tested soil samples;
- Toluene concentrations above the adopted criteria (subsequently superseded) in one samples (Bore 104/0.5);
- The absence of asbestos in soil in the analysed samples.

The assessment criteria used in the previous investigation has subsequently been superseded by NEPC 2013 (Ref 4). The results from previous testing have been compared to the current adopted health-based investigation and screening levels in Section 11 of this report.

Based on the previous work, further investigation was recommended to confirm site conditions and requirements for remediation (if any).

5. Site History

5.1 Extent of Site History

The brief review of site history comprised the following:

- Brief review of historic research conducted by AMAC Archaeological;
- Historical Title Deeds search, supplied by MCC;
- Review of historical aerial photos;
- Searches with NSW EPA;

Details are presented in the following sections.

5.2 Historic Research – AMAC Archaeological

A document titled “Historic Research, 273 High Street Maitland”, prepared by AMAC Archaeological (Ref 5) dated April 2018 was supplied by MCC.

The report was prepared for a portion of the site known as 273 High Street Maitland, Lot 51 1095739, as shown in Figure 2 below, extracted from the AMAC report.

Figure 2: Subject site of the AMAC Archaeological report

The findings of the AMAC report are as follows:

- Land including the subject lot was granted to George Stone in 1837, which was then subdivided in 1839. Subsequent sales/information on the land is as follows:
  - Sold to Samuel Lyons (auctioneer) in 1839. The current structure on the site was built at some stage during Lyons ownership;
  - Sold to Samuel Derrington in 1851 (occupation of the site unknown);
  - Sold to Jeremiah Ledsam (Methodist Preacher) in 1854;
  - Sold to Richard Cracknell in 1865;
  - Passed to Walter Cracknell in 1894. An 1886 plan indicates the site was occupied by a tinsmith;
  - Sold to William Harrington Palmer in 1896;
  - Sold to William John Russell in 1896 (physician/surgeon);
  - Sold to Patrick Dilley in 1924 (builder);
  - Passed to Alfred and Frederick Dilley in 1944 (builder and fitters assistant);

- Several more changes of hands occurred within the 20th century (including a butcher (twice) and grazier) until MCC bought the site in 1986;
- A local newspaper article from 3 February 1993 indicated that the site had been used as a barbershop, tobacconist and a take away café.

- It is understood that there were some outbuildings to the rear of the structure on the lot;
- Comparison of a Hunter Water plan from 1936 and a MCC plan from 1984 suggested that buildings surrounding the lot may have been demolished in the 1970s or 1980s;

5.3 Historical Title Search

A historic title deeds search for the site was carried out by Scott Ashwood Pty Ltd, as provided for this assessment by MCC. The results of the historical title search are provided in in Appendix B and are summarised in Tables 1 to 16 below.

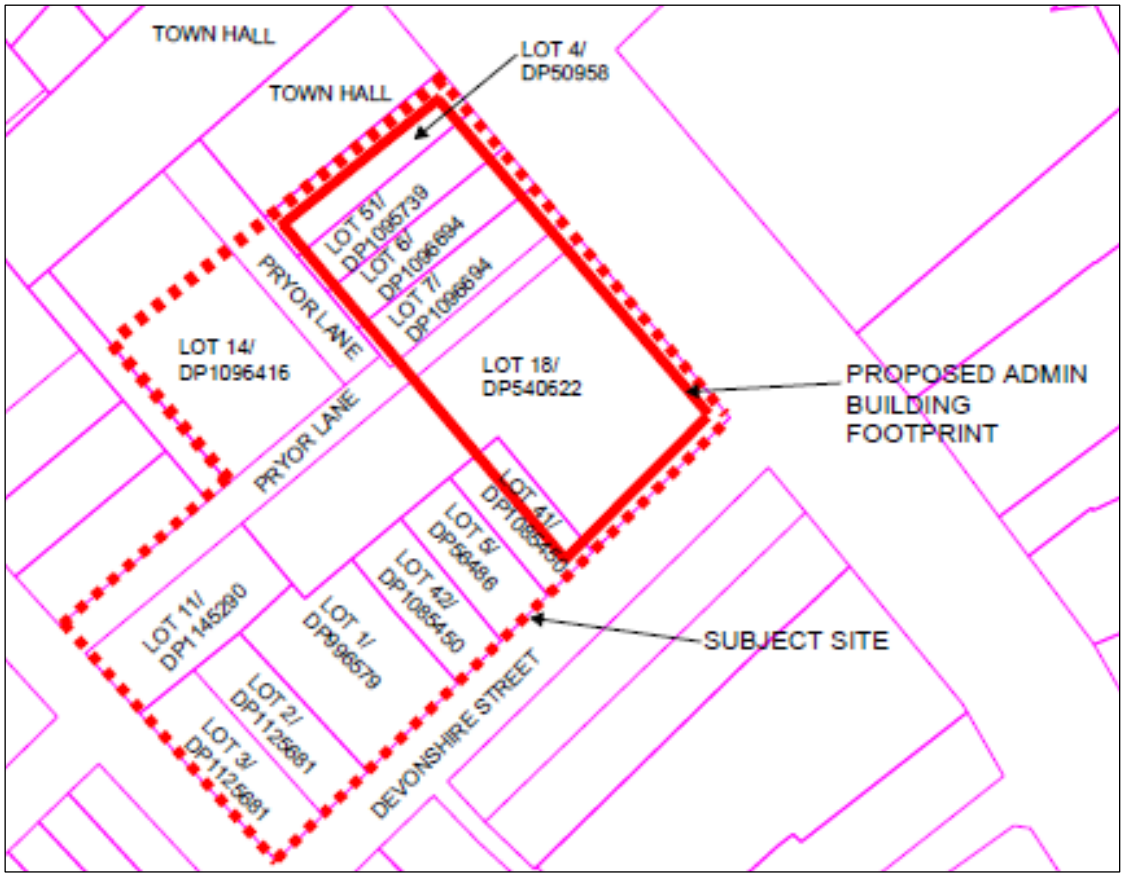


Table 1: - Historical Titles, Lot 1 D.P.996579 (formerly allotments 7 and 8 of a subdivision of Portion 183), 22 Devonshire Street, Maitland

Former Lot	Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
Lot 7	31.12.1915 (1915 to 1945)	Rose Agatha Ternes (Spinster)	Conveyance Book 1074 No. 486
	31.03.1945 (1945 to 1960)	Gladys Mary De Fiddes (Married Woman)	Conveyance Book 1965 No. 645
Lot 8	27.05.1914 (1914 to 1945)	Rose Agatha Ternes (Draper)	Conveyance Book 1029 No. 691
	31.03.1945 (1945 to 1960)	Gladys Mary De Fiddes (married Woman)	Conveyance Book 1965 No. 645
Lots 7 and 8	14.12.1959 (1959 to 1975)	Robert Mathieson Wood and Leslie Wood, (Real Estate Agents)	Conveyance Book 2534 No. 886
	22.11.1963 (1963 to 1975)	Mavis Wood (wife of Leslie Wood) as Regards the Interest of Robert Mathieson Wood	Conveyance Book 2681 No.135
	17.05.1974 (1974 to 1977)	Paul Costa, Investor	Conveyance Book 3170 No. 218
	06.07.1976 (1976 to1981)	Shirley Mary King, Married Woman	(Mortgagee Exercising Power of sale Re: Book 3184 No. 461) Conveyance Bk. 3237 No. 160
	29.09.1980 (1980 to 1995)	Daisy May Eyre (Married Woman)	Conveyance Book 3441 No. 123
	12.10.1994 (1994 to Date)	Council of the City of Maitland	Conveyance Book 4075 No. 814 Now Folio Identifier 1/996579

Table 2: - Historical Titles, Lot 2 D.P. 1125681, Devonshire Street Maitland

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
30.10.1897 (1897 to 1947)	Joseph Robertson (Painter)	Conveyance Book 609 No. 423
15.05.1947 (1947 to 1958)	William Carl Wright (Boot Repairer) and Hilda Ruth Wright (his wife)	Conveyance Book 2019 No. 862
18.12.1957 (1957 to 1963)	The Council of The City of Maitland	Book 2432 No. 733
24.05.1962 (1962 to 1965)	George Albert Emery, Frank Robins Cook, Ian Morton Sim and Francis James Freeman as Trustees for the Maitland Repertory Society	Book 2656 No. 355
12.04.1965 (1965 to 1976)	Teodar Diaczuk, Jozef Ciba and Zenon Kmak as Trustees of The Maitland Sub-branch of the Polish Association of New South Wales	Conveyance Book 2744 No. 120
16.03.1976 (1976 to date)	# The Council of the City of Maitland	Conveyance Book 3225 No. 690 Now Folio Identifier 2/1125681

Table 3: Historical Titles, Lot 3 D.P. 1125681, Devonshire Street Maitland

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
05.07.1923 (1923 to 1947)	Joseph Robertson (Painter)	Conveyance Book 1312 No. 70
15.05.1947 (1947 to 1958)	William Carl Wright (Boot Repairer) and Hilda Ruth Wright (his wife)	Conveyance Book 2019 No. 862
18.12.1957 (1957 to 1963)	The Council of The City of Maitland	Book 2432 No. 733
24.05.1962 (1962 to 1965)	George Albert Emery, Frank Robins Cook, Ian Morton Sim and Francis James Freeman as Trustees for the Maitland Repertory Society	Book 2656 No. 355
12.04.1965 (1965 to 1976)	Teodar Diaczuk, Jozef Ciba and Zenon Kmak as Trustees of The Maitland Sub-branch of the Polish Association of New South Wales	Conveyance Book 2744 No. 120
16.03.1976 (1976 to date)	# The Council of the City of Maitland	Conveyance Book 3225 No. 690 Now Folio Identifier 2/1125681

Table 4: Historical Titles, Lot 5 D.P.56486, 18 Devonshire Street, Maitland

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
08.06.1886 (1886 to 1886)	Stephen James Dowell (Storekeeper)	Vol. 792 Fol. 50
02.10.1886 (1886 to 1888)	Richard Alexander Young (Solicitor)	Vol. 792 Fol. 50
23.03.1888 (1888 to 1890)	John Cruickshank (Grazier)	Vol. 792 Fol. 50
06.05.1890 (1890 to 1908)	Walter Clement Green (Gentleman)	Vol. 792 Fol. 50
14.12.1908 (1908 to 1929)	Joseph Robertson (Painter)	Vol. 792 Fol. 50
25.02.1929 (1929 to 1968)	Mary Robertson (Widow) as To a Life Estate	Vol. 792 Fol. 50 Now Vol. 4252 Fol. 100 (cancelled)
25.02.1929 (1929 to 1962)	Joseph Edward Robertson (Architect) Estate in Remainder	Vol. 792 Fol. 50 Now Vol. 4252 Fol. 101 (⅓ share title)
08.03.1962 (1962 to 1978)	Suzanne Robertson (Widow) Estate in Remainder	Vol. 4252 Fol. 101 (⅓ share title) Now Vol. 10966 Fol. 80
25.02.1929 (1929 to 1978)	Margaret Jean Robertson (Spinster) Estate in Remainder	Vol. 4252 Fol. 102 (⅓ share title)Now Vol. 10966 Fol. 80
25.02.1929 (1929 to 1978)	James Angus Robertson, (Chemist) Estate in Remainder	Vol. 4252 Fol. 103 (⅓ share title) Now Vol. 10966 Fol. 80
14.03.1978 (1978 to 1979)	Margaret Jean Robertson (Spinster), James Angus Robertson (Chemist) & Patricia Gossling (Typist) Tenants in Common	Vol. 10966 Fol. 80
26.10.1978 (1978 to 2005)	Frens Pty Limited	Vol. 10966 Fol. 80 Now Folio Identifier 5/56486
27.06.2005 (2005 to Date)	#Maitland City Council	Folio Identifier 5/56486

Table 5: Historical Titles, Lots 41 and 42 D.P. 1085450, 18 Devonshire Street, Maitland

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
03.11.1928 (1928 to 1970)	James Angus Robertson (Chemist), Joseph Edward Robertson (Architect) and Margaret Jean Robertson (Spinster)	Conveyance Book 1542 No. 143
11.04.1969 (1969 to 2006)	Fren's Pty Limited	Conveyance Book 2938 No. 556
10.06.2005 (2005 to Date)	#Maitland City Council	Conveyance Book 4461 No. 702. Now Folio Identifiers 41-42/1085450

Table 6: Historical Titles, Lot 51 D.P. 1095739, 271-275 High Street, Maitland ('the Ex Butcher shop')

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
24.06.1893 (1893 to 1968)	Sarah Banfield, (Widow)	Mortgage Book 518 No.42 (Reconveyed Bk. 601 No.407)
19.01.1904 Deed of Settlement	Sarah Banfield (Widow)(Life Interest), George Frederick Rushforth (Clerk in Holy Orders), William Griffith Lipscombe (Chemist) (Trustees for Sarah Banfield for Life Interest), Mary Hornibrook Banfield, Jane Grace Banfield, Margaret Kingston Banfield, William Banfield, Hewitt Poole Banfield, Francis Kingston Banfield and George Lawrence Banfield	Deed Book 752 No. 129
10.04.1967 (1967 to 1975)	Charles Keith Martin (Storekeeper) and Helen Millar Martin his wife	Conveyance Book 2838 No.423
07.06.1974 (1974 to 1981)	Charles Vouvoushiotis (Storekeeper) and Angela Vouvoushiotis his wife	Conveyance Book 3157 No.240
15.05.1980 (1980 to Date)	# The Council of the City of Maitland	Conveyance Book 3418 No. 827 Now Folio Identifier 51/1095739

Table 7: Historical Titles, Lot 4 D.P. 50958, 271-275 High Street, Maitland ('the Ex Butcher shop')

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
13.12.1865 (1865 to 1894)	Richard Cracknell (Esquire)	Vol 22 Fol. 106
31.07.1894 (1894 to 1896)	Walter Cracknell (Miller)	Vol 22 Fol. 106
03.02.1896 (1896 to 1896)	William Harrington Palmer (by Transmission)	Vol 22 Fol. 106
29.12.1896 (1896 to 1924)	William John Russell (Medical Practitioner)	Vol 22 Fol. 106
15.12.1923 (1923 to 1944)	Alfred Patrick Dilley (Builder)	Vol 22 fol. 106
18.07.1944 (1944 to 1958)	Alfred Francis Dilley (Builder) and Frederick Henry Dilley (Fitters Assistant) (by Transmission)	Vol 22 Fol. 106
20.05.1958 (1958 to1965)	William Welbourne (Butcher)	Vol 22 Fol. 106 now Vol 7565 Fol. 147 (½ share title)
20.05.1958 (1958 to 1965)	Lesley Greedy (Butcher)	Vol 22 fol. 106 now Vol 7565 Fol. 148 (½ share title)
25.11.1965 (1965 to 1975)	Daphne Jean Jupp wife of James Joseph Jupp (Grazier)	Vol 7565 Fols. 147 & 148
07.03.1975 (1975 to 1986)	Jeffrey William Welbourne (Butcher) and Joy Welbourne his wife	Vol 7565 Fols. 147 & 148 Now Vol14257 Fol. 75
13.05.1986 (1986 to Date)	# The Council of the City of Maitland	Vol 14257 Fol. 75 Now Folio Identifier 4/50958

Table 8: Historical Titles, Lot 6 D.P. 1096694, 271-275 High Street, Maitland ('the Ex Butcher shop')

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
11.10.1922 (1922 to 1939)	Rosina Lamble wife of John Samuel Lamble (Harness Maker)	Conveyance Book 1279 No. 323
25.05.1939 (1939 to 1986)	Baptist Union of New South Wales	Conveyance Book 1846 No. 384
14.09.1984 (1984 to 1986)	Re: Baptist Churches of NSW Property Trust Act, 1984 Now vested in The Baptist Churches of New South Wales Property Trust	
22.04.1986 (1986 to Date)	# The Council of the City of Maitland	Conveyance Book 3670 No. 802 Now Folio Identifier 6/1096694

Table 9: Historical Titles, Lot 7 D.P. 1096694, 271-275 High Street, Maitland ('the Ex Butcher shop')

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
11.10.1922 (1922 to 1939)	Rosina Lamble wife of John Samuel Lamble (Harness Maker)	Conveyance Book 1279 No. 323
25.05.1939 (1939 to 1986)	Baptist Union of New South Wales	Conveyance Book 1846 No. 384
14.09.1984 (1984 to 1986)	Re: Baptist Churches of NSW Property Trust Act, 1984 Now vested in The Baptist Churches of New South Wales Property Trust	
22.04.1986 (1986 to Date)	# The Council of the City of Maitland	Conveyance Book 3670 No. 802 Now Folio Identifier 7/1096694

Table 10: Historical Titles, Lot 14 D.P. 1096416 279-287 High Street, Maitland

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
16.04.1920 (1920 to 1933)	James Tuck (Farmer)	Conveyance Book 1182 No. 892
17.11.1933 (1933 to 1935)	Leonard Maxwell Bruchert (Carpenter)	Conveyance Book 1677 No. 231
23.09.1935 (1935 to 1936)	Edna Ruth Bailey wife of Stanley John Bailey (Labourer)	Book 1729 No. 927
28.04.1936 (1936 to 1940)	Benjamin Pryor &and Kenneth Cleve Pryor (Plasterers)	Book 1748 No. 529
01.11.1940 (1940 to 1982)	B. Pryor & Son Pty Limited	Conveyance Book 1883 No. 425
10.03.1982 (1982 to Date)	# The Council of the City of Maitland	Conveyance Book 3501 No. 865 Now Folio Identifier 14/1096416

Table 11: Historical Titles, Lot 1 D.P. 11145290, 3 Grant Street, Maitland

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
06.08.1908 (1908 to 1938)	George Stephen Swiney (Caretaker)	Conveyance Book 862 No. 65
29.08.1908 (1908 to 1938)	George Stephen Swiney (Caretaker)	Conveyance Book 863 No. 805
12.04.1937 (1937 to 1981)	Percy Moore (Railway Employee)	Conveyance Book 1777 No. 210
30.12.1980 (1980 to 1982)	Harold Clive Moore (Labourer), Mervyn Leslie Moore (Labourer), Christine Leslie Jenkin (Home Duties)and Phillip Charles Jensen (Labourer)	Conveyance Book 3446 No, 685
30.12.1980 (1980 to 1989)	Harold Clive Moore (Labourer) and Mervyn Leslie Moore (Labourer)	Conveyance Book 3446 No. 682
01.02.1988 (1988 to 2010)	Mervyn Leslie (Retired Steel Worker)	Conveyance Book 3729 No. 511
04.06.2009 (2009 to date)	# The Council of the City of Maitland	Conveyance Book 4569 No. 3 Now Folio Identifier 1/1145290

Tables 12 to 14: Historical Titles for Lot 18 D.P.540622 comprising Lots A & B of a subdivision of original Lots 1, 2 & 3 of a subdivision of Portion 183 and part of Portion 183

Table 12: 1} as regards Lot A

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
28.11.1894 (1894 to 1941)	Susan Sarah Swan (Spinster)	Conveyance Book 548 No. 675
23.12.1941 (1941 to 1944)	Raymond Walter Swan (Retired Grazier)	Conveyance Book 1907 No. 782
17.03.1944 (1944 to 1968)	Elizabeth Lacy May Graham wife of Malcolm Graham (Engineer)	Acknowledgement Book 1942 No. 92
14.08.1968 (1968 to 1989)	B P Australia Limited	Conveyance Book 2897 No. 332 Now Part Volume 11525 Folio 157
26.04.1989 (1989 to Date)	# The Council of the City of Maitland	Part Volume 11525 Folio 157 Now Part Folio Identifier 18/540622

Table 13: 2} as regards Lot B

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
28.11.1894 (1894 to 1941)	Susan Sarah Swan (Spinster)	Conveyance Book 548 No. 675
23.12.1941 (1941 to 1944)	Raymond Walter Swan (Retired Grazier)	Conveyance Book 1911 No. 752
17.03.1944 (1944 to 1945)	Elizabeth Lacy May Graham, wife of Malcolm Graham (Engineer)	Acknowledgement Book 1942 No. 92
01.03.1945 (1945 to 1960)	Keith George Jones (Garage Proprietor)	Conveyance Book 1959 No. 447
11.07.1960 (1960 to 1964)	G.P. & Z. M. White Pty Limited	Conveyance Book 2534 No. 976
19.08.1964 (1964 to 1968)	Hunter Valley Tractors Pty Limited	Conveyance Book 2720 No. 545
14.08.1968 (1968 to 1989)	B P Australia Ltd	Conveyance Book 2897 No. 333 Now Part Volume 11525 Folio 157
26.04.1989 (1989 to Date)	# The Council of the City of Maitland	Part Volume 11525 Folio 157 Now Part Folio Identifier 18/540622

Table 14: 3} as regards Part Portion 183

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
01.07.1912 (1912 to 1953)	John Albert Cross	Conveyance Book 969 No. 856
25.04.1953 (1953 to 1960)	Edith Lily Miriam Brogan (Widow), Alice May Hinch wife of Ernest Frederick Hinch (Store Manager) & Ivy Mildred Colgan wife of Harold Leslie Colgan (Accountant)	Conveyance Book 2266 No.75
03.08.1960 (1960 to 1968)	James Henry Fairbairn (Company Director), Hubert Morris Greedy (Assistant Manager) and Alwyn Henry Brennan (County Clerk)	Conveyance Book 2535 No. 13
14.08.1968 (1968 to 1989)	B P Australia Ltd	Book 2899 No. 750 Now Part Volume 11525 Folio 157
26.04.1989 (1989 to Date)	#The Council of the City of Maitland	Part Volume 11525 Folio 157 Now Part Folio Identifier 18/540622

Tables 15 and 16: Historical Titles, Pryor Lane, Maitland being part of Portions 182 (1 acre 2 roods 4 perches Granted to George Stone) and 183 (2 acres 3 roods 34 perches Granted to Lewis Samuel)

Table 15: 1} as regards the part comprised in Portion 182

Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
22.07.1837 (1837 to 1840)	George Stone of Maitland	Land Grant Serial 57 Page 58
31.08.1839 and 1.9.1839 (1839 to 1841)	Samuel Lyons	Conveyance Book P No. 601
31.7.1840 and 1.8.1840 (1840 to 1846)	William Hengh (life interest to Charles Henry Chambers)	Conveyance Book T No. 61
15.08.1845 (1845 to Date)	# Samuel Lyons	Conveyance of Equity of Redemption Book 9 No. 481 (Re Mortgage Book T No. 62)

Table 16: 2} as regards the part comprised in Portion 183

-	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale
29.07.1837 (1837 to 1841)	Lewis Samuel of Pitt street, Sydney	Land Grant Serial 57 Page 102
5 & 6.04.1840 (1840 to Date)	# George Fletcher and Edward Sparke	Conveyance Book S No.25

The results of the historical title deeds search suggests that former landuses comprised various retail uses (boot repair, chemist, butcher), car sales/service, tractor sales/service, medical practitioner, builder, plasterer and service station as well as residential use.

5.4 Historical Aerial Photos

The results of the historical aerial photographs review are presented in Table 17 below.

Table 17: Historical Aerial Photo Review

Year	Scale (Colour)	Main Observations
Pre-1955	B & W photo	• The majority of the site is covered with structures; • Commercial structures (terrace style) along High Street, with residential along Devonshire Street and Grant Street; • Commercial structures(sheds) observed in the central portion of the site (i.e. current car park area) • Vincent Street and residential development to the east of the site.
1975	B & W photo	• Majority of the site appears to be covered with structures; • Poor photo resolution
1983	B & W photo	• Residential structures in the south-eastern portion of the site (i.e. on Devonshire Street); • Possible pavement/structures in the north-eastern portion of the site L-shaped building) • Possible structure or pavement in the central portion of the site (i.e. to the south of the Council buildings/south-east of town hall); • Possibly some demolition of previously observed structures in the central portion of the site.
1984	B & W photo	• Similar to 1983 photo; • Poor resolution
1993	Colour photo 1:25,000	• Northern and north-eastern portion of the site is grassed and vacant; • Dwellings on Devonshire Street present (similar to current); • Dwelling evident to the south of the site.
1996	Colour photo 1:25,000	• Residential dwellings on Devonshire Street and Grant Street as current; • North-eastern and central portions of the site are grassed and vacant; • Paved car park present to the south of Council buildings
Google Maps	Colour Google Earth	• Similar to 1996 photo

It is noted that data obtained from aerial photos was limited due to the relatively small scale and poor resolutions.

6. Site Condition

At the time of the site walkover (19 May 2018), the following relevant site features were observed:

- Unpaved vacant area in the north-eastern portion of the site, understood to be used as a parking area by MCC (Figure 3);
- Grassed area in the south-eastern portion of the site (Figure 4);

- Grassed vacant area in the north-western portion of the site, adjacent to the historical commercial structure (Figure 5);
- Asphalt-paved car parking areas in the western portion of the site (Figure 6);

Figure 3: Unpaved car park area in the north-eastern portion of the site, looking south-east

Figure 4: Grassed area in the south-eastern portion of the site, looking south

Figure 5: Grassed area and former shop (far right of figure) in the north-western portion of the site, looking south-west

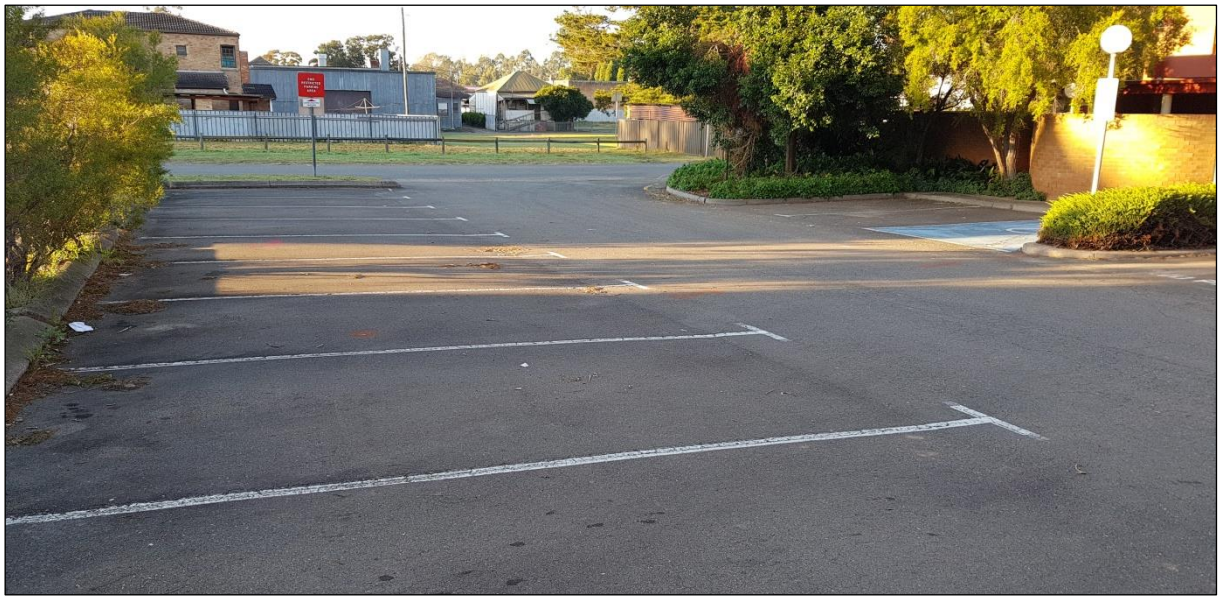


Figure 6: Asphalt car park in the western portion of the site, looking east

7. Potential Contaminants

On the basis of the desktop review, available site history information and observations made during the site inspection, a number of sources of potential contamination have been identified for the site as follows:

- Imported fill materials (source unknown) which may have been placed on the site as part of road making activities or as general site filling. Fill materials may be a source of various contaminants including hydrocarbons, pesticides, heavy metals and asbestos, depending on the source;

- Various former commercial and light industrial activities, which may be a source of hydrocarbons (fuel use and storage, vehicle servicing), hazardous building materials (builders/plasterers) and pesticides (possible historical pest control);
- Demolition/renovation of former structures across the site. Various former structures have been demolished over the history of the site. Demolition may be a source of hazardous building materials, including asbestos;
- Former fuel infrastructure (underground tanks, bowsers, fuel lines, vent pipes), which may be a source of hydrocarbons and heavy metals.

On the basis of site observations and site history, the potential for gross contamination from the above potential contaminant sources is considered to be moderate to high.

8. Conceptual Site Model

A Conceptual Site Model (CSM) has been prepared for the site with reference to the National Environment Protection (Assessment of Site Contamination) Measure 1999 (Amendment Measure 2013) Schedule B2 (Ref 4). The CSM identifies potential contaminant sources and contaminants of concern, contaminant release mechanisms, exposure pathways and potential receptors. The CSM is presented in Table 18.

Table 18: Conceptual Site Model

Known and Potential Primary Sources	Primary Release Mechanism	Secondary Release Mechanism	Potential Impacted Media	Contaminants of Concern	Exposure Pathway	Potential Receptors	
						Current	Future
imported filling and fill stockpiles across the site (subject to source)	Placement of filling on-site	Long-term leaching of contaminants via runoff, rain water infiltration / percolation or exposure / disturbance during proposed development	Soil, groundwater, surface water	TRH, BTEX, PAH, Metals, Pesticides, PCB, asbestos	Dermal contact, inhalation (dust/vapours), ingestion	Site workers, maintenance workers, consultants, trespassers, surface water bodies, groundwater, neighbouring properties in the case of groundwater or surface water migration	Site workers, residents, maintenance workers, consultants, trespassers, surface water bodies, groundwater, neighbouring properties in the case of groundwater or surface water migration
Demolition of former structures or renovations to existing / former buildings	Demolition of buildings / structures	Long-term leaching of contaminants via runoff, rain water infiltration / percolation or exposure / disturbance during proposed development	Soil, groundwater, surface water	Metals, PCB, Asbestos	Dermal contact, inhalation (dust/vapours), ingestion		
Various commercial activities (builders, butcher, chemist)	Spills/leaks/dumping during site use	Long-term leaching of contaminants via runoff, rain water infiltration / percolation or exposure / disturbance during proposed development	Soil, groundwater, surface water	TRH, BTEX, PAH, Metals, Pesticides, PCB, asbestos	Dermal contact, inhalation (dust/vapours), ingestion		
Storage of fuels, batteries, oils etc.	Spills and leaks	Long-term leaching of contaminants via runoff, rain water infiltration / percolation, through soil or cracks / joints in concrete or exposure/disturbance during proposed development	Soil, groundwater, surface water	TRH, BTEX, PAH, Metals, VOC, acids	Dermal contact, inhalation (dust/vapours), ingestion		
Repairs/servicing of vehicles and storage of vehicles / parts	Spills and leaks, hydrocarbon sources and solvents	Long-term leaching of contaminants via runoff, rain water infiltration / percolation, through soil or cracks / joints in concrete or exposure/disturbance during proposed development	Soil, groundwater, surface water	TRH, BTEX, PAH, Metals, VOC	Dermal contact, inhalation (dust/vapours), ingestion		

Table 18: Conceptual Site Model (continued)

Known and Potential Primary Sources	Primary Release Mechanism	Secondary Release Mechanism	Potential Impacted Media	Contaminants of Concern	Exposure Pathway	Potential Receptors	
						Current	Future
USTs and associated Infrastructure on site	Potential leaks and spills from USTs, bowsers and associated pipework	Long-term leaching of contaminants via runoff, rain water infiltration / percolation, through soil or cracks/joints in concrete, groundwater migration or exposure/disturbance during proposed development	Soil, groundwater, surface water	TRH, BTEX, PAH, Metals, VOC	Dermal contact, inhalation (dust/vapours), ingestion	Site workers, maintenance workers, consultants, trespassers, surface water bodies, groundwater, neighbouring properties in the case of groundwater or surface water migration	Site workers, residents, maintenance workers, consultants, trespassers, surface water bodies, groundwater, neighbouring properties in the case of groundwater or surface water migration
Historical Pest Control	Use of pesticides during historical pest control	Long-term leaching of contaminants via runoff, rain water infiltration / percolation, through soil or cracks/joints in concrete / asphalt, groundwater migration or exposure / disturbance during proposed development	Soil, groundwater, surface water	Pesticides (OCP/OPP)	Dermal contact, inhalation (vapours, dust), ingestion		

9. Field Work Methods

9.1 Sampling Rationale

A number of potential sources of site contamination were identified in the brief history review and the previous investigation (Ref 1). A judgemental and systematic sampling procedure was conducted for the DSI to assess the principal potential sources of contamination described above.

A total of eight test pits and one borehole (Pit 301, Pits 303 to 309 and Bore 302) were excavated/drilled at accessible locations for the assessment. The test locations were located to assess the main potential contaminant sources as summarised in Table 19 below.

Table 19: Sample Locations and Associated Potential Contamination Sources

Potential Contamination Source	Sample ID
Fill placement	All bores/pits
Demolition of former structures	All bores/pits
Former Service Station	Pits 305, 306, 307 Bores 101 to 107
Industrial site use	All bores/pits

Soil samples were selected for analysis on the basis of the likely presence of contamination, based on material type, visual or olfactory evidence of possible contamination (i.e. odour or staining), proximity to a known source of contamination, and whether generally representative of soil / fill conditions.

9.2 Methods

The field work was undertaken on 19 May 2018 comprised the following:

- Site inspection by an environmental engineer from DP;
- Checking for underground services at proposed bore locations by a professional service locator;
- Ground penetrating radar (GPR) search in the vicinity of the former service station to assess possible former underground fuel infrastructure locations;
- Excavation of eight test pits to depths of 2.0 m to 3.2 m across the site;
- Drilling of one borehole within the current asphalt pavement to a depth of 2.5 m;
- Logging of the subsurface profile, including visual and olfactory assessment of potential contaminants in filling;
- Collection of soil samples for contamination testing purposes from the test locations.

Geotechnical subsurface investigation was conducted at the site as part of the investigation, comprising Cone Penetration Testing (CPT) and deep boreholes. The results of the geotechnical assessment are provided in a separate report.

The above scope was conducted in addition to the previous fieldwork conducted by DP in 2011, which comprised the following:

- Drilling of six boreholes (Bores 101 to 106) to depths of between 3.7 m and 8.05 m below ground level using a specialised truck mounted drill rig with solid flight augers;
- Excavation of two test pits to depths of 0.3 m and 0.4 m (Pits 107 and 108) using hand tools;
- CPT at five locations to assist in geotechnical assessment of the site

An engineer from DP logged the subsurface profile and collected samples for identification and testing purposes. The approximate test locations were recorded using site features and are shown on Drawing 1, Appendix D.

The process of obtaining samples and their transportation, storage and delivery to laboratories for analysis was documented on DP standard Chain of Custody (C-O-C) forms. Copies of completed forms are contained in Appendix C.

9.3 Results

GPR Survey

The GPR survey and associated electronic scan was conducted on 19 May 2018 within accessible areas in the vicinity of former fuel infrastructure (i.e. bowser, fuel lines, UST locations) in the north-eastern portion of the site.

The GPR was unable to clearly detect the presence of any USTs or associated pipe work. There is, however, the potential for interference from other underground infrastructure or filling which may preclude detection of fuel tanks, pipes etc.

Subsurface Conditions

The subsurface conditions are presented in the borehole and test pit logs, Appendix A and summarised below. These should be read in conjunction with the general notes preceding them, which explain definitions of the classification methods and descriptive terms.

In summary from the previous assessment, filling was encountered in the bores / pits to depths of up to 2.8 m and generally comprised clayey silty sand with trace to some building rubble consisting of bricks, tiles, concrete, glass, ceramic. The inferred thickness of the filling in the CPT profiles ranged between 0.4 m and 1.1 m.

The subsurface conditions beneath the filling consisted of an alluvial sequence typically comprising stiff to hard clay with variable proportions of silt and sand to depths of between 5 m and 7 m overlying interbedded silty sand and clay to the depth of investigation of 12.33 m to 14.46 m where CPTs refused in a sand / gravel layer.

Free groundwater was observed in all previous CPTs at 6 m depth, at completion of the test in the remnant cone hole. The measurement of groundwater level by dipping the CPT hole provides a relatively crude indication of possible groundwater levels. Free groundwater was encountered at depths ranging from 7 m to 7.5 m in Bores 102 to 104. It should be noted that groundwater levels are affected by factors such as climatic conditions and soil permeability and will therefore vary with time.

The subsurface conditions encountered in the shallow pits/boreholes conducted as part of the current assessment is summarised below.

FILLING: Encountered in all bores and pits from the surface to 0.6 m / >2.0 m depth and generally comprising silty sand/silty sandy clay/clayey sand filling with abundant inclusions such as cobbles, brick, ceramic, coal, ash, metal and fibro fragments.

SILTY CLAY Silty clay/clayey silt was encountered at all test locations beneath filling (except 307) to termination at depths of up to 2.0 m /3.2 m.

Groundwater was encountered during drilling of deep boreholes for the concurrent geotechnical assessment. Groundwater depth measurement was precluded by the drilling fluids, however, there was no observations of gross contamination observed during drilling.

Further details are provided in the borehole and test pit logs in Appendix A.

9.4 Contaminant Observations

Observations of potential contamination during field work generally comprised building rubble in filling at all borehole/pit locations from the current assessment, along with ash in filling in Pits 301 302 305, 306, 308 and 309. Fibro fragments (possible asbestos-containing material – ACM) were encountered in filling in Pit 301 (0.4 m to 1.2 m depth) and Pit 308 (0.4 m to 1.0 m depth). The fibro fragemnts were generally observed to be in sound condition.

The results of PID screening on soil samples are shown on the borehole and test pit logs in Appendix A. PID screening generally suggested the absence of gross volatile hydrocarbon impact in the screened soil samples (i.e. < 1 ppm).

10. Data Quality Objectives

10.1 Data Quality Objectives

Table 20 summarises the data quality objectives (DQO) and the procedures designed to enable achievement of the DQOs.

Table 20: Data Quality Objectives

DQO	Achievement Evaluation Procedure
Step 1 – State the problem	Level of contamination and possible remediation / management options and waste classification/reuse options.
Step 2 – Identify the decision	Assess whether the identified contaminated filling can be managed on site as part of the intended building construction and commercial land use from a contamination perspective. Refer Section 12 for adopted site assessment criteria.
Step 3 – Identify the inputs to the decision	Findings of the previous investigations at the site. Selection of appropriate contaminants of concern based on previous investigation findings and CSM (Section 8). Selection of the appropriate laboratory testing methods Field and laboratory QA/QC data to assess the suitability of the environmental data for the assessment.
Step 4 – Define the Boundary of the Assessment	As defined in Section 2 and shown on Drawing 1.
Step 5 – Develop of decision rule	Selected soil samples were analysed for the contaminants of concern as outlined in Section 8. The field and laboratory data was assessed as reliable by reference to the Data Quality Indicators (DQI) as outlined in Step 7.
Step 6 – Specify the acceptance criteria	The site assessment criteria were developed through reference to NEPC 2013 (Ref 4) and NSW EPA Waste Classification Guidelines (Ref 6). The acceptance limits for laboratory QA/QC parameters were based on the laboratory reported acceptance limits and those stated in NEPC 2013.
Step 7 – Optimise the design for obtaining data	Design was optimised by the development of a plan for sample collection, handling and analysis, including undertaking quality assurance and quality control measures to allow assessment of the suitability of the data collected. Measurement to assess the project DQOs using data quality indicators (DQIs) as follows: Completeness – completion of field and laboratory chain of custody documentation, use of experienced field staff, compliance with holding times and correct documentation; Comparability – consistent sampling procedures, use of NATA certified laboratory and experienced field staff; Representativeness – appropriate media sampled; Precision - Analysis of field and laboratory replicates and achievement of acceptable RPDs, acceptable levels for laboratory QC criteria; Accuracy – Analysis of field duplicates, matrix spikes and surrogate spikes.

10.2 Sampling and Analysis

10.2.1 Soil Sample Collection, Decontamination and Preservation

Soil samples for contamination testing were collected with reference to environmental sampling protocols and chain of custody (COC) documentation.

Soil samples were generally collected from the near surface and at regular depth intervals or changes in strata within each borehole or test pit. Soil samples were collected directly from the auger (drilling rig/hand auger), or directly from the excavator bucket (test pits) using stainless steel sampling equipment and / or disposable gloves. Care was taken to remove any extraneous material deposited on the sample.

All sampling data was recorded on DP COC. The general sampling procedure comprised:

- Decontamination of sampling equipment using a 3% solution of phosphate free detergent (Decon 90) and tap water prior to collecting each sample;
- The use of new disposable gloves for each sampling event;
- Transfer of samples into laboratory-prepared jars and capping immediately;
- Collection of replicate soil samples in zip-lock plastic bags at each depth for screening by PID;
- Collection of additional samples, excluded from air for the purposes of acid sulfate testing;
- Collection of replicate samples for QA / QC purposes;
- Labelling of sample containers with individual and unique identification, including project number, sample location and sample depth; and
- Placement of the sample containers and replicate sample bags into a cooled, insulated and sealed container for transport to the laboratory.

The process of obtaining samples and their transportation, storage and delivery to laboratories for analysis was documented on a DP standard COC. Copies of completed forms are provided in Appendix C.

Replicate samples for each soil sample were screened for the presence of VOCs, using a MiniRAE LITE PID and MiniRAE 3000 with a 10.6 eV lamp, calibrated to 100 ppm Isobutylene. A PID calibration certificate is provided in Appendix C.

Information on quality assurance and quality control, including analysis of replicate samples, is found in Appendix C.

10.2.2 Laboratory QA / QC

The NATA accredited chemical laboratory undertook in-house QA / QC procedures involving the routine testing of:

- Reagent blanks;
- Spike recovery analysis;

- Laboratory duplicate analysis;
- Analysis of control standards;
- Calibration standards and blanks; and
- Statistical analysis of QC data.

An assessment of the overall data quality is presented in Appendix C.

11. Laboratory Testing

11.1 Analytical Program

Laboratory testing for the DSI was undertaken by Envirolab Services Pty Ltd, a NATA registered laboratory. Analytical methods used are shown in the laboratory sheets in Appendix B.

A total of 15 soil samples (including two QA/QC soil samples) were selected to provide an assessment of soil / fill conditions. The samples were selected to target the identified potential sources of contamination (see Section 8) and were analysed for a range of the following potential contaminants:

- Total Recoverable Hydrocarbons (TRH);
- Benzene, Toluene, Ethyl Benzene, Xylene (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAH);
- Polychlorinated Biphenyls (PCBs);
- Organochlorine (OC) and Organophosphate (OP) Pesticides;
- Metals: Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb); Mercury (Hg), Nickel (Ni), Zinc (Zn), Manganese (Mn) and Iron (Fe).

QA / QC comprised analysis of two replicate soil sample. The results of QA / QC testing are presented in Appendix C.

In addition, two bonded fibro sheeting fragment samples and four soil sample was analysed for asbestos identification.

Following the receipt of total contaminant test results, acid leachability testing (TCLP) was conducted for waste classification purposes on nine selected soil samples.

Laboratory testing for ASS comprised a total of 22 ASS screening tests.

11.2 Analytical Results

The results of chemical analysis undertaken on soil / fibro fragment samples, including acid leach testing for waste classification, are summarised in Tables 21 to 24.

ASS screening results are shown in Table 25.

Table 21: Laboratory Results in Soil – Metals

Sample I.D	Depth (m)	PID (ppm)	As [3]	Cd	Cr [7]	Cu	Pb [4]	Pb TCLP	Hg [5,6]	Ni	Zn	Fe	Mn
101	0.5	<1	5	1.4	25	92	**440**	NT	0.6	27	1200	NT	NT
102	6	<1	<PQL	<PQL	38	25	10	NT	<PQL	35	47	NT	NT
103	7	<1	<PQL	<PQL	35	19	8	NT	<PQL	28	40	NT	NT
104	0.5	<1	6	1.2	26	120	**1400**	NT	1.1	36	830	NT	NT
104	3	<1	<PQL	<PQL	35	24	12	NT	<PQL	39	46	NT	NT
105	3.5	<1	<PQL	<PQL	28	16	7	NT	<PQL	23	34	NT	NT
106	2.5	<1	<PQL	<PQL	36	53	**110**	NT	0.2	38	77	NT	NT
107	0.0-0.2	<1	<PQL	<PQL	26	86	38	NT	<PQL	26	130	NT	NT
108	0.2	<1	7	0.6	29	44	**460**	NT	1.2	32	600	NT	NT
301	0.5	<1	<4	<0.4	10	35	**210**	NT	0.2	11	520	11000	210
302	0.1-0.3	<1	6	<0.4	7	10	6	NA	<0.1	10	40	18000	430
303	0.5	<1	<4	0.8	32	46	130	<0.03	0.5	33	300	27000	610
304	0.1	<1	<4	<0.4	28	35	140	<0.03	0.8	30	190	26000	470
305	0.6	<1	5	<0.4	18	47	250	<0.03	0.8	27	280	18000	330
306	0.5	<1	<4	<0.4	26	39	480	0.06	0.4	30	140	26000	330
306	3	<1	<4	<0.4	36	30	9	NA	<0.1	40	59	36000	870
307	0.5	<1	<4	<0.4	27	25	83	NA	0.3	28	93	27000	440
307	1.7	<1	<4	<0.4	25	36	230	<0.03	0.8	28	150	24000	440
308	0.5	<1	4	1	29	83	810	<0.03	<0.1	29	550	23000	420
308	2	<1	<4	<0.4	25	17	6	NA	<0.1	25	35	22000	520
D1/JPS	-	<1	4	0.8	24	69	810	0.08	1.1	26	510	22000	350
309	0-0.2	<1	<4	<0.4	19	19	81	NA	0.2	21	120	21000	320
309	1	<1	5	1	22	77	650	<0.03	1	28	720	23000	320
D3/JPS	-	<1	5	0.9	24	73	**2200**	<0.03	2.4	30	800	25000	400
D3/JPS TRIPLICATE	-	<1	4	0.7	26	67	**460**	NT	1.2	29	560	24000	390
Laboratory PQL			4	0.4	1	1	1	0.03	0.1	1	1	1	1
NEPM HIL D [1,2] (Ref 4)			3000	900	3600	240000	1500	NC	730	6000	400000	NC	60000
NSW EPA - General Solid Waste Guidelines - CT1 (Ref 6)			100	20	100	NC	100/1500*	5	4	40	NC	NC	NC
NSW EPA - Restricted Solid Waste Guidelines - CT2 (Ref 6)			400	80	400	NC	400/6000*	20	16	160	NC	NC	NC

Notes to Table 21:

All results in mg/kg on a dry weight basis
CT - Concentration Threshold
NA - Not Applicable
NC - No Criteria
NT - Not Tested
PID - Photoionisation Detector
PQL - Practical Quantitation Limits
SCC - Specific Contaminant Concentration
100 series sampels from Reference 1 (2011)
300 series samples from current investigation
D1/JPS is a replicate sample of 308/2.0
D3/JPS is a replicate of samples 309/1.0
1 - Health Based Criteria for Commerical / Industrial Land Use
2- HIL generally applies to the top 3m of soil
3- HIL assumes 70% oral bioavailability. Site-specific bioavailability may be important and should be considered where appropriate (refer Schedule B7)
4- HIL is based on blood lead models (adult lead model where 50% bioavailability has been considered. Site-specific bioavailability may be important and should be considered where appropriate (refer Schedule B7)
5- Assessment of methyl mercury should only be considered if there is evidence of its potential source.
6- HIL does not address elemental mercury
7 - Chromium (VI) (Conservative)
exceeds NEPM Health-Based Criteria for Commerical / Industrial Landuse
Bold results exceed NSW EPA Waste Classification Guidelines for General Solid Waste

Table 22: Laboratory Results in Soil – TRH and BTEX

Bore	Depth (m)	PID (ppm)	TRH				TRH (NEPM)						BTEX				
			C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	F1 (C_6-C_{10}-BTEX)	F2 (>C_{10}-C_{16} - Naphthalene)	C_6-C_{10}	>C_{10}-C_{16}	F3 (>C_{16}-C_{34})	F4 (>C_{34}-C_{40})	Benzene	Toluene	Ethyl Benzene	Xylenes	Naphthalene
101	0.5	<1	<PQL	<PQL	<PQL	<PQL	NA	NA	NA	NA	NA	NA	<0.2	<0.5	<1	<3	NA
102	6	<1	<PQL	<PQL	<PQL	<PQL	NA	NA	NA	NA	NA	NA	<0.2	<0.5	<1	<3	NA
103	7	<1	<PQL	<PQL	<PQL	<PQL	NA	NA	NA	NA	NA	NA	<0.2	<0.5	<1	<3	NA
104	0.5	<1	<PQL	180	210	130	NA	NA	NA	NA	NA	NA	0.3	2	<1	6	NA
104	3	<1	<PQL	<PQL	<PQL	<PQL	NA	NA	NA	NA	NA	NA	<0.2	<0.5	<1	<3	NA
105	3.5	<1	<PQL	<PQL	<PQL	<PQL	NA	NA	NA	NA	NA	NA	<0.2	<0.5	<1	<3	NA
106	2.5	<1	<PQL	<PQL	<PQL	<PQL	NA	NA	NA	NA	NA	NA	<0.2	<0.5	<1	<3	NA
107	0.0-0.2	<1	<PQL	<PQL	<PQL	<PQL	NA	NA	NA	NA	NA	NA	<0.2	<0.5	<1	<3	NA
108	0.2	<1	<PQL	<PQL	<PQL	<PQL	NA	NA	NA	NA	NA	NA	<0.2	<0.5	<1	<3	NA
301	0.5	<1	<25	<50	<100	<100	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1
302	0.1-0.3	<1	<25	<50	<100	<100	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1
303	0.5	<1	<25	<50	<100	<100	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1
304	0.1	<1	<25	<50	<100	<100	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1
305	0.6	<1	<25	<50	<100	140	<25	<50	<25	<50	190	<100	<0.2	<0.5	<1	<3	<1
306	0.5	<1	<25	<50	<100	<100	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1
306	3	<1	<25	<50	<100	<100	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1
307	0.5	<1	<25	<50	<100	<100	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1
307	1.7	<1	<25	<50	<100	<100	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1
308	0.5	<1	<25	<50	<100	<100	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1
308	2	<1	<25	<50	<100	<100	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1
D1/JPS	-	<1	<25	<50	<100	<100	<25	<50	<25	<50	150	<100	<0.2	<0.5	<1	<3	<1
309	0-0.2	<1	<25	<50	<100	<100	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1
309	1	<1	<25	<50	<100	<100	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1
D3/JPS	-	<1	<25	<50	<100	<100	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1
Laboratory PQL			25	50	100	100	25	50	25	50	100	100	0.2	0.5	1	3	1
NEPM HSL D [3] (Ref 4) SAND			NC	NC			260/370/630/NL [1]	NL/NL/NL/NL [1]	260	NL	NC		3/3/3/3 [1]	NL/NL/NL/NL [1]	NL/NL/NL/NL [1]	230/NL/NL/NL [1]	NL/NL/NL/NL [1]
Management limits for TPH fractions in coarse soils - Commercial/Industrial D [2]			NC	NC			NC	NC	700	1000	3500	10000	NC	NC	NC	NC	NC
NSW EPA - General Solid Waste Guidelines - CT1 (Ref 6)			650	10000 total			NC	NC	NC	NC	NC	NC	10	288	600	1000	NC
NSW EPA - Restricted Solid Waste Guidelines - CT2 (Ref 6)			2600	40000 total			NC	NC	NC	NC	NC	NC	40	1152	2400	4000	NC

Notes to Table 22:
All results in mg/kg on a dry weight basis
CT - Concentration Threshold
NA - Not Applicable
NC - No Criteria
NL - Non Limit
NT - Not Tested
PID - Photoionisation Detector
PQL - Practical Quantitation Limits
SCC - Specific Contaminant Concentration
1- Soil HSLs for vapour intrusion (mg/kg) for SAND samples recovered from 0 m to <1 m / 1 m to <2 m / 2 m to <4 m / >=4 m
2- Management limits are applied after consideration of relevant ESLs and HSLs
3- Multiplication factor may be applied (for depths >2m) subject to favourable biodegradation conditions - refer to 2.4.10
exceeds NEPM HSL Health-Based Criteria for Commercial / Industrial Landuse
Bold results exceed NSW EPA Waste Classification Guidelines for General Solid Waste without leachability testing

100 series sampels from Reference 1 (2011)
300 series samples from current investigation
D1/JPS is a replicate sample of 308/2.0
D3/JPS is a replicate of samples 309/1.0

Table 23: Laboratory Results in Soil – PAH, PCB, OCP, OPP

Bore	Depth (m)	PID (ppm)	Total PAH	Benzo(a) Pyrene	Benzo(a) Pyrene TCLP	Benzo(a) Pyrene TEQ	Total PCB [3]	Total OPP	Chlorpyrifos	Total OCP	Aldrin + Dieldrin	Chlordane	DDT+DDE+DDD	Endosulphan	Endrin	Heptachlor	HCB	Methoxychlor
101	0.5	<1	17	**1.8**	NT	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
102	6	<1	<PQL	<PQL	NT	NA	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
103	7	<1	<PQL	<PQL	NT	NA	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
104	0.5	<1	12.07	**0.97**	NT	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
104	3	<1	<PQL	<PQL	NT	NA	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
105	3.5	<1	<PQL	<PQL	NT	NA	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
106	2.5	<1	<PQL	<PQL	NT	NA	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
107	0.0-0.2	<1	0.26	0.06	NT	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
108	0.2	<1	12.5	**1.3**	NT	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
301	0.5	<1	1.5	0.2	NA	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
302	0.1-0.3	<1	<0.05	<0.05	NA	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
303	0.5	<1	12	1.2	<0.001	1.7	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
304	0.1	<1	4	0.4	NA	0.6	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
305	0.6	<1	25	3.5	<0.001	5.3	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
306	0.5	<1	4	0.54	NA	0.8	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
306	3	<1	<0.05	<0.05	NA	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
307	0.5	<1	1.3	0.2	NA	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
307	1.7	<1	5.1	0.6	NA	0.9	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
308	0.5	<1	14	1.2	<0.001	1.8	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
308	2	<1	<0.05	<0.05	NA	<0.5	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
D1/JPS	-	<1	8.5	0.88	<0.001	1.3	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
309	0-0.2	<1	4.4	0.4	NA	0.6	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
309	1	<1	17	1.6	<0.001	2.4	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
D3/JPS	-	<1	15	2	<0.001	2.9	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
Laboratory PQL			0.05	0.05	0.001	0.5	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1
NEPM HIL D [1] (Ref 4)			4000	NC	NA	40	7	NC	2000	NC	45	530	3600	2000	100	50	80	2500
NSW EPA - General Solid Waste Guidelines - CT1 (Ref 6)			200	0.8/10*	0.04	NC	50	NC	4	NC	NC	NC	NC	60	NC	NC	NC	NC
NSW EPA - Restricted Solid Waste Guidelines - CT2 (Ref 6)			800	3.2/23*	0.16	NC	50	NC	16	NC	NC	NC	NC	240	NC	NC	NC	NC

Notes to Table 23:

All results in mg/kg on a dry w eight basis
CT - Concentration Threshold
NA - Not Applicable
NC - No Criteria
NT - Not Tested
PID - Photoionisation Detector
PQL - Practical Quantitation Limits
SCC - Specific Contaminant Concentration
TEQ - Toxicity Equivalent Quotient
Total PAH - Sum of positive and PQL values
1 - Health Based Criteria for Commercial Land Use
exceeds NEPM Health-Based Criteria for Commercial/Industrial Landuse
Bold results exceed NSW EPA Waste Classification Guidelines for General Solid Waste

100 series sampels from Reference 1 (2011)
300 series samples from current investigation
D1/JPS is a replicate sample of 308/2.0
D3/JPS is a replicate of samples 309/1.0

Table 24: Laboratory Results – Asbestos in Soil and Materials

Sample ID	Sample Type	Asbestos Detected	Trace Analysis
Bore 101 / 0.5m	Filling	No asbestos detected at the reporting limit of 0.1 g/kg	No asbestos detected
Bore 104 / 0.5 m	Filling	No asbestos detected at the reporting limit of 0.1 g/kg	No asbestos detected
Pit 107 / 0.0 m to 0.2 m	Filling	No asbestos detected at the reporting limit of 0.1 g/kg	No asbestos detected
Pit 108 / 0.2 m	Filling	No asbestos detected at the reporting limit of 0.1 g/kg	No asbestos detected
Pit 301/0.5	Filling	No asbestos detected at the reporting limit of 0.1 g/kg	No asbestos detected
Pit 301/0.5	Material (fibro fragment)	Chrysotile Asbestos detected	NA
Pit 305/0.6	Soil	No asbestos detected at the reporting limit of 0.1 g/kg	No asbestos detected
Pit 306/0.5	Soil	No asbestos detected at the reporting limit of 0.1 g/kg	No asbestos detected
Pit 308/0.5	Soil	No asbestos detected at the reporting limit of 0.1 g/kg	No asbestos detected
Pit 308/0.5	Material (fibro fragment)	Chrysotile Asbestos detected	NA

Table 25: Results of Acid Sulfate Screening Tests

Sample ID	Sample Depth [a] (m)	Sample Description	Screening Test Results			
			pH			Strength of Reaction [b]
			pH_F	pH_{FOX}	pH_F - pH_{FOX}	
301	2	Dark brown silty clay	6.8	5.9	0.9	4, H
	2.7	Dark brown silty clay	6.8	6.6	0.2	
302	1.5	Dark brown silty clay	6.9	6.4	0.5	
	2	Dark brown silty clay	6.5	6.4	0.1	
	2.4	Dark brown silty clay	6.5	6.0	0.5	
303	0.1	Dark brown silty sandy clay filling	6.5	5.9	0.6	
	0.5	Dark brown silty sandy clay filling	6.4	6.0	0.4	
	0.7-1.0	Brown silty clay/clayey silt	6.5	6.1	0.4	
	1.5	Brown silty clay/clayey silt	6.6	6.3	0.3	
304	0.1	Dark brown clayey sandy silt filling	6.5	6.4	0.1	4, H
	0.5	Dark brown clayey sandy silt filling	6.6	6.5	0.1	
	0.7-1.0	Brown silty clay/clayey silt	6.8	6.6	0.2	
	1.5	Brown silty clay/clayey silt	6.8	6.6	0.2	
306	0.0-0.2	Brown silty sandy clay filling	6.5	6.2	0.3	
	0.5	Brown silty sandy clay filling	6.7	6.3	0.4	
	1.0	Dark brown silty clay	7.0	6.3	0.7	
	2	Dark brown silty clay	6.7	6.2	0.5	
	3	Dark brown silty clay	6.6	6.5	0.1	
308	0.0-0.2	Brown silty sandy clay filling	7.1	4.3	**2.8**	
	0.5	Dark brown silty sandy clay filling	6.8	6.5	0.3	4, H
	1	Dark brown silty sandy clay filling	6.3	6.3	0.0	4, H
	2	Dark brown silty clay	6.7	6.4	0.3	4, H
Guideline		Coarse sands, poorly buffered	<4[c]	<3.5[d]	≥1[d]	-
		Coarse sands to loamy sands and peats				
		Medium sandy loams to light clays				
		Fine medium to heavy clays & silty clays				

Notes to Table 25:

a Depth below ground surface

b Strength of Reaction

1 denotes no or slight reaction

2 denotes moderate reaction

3 denotes high reaction

4 denotes very vigorous reaction

F denotes bubbling/frothy reaction indicative of organics

H denotes heat generated

c For actual acid sulfate soils (ASS)

d Indicative value only for Potential Acid Sulfate Soils (PASS)

Bold/shaded results indicative of ASS

pH_F - Soil pH Test (1:5 soil:distilled water)

pH_{FOX} - Soil Peroxide pH Test (1:4 soil:distilled water following oxidation of soil with 30% hydrogen peroxide (H_2O_2))

The Acid Sulfate Soil Management Advisory Committee (ASSMAC) guidelines (Ref 7) suggest that a soil pH<4 in water is an indicator of actual ASS. The results of screening tests therefore suggest the absence of actual ASS at the locations and depths tested.

The ASSMAC guidelines (Ref 7) also suggest that indicators of potential acid sulphate soils (PASS) include the following:

- Soil pH <3.5 following oxidation with H_2O_2 (i.e. pH_{FOX});
- Drop of 1 pH unit or more between pH_F and pH_{FOX}.

The results of screening tests indicated that one near-surface sample tested exhibited a pH drop greater than one unit. No samples exhibited a soil pH following oxidation below 3.5.

It is noted that ASS screening tests are a qualitative method only and give an indication of the intensity of total acidification (pH). The guidelines indicate that peroxide may also oxidise organic matter (in addition to pyrite) to produce acids which are unlikely to form under natural conditions, thus giving falsely high indication of acid sulphate potential.

Based on the above, it is considered unlikely that the fill and natural soils tested at the site are ASS.

12. Site Assessment Criteria for Soils

12.1 Introduction

It is understood that the proposed development, will comprise a five-level commercial building and associated on-grade car parking. It is further understood that no basement excavation is proposed for the project with no access to soils proposed (i.e. entire footprint covered by concrete pavements).

The Site Assessment Criteria (SAC) applied in the current investigation are informed by the CSM which identified human and ecological receptors to potential contamination on the site (refer to Section 8). Analytical results were assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1, *National Environment Protection (Assessment of Site Contamination) Measure* 1999, as amended 2013 (NEPC, 2013). NEPC (2013) is endorsed by the NSW EPA under the CLM Act 1997.

The investigation and screening levels applied in the current investigation comprise levels adopted for a generic commercial / industrial land use scenario (HIL-D).

12.2 Health Investigation and Screening Levels

The generic HIL and HSL are considered to be appropriate for the assessment of contamination at the site. The adopted soil HIL and HSL for commercial (HIL/HSL D) for the potential contaminants of concern are presented in Table 26.

Table 26: HIL and HSL in mg/kg Unless Otherwise Indicated

Contaminants		HIL- D	HSL- D [4]
Metals	Arsenic	3000	NC
	Cadmium	900	NC
	Chromium (VI)	3600	NC
	Copper	240000	NC
	Lead	1500	NC
	Manganese	60000	NC
	Mercury (inorganic)	730	NC
	Nickel	6000	NC
	Zinc	400000	NC
PAH	Benzo(a)pyrene TEQ[1]	40	NC
	Naphthalene	NC	NL/NL/NL
	Total PAH	4000	NC
TRH	C6 – C10 (less BTEX) [F1]	NC	260/370/630
	>C10-C16 (less Naphthalene) [F2]	NC	NL/NL/NL
	>C16-C34 [F3]	NC	NC
	>C34-C40 [F4]	NC	NC
BTEX	Benzene	NC	3/3/3
	Toluene	NC	NL/NL/NL
	Ethylbenzene	NC	NLNL/NL
	Xylenes	NC	230/NL/NL
OCP	Aldrin + Dieldrin	45	NC
	Chlordane	530	NC
	DDT+DDE+DDD	3600	NC
	Endosulfan	2000	NC
	Endrin	100	NC
	Heptachlor	50	NC
	HCB	80	NC
	Methoxychlor	2500	NC
OPP	Chlorpyrifos	2000	NC
PCB [2]		7	NC

Notes to Table 26:

1 Sum of carcinogenic PAH

2 Non dioxin-like PCBs only.

3 The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds Csat, a soil vapour source concentration for a petroleum mixture could not exceed a level that would results in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'.

4 The HSL have been calculated for a potential vapour intrusion pathway, a sand soil based on subsurface conditions being the predominant soil type (Section 9.3) and an assumed depth to contamination of 0 m to <1 m / 1 m to < 2 m / 2 m to <4 m.

As shown in Table 26 the adopted HSLs are predicated on a potential vapour intrusion pathway, as identified in the CSM. Although the CSM also identifies a direct contact pathway, and construction worker receptors, the corresponding HSLs are significantly higher than those for the vapour intrusion pathway and are therefore not drivers for further assessment and/or remediation. As such the direct contact and intrusive maintenance worker HSLs have not been listed.

12.3 Ecological Investigation Levels

Ecological Investigation Levels (EIL) are not considered to be relevant for the proposed residential with minimal access to soil / commercial development due to the following:

- The fill materials present across the site are likely to be typical of the fill conditions across the broader Maitland area;
- The majority of the site will be capped with concrete slabs and pavements;
- The site is not considered to comprise an area of ecological significance due to the former landuse and extensive filling conducted;
- The site is extensively covered by pavements and as such would have limited environmental value related to terrestrial ecosystems.

12.4 Ecological Screening Levels

Ecological Screening Levels (ESL) are not considered to be relevant for the proposed residential with minimal access to soil / commercial development as discussed above.

12.5 Management Limits

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards;
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services.

The adopted management limits from Schedule B1 of NEPC (2013) are shown in the following Table 27.

Table 27: Management Limits in mg/kg

Analyte		Management Limit Residential	Management Limit Commercial	
TRH	$C_6 – C_{10}$ (F1) #	700	700	The management limits have been calculated for a coarse soil based on sands being the predominant soil type (Section 9.3) and residential, parkland and public open space / commercial and industrial landuse
	$>C_{10}-C_{16}$ (F2) #	1000	1000	
	$>C_{16}-C_{34}$ (F3)	2500	3500	
	$>C_{34}-C_{40}$ (F4)	10000	10000	

Notes to Table 27

Separate management limits for BTEX and naphthalene are not available hence these have not been subtracted from the relevant fractions to obtain F1 and F2

12.6 Asbestos in Soil

Asbestos only poses a risk to human health when asbestos fibres are made airborne and inhaled. If asbestos is bound in a matrix such as cement or resin, it is not readily made airborne except through substantial physical damage. Bonded ACM in sound condition represents a low human health risk, whilst both Fibrous Asbestos (FA) and Asbestos Fines (AF) materials have the potential to generate, or be associated with, free asbestos fibres. Consequently, FA and AF must be carefully managed to prevent the release of asbestos fibres into the air.

A detailed asbestos assessment was not undertaken as part of these works. Therefore the presence or absence of asbestos at a limit of reporting of 0.1 g/kg has been adopted for this assessment as an initial screen.

13. Assessment of Contamination

13.1 Analytical Results

Potential contaminant concentrations in all soil samples tested were within the health investigation levels for commercial land use (HIL-D) with the exception of D3/JPS, which is a replicate of the sample from Pit 309/1.0 which exceeded HIL D for lead. The primary sample, plus a laboratory triplicate sample, both indicated lead concentrations within the adopted criteria for the sample. The exceedance may be attributed to particulates in filling. It is noted that filling at the location included building rubble and ash.

Potential contaminant concentrations in all soil samples tested contained hydrocarbon concentrations within the health screening levels for commercial landuse (HSL-D), TRH management limits, direct contact HSLs and intrusive maintenance worker guidelines.

Based on the results of total concentrations and TCLP leachability testing results conducted as part of the current assessment, the tested soils were classified as 'General Solid Waste' for disposal to an appropriately licensed landfill. Samples not tested for TCLP analysis (i.e. samples from the 2011 assessment) exceeded 'General Solid Waste' criteria, however, are considered to meet the criteria for 'General Solid Waste' in conjunction with leachability testing based on the results of the current assessment.

Bonded asbestos-containing were encountered as fibro fragments in upper filling at two pit locations within the site (Pit 301 and Pit 308). It is noted that building rubble was encountered in fill materials across the site, which is indicative of the possible presence of additional hazardous building materials (HBM) including asbestos. The presence of additional asbestos materials in fill across the site therefore cannot be precluded. Analysis of selected soil/fill samples containing building rubble within the site indicated the absence of asbestos fines in the tested samples.

13.2 Revised Conceptual Site Model

The data collected for this assessment has generally confirmed that certain potential contaminant sources outlined in the CSM outlined in Section 8 pose a potentially complete pathway to the identified receptor(s) whilst others do not. No other sources of contamination have been identified as a result of the testing results. Historical site use suggests that some contaminants (i.e. TRH) likely to be from former service station use could migrate to groundwater, however, adverse impacts to soil have not been identified. Table 28 presents an updated assessment based on the CSM provided in Section 8.

Table 28: Updated Summary of Potential Complete Pathways Based on Proposed Land Use

Source	Transport Pathway	Receptor	Remediation Action Required
Imported filling across the site (subject to source)	Dermal contact, inhalation (dust/vapours), ingestion	Commercial site users, site workers, maintenance workers, construction workers, consultants, trespassers, surface water bodies, groundwater	Remediation/management required in areas where site users are potentially exposed to filling
Demolition of former structures or renovations to existing / former buildings	Dermal contact, inhalation (dust/vapours), ingestion	Commercial site users, site workers, maintenance workers, construction workers, consultants, trespassers, surface water bodies, groundwater	Controls should be in place for management of identified ACM disturbed during construction. Further investigation would be required to quantify whether the ACM in soil exceeds the relevant criteria for the proposed land use. Options for the management of ACM impacted fill include cap and contain, remediation of impacted soil and off-site disposal.
Various commercial activities (builders, butcher, chemist)	Dermal contact, inhalation (dust/vapours), ingestion	Commercial site users, site workers, maintenance workers, construction workers, consultants, trespassers, surface water bodies, groundwater	Testing of soil within the site indicates that contaminants associated with former land uses do not appear to be significantly impacting the site.
Storage of fuels, batteries, oils etc.	Dermal contact, inhalation (dust/vapours), ingestion	Commercial site users, site workers, maintenance workers, construction workers, consultants, trespassers, surface water bodies, groundwater	Testing of soil within the site indicates that contaminants associated with former land uses do not appear to be significantly impacting the site.
Repairs/servicing of vehicles and storage of vehicles / parts	Dermal contact, inhalation (dust/vapours), ingestion	Commercial site users, site workers, maintenance workers, construction workers, consultants, trespassers, surface water bodies, groundwater	Testing of soil within the site indicates that contaminants associated with former land uses do not appear to be significantly impacting the site.
USTs & associated Infrastructure	Dermal contact, inhalation (dust/vapours), ingestion	Commercial site users, site workers, maintenance workers, construction workers, consultants, trespassers, surface water bodies, groundwater	Testing of soil and contaminant observations within the site indicates that contaminants associated with the former land use as a service station do not appear to be significantly impacting the site.
Historical Pest Control	Dermal contact, inhalation (dust/vapours), ingestion	Commercial site users, site workers, maintenance workers, construction workers, consultants, trespassers, surface water bodies, groundwater	Testing of soil within the site indicates that contaminants associated with former land uses do not appear to be significantly impacting the site.

14. Comments

The results of site history and site observations conducted as part of the previous and current assessments indicated potential contaminant sources including fill materials of unknown origin, demolition of former structures, possible vehicle/parts storage and service/maintenance and a service station (including fuel storage).

Subsurface investigation and chemical laboratory testing conducted to target the above potential contaminant sources indicated the general absence of gross chemical contamination in filling and soils within the site to the depths investigated. One exceedance of the adopted lead criteria was encountered in a field replicate sample, which was not reproduced in the primary sample or subsequent laboratory triplicate sample. The exceedance may be attributed to particulates encountered within the filling containing building rubble and ash.

Asbestos-containing materials were encountered in upper filling, likely to be associated with historical demolition of structures. Building rubble was encountered in filling at the majority of test locations, which is indicative of the possible presence of hazardous building materials including asbestos.

The proposed administration building is located in the north-eastern portion of the site, with associated on-grade paved car parking proposed over the remainder of the site. The proposed development is shown in the drawing provided by Council (BVN Architecture, ref AR-A-XX-04, s1508005), Appendix D.

Based on the results of site history assessment, site observations, subsurface investigation and laboratory testing, the site could be made suitable for the proposed administration building landuse, subject to remediation and/or management of the identified contamination. Options for the remediation/management of the identified contamination include the following:

Off-site Disposal of Impacted Soils

Off-site disposal of impacted soils could be considered for remediation of the identified contamination. Following removal of the impacted soils from site, validation of the remaining soils would be required.

Although bonded asbestos materials (fibro fragments) were observed at two locations within the site, the presence of building rubble indicates the possible presence of additional asbestos impacts within filling across the site.

There are some areas of the site that have not been assessed due to access constraints (i.e. beneath asphalt pavements). Due to the presence of identified asbestos contamination in filling across the site, the presence of further contamination between sampling and testing points cannot be discounted.

On-site Management of Impacted Soils

On-site management of the identified contamination could be considered for the site, based on the general absence of gross chemical contamination in filling, the depth of groundwater (i.e. generally greater than 6 m depth from the ground surface) and the possible distribution of additional asbestos containing materials in filling.

On-site management of identified contaminated soil would require capping in situ, or within a purpose-built contaminant cell on site. Site capping options include capping with building slabs or pavements, and/or beneath a 'clean' soil cap (generally at least 0.3 m to 0.5 m thick). On-site management of contaminated soils would also require the implementation of a long-term Environmental Management Plan (EMP), and would also attract a notification on the property title. On-site management of contamination would also require regulatory approval.

Due to the historic commercial landuse and extensive filling conducted, the site is not currently considered to comprise an area of ecological significance. The development areas are proposed to be covered by pavements and buildings and as such would have limited environmental value related to terrestrial ecosystems. The applicability of EILs and ESLs for contamination assessment at the site should be assessed following review of the proposed development for the site (i.e. landscaped areas associated with the proposed development).

The assessment requirements and suitability for on-site management of identified contamination are subject to the proposed development and approvals from the appropriate consent authority for the proposed redevelopment of the site. Additional assessment may be required by Council, regulatory authority or an Auditor in the event of a review.

Site remediation should be conducted in accordance with a site-specific Remediation Action Plan (RAP) which would present remediation strategies, procedures and validation criteria for remediation of the site for the proposed commercial landuse.

It is noted that although asbestos containing materials were observed at localised test locations investigated for the assessment, there is a risk that such materials are present at additional locations due to the former site activities (i.e. demolition of former site structures), historical filling and possible association with anthropogenic materials within filling. The presence of additional asbestos containing materials within filling therefore cannot be precluded.

The subsurface investigation targeted areas of potential contamination at the site based on the results of site history review and field observations. Additional areas of contamination may be encountered during site clearing or earthworks. The RAP for the site should include contingency for the remediation of additional contamination if identified during earthworks and construction (i.e. unexpected finds protocol).

On the basis of the investigation, the site can be made suitable for the proposed administration building development subject to remediation/management of the identified contamination in accordance with a site-specific RAP.

15. References

1. Douglas Partners Pty Ltd, "Report on Preliminary Geotechnical Investigation and Contamination Testing, Proposed Administration Building, 263 High Street Maitland, Project 49797, prepared for Maitland City Council, August 2011".
2. Douglas Partners Pty Ltd, "Report on Geotechnical Investigation, Proposed Administration Building, 263 High Street Maitland, Project 49797.01, September 2018".

3. NSW EPA (2011), Guidelines for Consultants Reporting on Contaminated Sites, NSW Environmental Protection Authority, August 2011.
4. National Environment Protection Council "National Environment Protection (Assessment of Site Contamination) Measure 1999" (the ASC NEPM), April 2013 (NEPC 2013).
5. AMAC Archaeological, "Historical Research, 273 High Street Maitland, for John Carr Heritage Design, April 2018".
6. NSW EPA 'Waste Classification Guidelines, Part 1: Classifying Waste', November 2014.
7. ASSMAC, "ASSMAC Acid Sulphate Soil Manual", New South Wales Acid Sulphate Soil Management Advisory Committee, August 1998.

16. Limitations

Douglas Partners (DP) has prepared this report for this project at 263 High Street Maitland with reference to DP's proposal dated 17 April 2018 and 7 May 2018 and acceptance received from Maitland City Council dated 7 May 2018. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Maitland City Council for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Asbestos has been detected by observation and by laboratory analysis in fill materials at the test locations sampled and analysed. Building demolition materials, such as concrete, brick and ceramic were also located in below-ground filling and these are considered as indicative of the possible presence of hazardous building materials (HBM), including asbestos.

Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions or to budget constraints (as discussed above), or to parts of the site being inaccessible and not available for inspection/sampling or to vegetation preventing visual inspection and reasonable access. It is therefore considered possible that additional HBM, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that additional asbestos is not present.

Groundwater sampling and testing has not been conducted by DP at the site to confirm groundwater quality. It is noted, however, that there were no observations of gross contamination in groundwater (i.e. odours or staining) during previous or concurrent geotechnical drilling at the site where groundwater was encountered at depths of approximately 6 m to 7 m below the ground surface.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the environmental components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

About This Report
Sampling Methods
Soil Descriptions
Symbols and Abbreviations
Test Pit Logs (Pit 301, Pits 303 to 309, Pits 107 and 108)
Borehole Logs (Bore 302, Bores 101 to 106, Bores 401 and 403)

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

Douglas Partners

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726-1993, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Symbols & Abbreviations

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

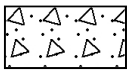
Symbols & Abbreviations

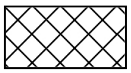
Graphic Symbols for Soil and Rock

General

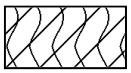

Asphalt

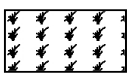

Road base

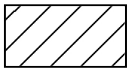

Concrete

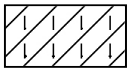

Filling

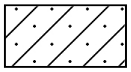
Soils


Topsoil

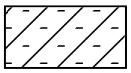

Peat

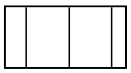

Clay

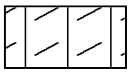

Silty clay

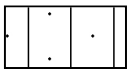

Sandy clay

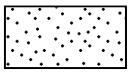

Gravelly clay

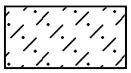

Shaly clay

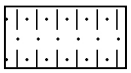

Silt


Clayey silt


Sandy silt

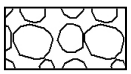

Sand

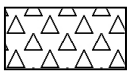

Clayey sand


Silty sand


Gravel

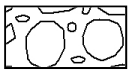

Sandy gravel


Cobbles, boulders

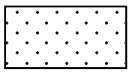

Talus

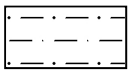
Sedimentary Rocks

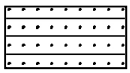

Boulder conglomerate

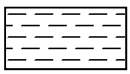

Conglomerate


Conglomeratic sandstone

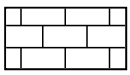

Sandstone


Siltstone

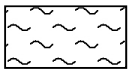

Laminite

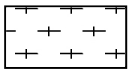

Mudstone, claystone, shale

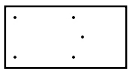

Coal


Limestone

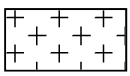
Metamorphic Rocks

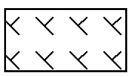

Slate, phyllite, schist

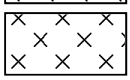

Gneiss

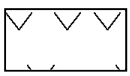

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

TEST PIT LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: High Street, Maitland

SURFACE LEVEL: --
EASTING: 365171
NORTHING: 6376885

PIT No: 301
PROJECT No: 49797.01
DATE: 19/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILLING - Generally comprising pale brown gravelly silty sand filling with subrounded gravel approximately 50mm diameter, moist		D	0.0	E			
					0.2				
	0.4	FILLING - Generally comprising dark brown silty sand filling with some to abundant, brick, ceramic and some coal, ash and subrounded gravel with trace silty clay, trace fibro and metal, moist		D	0.5	E			
	1								1
	1.2	SILTY CLAY - Dark brown silty clay, M>Wp			1.3				
				U	1.5	E			
				D					
					1.7		pp = 150		
	2			D	2.0	E			2
				D	2.7	E	pp = 100-200		
	2.8	Pit discontinued at 2.8m, limit of investigation							
	3								3
	4								4

RIG: 3.5 Tonne Excavator with 450mm tooth bucket

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING: 365129
NORTHING: 6376870
DIP/AZIMUTH: 90°/--

BORE No: 302
PROJECT No: 49797.01
DATE: 19/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.05	ASPHALT							
		FILLING - Generally comprising pale brown gravelly silty sand with trace cobbles at 100mm diameter, moist		A	0.1	E, B			
					0.3				
	0.6	FILLING - Generally comprising dark grey silty sand filling with some brick fragments, coal, ash and trace clay, moist		A	0.7	E			
	1				0.9				1
	1.2	SILTY CLAY - Dark brown silty clay, M>Wp		A	1.5	E, B			
	2			A	2.0	E, B			2
				A	2.4	E, B			
	2.5	Bore discontinued at 2.5m, limit of investigation							
	3								3
	4								4

RIG: 3.5 Tonne Excavator **DRILLER:** Sebastian **LOGGED:** Sebastian **CASING:** Uncased

TYPE OF BORING: 3.5 Tonne Excavator with 450mm

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: High Street, Maitland

SURFACE LEVEL: --
EASTING: 365141
NORTHING: 6376847

PIT No: 303
PROJECT No: 49797.01
DATE: 19/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
		FILLING - Generally comprising dark brown silty sandy clay filling with some glass and brick, moist		D	0.1	E, A			
				D	0.5	E, A			
	0.6	SILTY CLAY / CLAYEY SILT - Brown,silty clay / clayey silt with some sand, M>Wp, moist		D	0.7	E, A			
	1			D	1.0				
				D	1.5	E, A			
	2	2.0 Pit discontinued at 2.0m, limit of investigation							
	3								
	4								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 3.5 Tonne Excavator with 450mm tooth bucket

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: High Street, Maitland

SURFACE LEVEL: --
EASTING: 365185
NORTHING: 6376808

PIT No: 304
PROJECT No: 49797.01
DATE: 19/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
		FILLING - Generally comprising dark brown clayey sandy silt with abundant brick, ceramic pipe and concrete and gravel		D	0.1	E, A			
				D	0.5	E, A			
	0.6	SILTY CLAY / CLAYEY SILT - Brown silty clay / clayey silt with some sand, M>Wp, moist		B	0.7	E, A			
	1			D	1.0	E, A			
	2				1.5				
	2.0	Pit discontinued at 2.0m, limit of investigation							
	3								
	4								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 3.5 Tonne Excavator with 450mm tooth bucket

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: High Street, Maitland

SURFACE LEVEL: --
EASTING: 365170
NORTHING: 6376842

PIT No: 305
PROJECT No: 49797.01
DATE: 19/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
		FILLING - Generally comprising brown silty sand clay filling with some gravel, bricks, coal, ash and ceramics, moist		D	0.0				
					0.2				
					0.3				
				U_{50}					
				D	0.6				
					0.7				
	0.9								
		SILTY CLAY - Dark brown silty clay, M>Wp		D	1.0				
				D	2.0				
				D	2.5				
	2.8								
		Pit discontinued at 2.8m, limit of investigation							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2, 3, 4

RIG: 3.5 Tonne Excavator with 450mm tooth bucket

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: High Street, Maitland

SURFACE LEVEL: --
EASTING: 365180
NORTHING: 6376841

PIT No: 306
PROJECT No: 49797.01
DATE: 19/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
		FILLING - Generally comprising brown silty sandy clay filling with some gravel, brick, ash, coal and ceramics, M>Wp		D	0.0	E, A			
					0.2				
					0.3				
				U_{50} D	0.5	E, A			
	0.6	SILTY CLAY - Dark brown silty clay, M>Wp			0.7				
	1			D	1.0	E, A	pp = 100		1
	2			D	2.0	E, A	pp = 300		2
	3			D	3.0	E, A			3
	3.2	Pit discontinued at 3.2m, limit of investigation							
	4								4

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 3.5 Tonne Excavator with 450mm tooth bucket

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

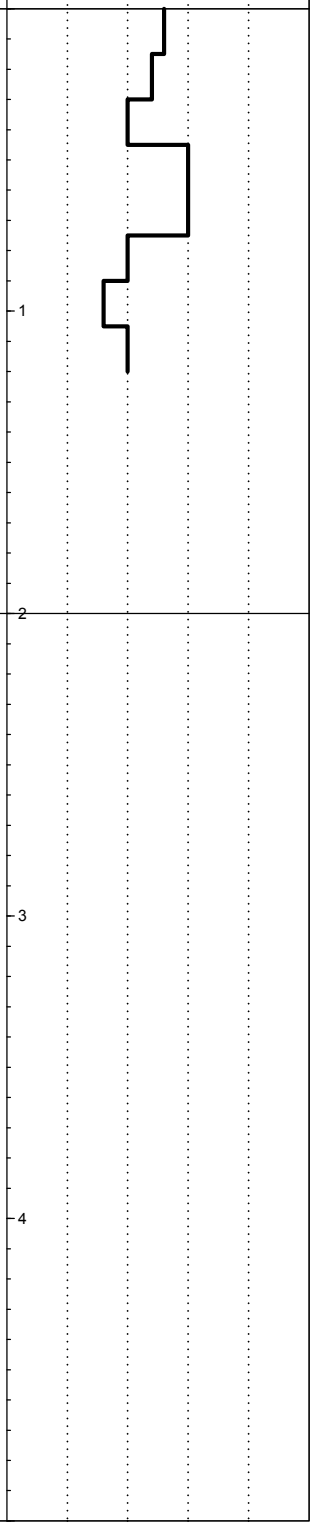
TEST PIT LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: High Street, Maitland

SURFACE LEVEL: --
EASTING: 365185
NORTHING: 6376855

PIT No: 307
PROJECT No: 49797.01
DATE: 19/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILLING - Generally comprising pale brown sandy silty clay filling with trace ceramics and gravel, M>Wp		D	0.0	E, A			
					0.2				
	0.4	FILLING - Generally comprising brown silty sandy clay filling with trace ceramics, brick, some subrounded gravel From 0.45m to 0.6m, concrete boulders		D	0.5	E, A			
1				D	1.0	E, A			
				D	1.7	E, A			
		From 1.8m, increased resistance (possible natural)							
2	2.0	Pit discontinued at 2.0m, virtual refusal							
3									
4									



RIG: 3.5 Tonne Excavator with 450mm tooth bucket

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Concrete slab adjacent to pit from 0.4m

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: High Street, Maitland

SURFACE LEVEL: --
EASTING: 365172
NORTHING: 6376868

PIT No: 308
PROJECT No: 49797.01
DATE: 19/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILLING - Generally comprising brown silty sandy clay filling, M>Wp		D	0.0	E, A			
	0.2								
	0.3	FILLING - Generally comprising dark brown silty sandy clay filling, M≫Wp From 0.4m to 1.0m, some pale brown and grey ash and fibro, abundant brick and some ceramics and timber		D	0.5	E, A			
	1			D	1.0	E, A			
	1.6	SILTY CLAY - Dark brown silty clay, M>Wp							
	2			D	2.0	E, A			
	2.7	Pit discontinued at 2.7m, limit of investigation							
	3								
	4								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 3.5 Tonne Excavator with 450mm tooth bucket

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: High Street, Maitland

SURFACE LEVEL: --
EASTING: 365161
NORTHING: 6376852

PIT No: 309
PROJECT No: 49797.01
DATE: 19/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILLING - Generally comprising brown silty sandy clay filling, M>Wp		D	0.0	E, A			
	0.3	FILLING - Generally comprising dark brown silty sand with some gravel, clay and abundant bricks, ash and trace ceramics and timber, glass		D	0.2	E, A			
		From 0.8m, no bricks		D	0.5	E, A			
	1			D	1.0	E, A			
	1.4	SILTY CLAY - Dark brown silty clay, M>Wp		D	1.5	E, A	pp = 100-200		
	2			D	2.0	E, A	pp = 100-200		
				D	2.7	E, A			
	2.8	Pit discontinued at 2.8m, limit of investigation							
	3								
	4								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 3.5 Tonne Excavator with 450mm tooth bucket

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Adjacent to unknown scanned pipe

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Maitland City Council
PROJECT: Preliminary Soil Assessment
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 101
PROJECT No: 49797
DATE: 3/8/2011
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.2	FILLING - Grey brown fine to medium grained clayey silty sand filling, moist		A, PID	0.1		<1 ppm		
		FILLING - Dark grey brown fine to medium grained clayey silty sand filling, with trace bricks and tiles, moist		A, PID	0.5		<1 ppm		
	1			A, PID	1.0		<1 ppm		1
	1.3	CLAYEY SILTY SAND - Brown fine to medium grained clayey silty sand, moist		A, PID	1.5		<1 ppm		
	1.8	SILTY CLAY - Dark brown silty clay with some sand, M<Wp		A, PID	2.0		<1 ppm		
	2	From 2.0m, becoming light brown		A, PID	2.5		<1 ppm		2
	3			A, PID	3.0		<1 ppm		3
	3.2	SANDY CLAY - Light brown medium grained sandy clay, M>Wp		A, PID	3.5		<1 ppm		
	4			A, PID	4.0		<1 ppm		4
	4.05	Bore discontinued at 4.05m, limit of investigation							
	5								5
	6								6
	7								7
	8								8
	9								9

RIG: BA Mack II **DRILLER:** Fico **LOGGED:** Sebastian **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed during drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics I Environment I Groundwater

BOREHOLE LOG

CLIENT: Maitland City Council
PROJECT: Preliminary Soil Assessment
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 102
PROJECT No: 49797
DATE: 3/8/2011
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.2	FILLING - Grey/brown fine to medium grained clayey silty sand filling with some building rubble inclusions (concrete, glass, bricks) moist		A, PID	0.1		<1 ppm		
		FILLING - Dark grey/brown fine to medium grained clayey silty sand filling, moist		A, PID	0.5		<1 ppm		
	1			A, PID	1.0		<1 ppm		1
	1.2	SILTY CLAY - Dark brown silty clay with trace sand, M<Wp		A, PID	1.5		<1 ppm		
	2			A, PID	2.0		<1 ppm		2
				A, PID	2.5		<1 ppm		
		From 2.7m, light brown silty clay with some sand							
	3			A, PID	3.0		<1 ppm		3
	3.4	SANDY CLAY/CLAYEY SAND - Light brown fine grained sandy clay, dry to moist		A, PID	3.5		<1 ppm		
	4			A, PID	4.0		<1 ppm		4
				A, PID	4.5		<1 ppm		
	5			A, PID	5.0		<1 ppm		5
	6	From 6.0m, moisture content increasing, slight hydrocarbon odour		A, PID	6.0		<1 ppm		6
	7							▼	7
		From 7.50m, saturated							
	8			A, PID	8.0		<1 ppm		8
	8.05	Bore discontinued at 8.05m, limit of investigation							
	9								9

RIG: BA Mack II **DRILLER:** Fico **LOGGED:** Sebastian **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 7.5m during drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Maitland City Council
PROJECT: Preliminary Soil Assessment
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 103
PROJECT No: 49797
DATE: 3/8/2011
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.2	FILLING - Brown fine to medium grained clayey silty sand filling with rootlet inclusions, moist		A, PID	0.1		<1 ppm		
		FILLING - Brown, dark brown clayey silty sand filling with building rubble inclusions (brick, tiles), moist		A, PID	0.5		<1 ppm		
	1			A, PID	1.0		<1 ppm		1
				A, PID	1.5		<1 ppm		
	2			A, PID	2.0		<1 ppm		2
	2.4	SILTY CLAY - Dark brown silty clay, with some sand, M~Wp		A, PID	2.5		<1 ppm		
	3			A, PID	3.0		<1 ppm		3
		From 3.5m, sand content increasing, light brown		A, PID	3.5		<1 ppm		
	4			A, PID	4.0		<1 ppm		4
				A, PID	4.5		<1 ppm		
	5			A, PID	5.0		<1 ppm		5
	5.3	CLAYEY SAND - Light brown grey medium grained clayey sand, moist							
	6			A, PID	6.0		<1 ppm		6
	7	From 7.0m, saturated		A, PID	7.0		<1 ppm	▼	7
	7.3	Bore discontinued at 7.3m, limit of investigation							
	8								8
	9								9

RIG: BA Mack II **DRILLER:** Fico **LOGGED:** Sebastian **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 7.0m during drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Maitland City Council
PROJECT: Preliminary Soil Assessment
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 104
PROJECT No: 49797
DATE: 3/8/2011
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	FILLING - Brown fine to medium grained clayey silty sand filling with rootlet inclusions, moist		A, PID	0.1		<1 ppm		
	0.3	FILLING - Dark brown clayey sandy silt filling with trace building rubble inclusions (brick, tiles), moist		A, PID	0.5		<1 ppm		
	1			A, PID	1.0		<1 ppm		
				A, PID	1.5		<1 ppm		
	2			A, PID	2.0		<1 ppm		
				A, PID	2.5		<1 ppm		
	2.8	SILTY CLAY - Brown medium grained silty clay with trace sand, M<Wp		A, PID	3.0		<1 ppm		
	3	From 3.30m, light brown		A, PID	3.5		<1 ppm		
		From 3.8m, more moist		A, PID	4.0		<1 ppm		
	4								
	5								
	5.5	CLAYEY SAND - Light brown clayey sand, moist							
	6								
	7			A, PID	7.0		<1 ppm	▼	
	7.1	From 7.0m, saturated Bore discontinued at 7.1m, limit of investigation							
	8								
	9								

RIG: BA Mack II **DRILLER:** Fico **LOGGED:** Sebastian **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 7.0m during drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Maitland City Council
PROJECT: Preliminary Soil Assessment
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 105
PROJECT No: 49797
DATE: 3/8/2011
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	FILLING - Brown clayey silty sand filling with rootlet inclusions, moist		A, PID	0.1		<1 ppm		
	0.3	FILLING - Dark brown clayey silty sand filling with building rubble inclusions (bricks, tiles, concrete), moist		A, PID	0.5		<1 ppm		
	1			A, PID	1.0		<1 ppm		
				A, PID	1.5		<1 ppm		
	2			A, PID	2.0		<1 ppm		
	2.2	SILTY CLAY - Dark brown fine to medium grained silty clay, M≤Wp		A, PID	2.5		<1 ppm		
	3			A, PID	3.0		<1 ppm		
	3.3	SANDY CLAY - Light brown fine grained sandy clay, M<Wp		A, PID	3.5		<1 ppm		
	4			A, PID	4.0		<1 ppm		
	4.1	Bore discontinued at 4.1m, limit of investigation							
	5								
	6								
	7								
	8								
	9								

RIG: BA Mack II **DRILLER:** Fico **LOGGED:** Sebastian **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed during drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Maitland City Council
PROJECT: Preliminary Soil Assessment
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 106
PROJECT No: 49797
DATE: 3/8/2011
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.3	FILLING - Brown fine to medium grained clayey silty sand filling with rootlet inclusions, moist		A, PID	0.1		<1 ppm		
		FILLING - Brown medium grained silty sandy clay filling with building rubble inclusions (glass, bricks, concrete), moist		A, PID	0.5		<1 ppm		
	1			A, PID	1.0		<1 ppm		
				A, PID	1.5		<1 ppm		
	1.7	SILTY SANDY CLAY - Dark brown medium grained silty sandy clay, M≤Wp		A, PID	2.0		<1 ppm		
	2			A, PID	2.5		<1 ppm		
	2.8	SANDY CLAY - Light brown fine grained sandy clay, moist, M~Wp		A, PID	3.0		<1 ppm		
	3			A, PID	3.5		<1 ppm		
	3.7	Bore discontinued at 3.7m, limit of investigation							
	4								
	5								
	6								
	7								
	8								
	9								

RIG: BA Mack II **DRILLER:** Fico **LOGGED:** Sebastian **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed during drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U$_x$	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Maitland City Council
PROJECT: Preliminary Soil Assessment
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 107
PROJECT No: 49797
DATE: 3/8/2011
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - Grey brown clayey silty sand filling with bricks, moist		D, PID	0.0		<1 ppm		
					0.2				
	0.3	Pit discontinued at 0.3m, slow progress on bricks							

RIG: Hand Tools
LOGGED: Sebastian
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed during drilling

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Maitland City Council
PROJECT: Preliminary Soil Assessment
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

PIT No: 108
PROJECT No: 49797
DATE: 3/8/2011
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - Dark grey brown silty clayey sand filling with some crushed concrete/mortar (coarse sand/fine grained size), trace coal, trace brick fragments and ceramic (china), moist		D, PID	0.05		<1 ppm		
				D, PID	0.2		<1 ppm		
	0.3	SILTY CLAYEY SAND (FILLING?) - Grey brown fine to medium grained silty clayey sand, moist		D, PID	0.35		<1 ppm		
	0.4	Pit discontinued at 0.4m, limit of investigation							

RIG: Hand Tools
LOGGED: Sebastian
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed during drilling

REMARKS: At CPT4 location

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 401
PROJECT No: 49797.01
DATE: 30/5-1/6/18
SHEET 1 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW, HW, MW, SW, FS, FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		FILLING - Generally comprising grey-brown clayey sand filling, some fine coal, moist										
	0.8	SILTY CLAY - Grey brown silty clay, some silty sand bands, M>Wp										
	1											
	2											
	3											
	4											
	5											
	6											
	7											
	8											
	9											

RIG: TD106 **DRILLER:** Total Drilling (Keirnan) **LOGGED:** Parkinson **CASING:** HQ to 6m

TYPE OF BORING: Wash bore to 13m, rock roller to 24.5m, NMLC core to 28.4m

WATER OBSERVATIONS: No free groundwater observed observations obscured by drilling fluids

REMARKS: Strengths and strata pre 19m inferred from CPT 201

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 401
PROJECT No: 49797.01
DATE: 30/5-1/6/18
SHEET 2 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	11	SILTY CLAY - Grey brown silty clay, some silty sand bands, M>Wp *(continued)*										
	12 12.0	SAND AND GRAVEL - Brown fine to coarse grained sand and gravel, gravel fine to coarse sized and subrounded with some possible cobbles										
	13											
	14											
	15											
	16											
	17											
	18											
	19											

RIG: TD106 **DRILLER:** Total Drilling (Keirnan) **LOGGED:** Parkinson **CASING:** HQ to 6m

TYPE OF BORING: Wash bore to 13m, rock roller to 24.5m, NMLC core to 28.4m

WATER OBSERVATIONS: No free groundwater observed observations obscured by drilling fluids

REMARKS: Strengths and strata pre 19m inferred from CPT 201

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 401
PROJECT No: 49797.01
DATE: 30/5-1/6/18
SHEET 3 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
	20.5	SANDY SILTY CLAY - Stiff, brown-orange, fine grained sandy silty clay, silt content increasing with depth, M>Wp							S			pp = 190-210 7,8,7 N = 15
	21											
	22								S			3,7,6 N = 13
	23 23.0	SANDY GRAVEL - Brown, fine to coarse grained sandy gravel, gravel medium to cobble sized with possible boulders										
	24 24.1	SILTSTONE - Extremely low to very low strength, slightly weathered, dark grey stained orange siltstone, some fine grained sand							S			pp >600 32,-,- refusal
	24.5							24.5m: CORE LOSS: 50mm				
	24.55	CORE LOSS - 0.05m - probable siltstone						24.63m: J, 30°, ir, ro, stnfe 24.72m: J, 40°, ir, ro, stnfe 24.82m: J, 10°, ir, ro, stnfe 24.84m: J, 10°, ir, ro, stnfe 24.96m: PT, sh, ir, ro, stnfe From 25m to 25.25m, J, 10°, pl, ro, stnfe, spaced generally 50mm 25.4m: PT, sh, pl, ro, stnfe 25.48m: PT, sh, pl, ro, stnfe 26.28m: PT, sh, pl, sm 26.74m: PT, sh, ro 26.78m: PT, sh, ro	C	98	74	PL(A) = 0.4 PL(A) = 0.71 PL(D) = 0.83 PL(A) = 0.98 PL(D) = 0.52
	24.6	SILTSTONE - Extremely to very low strength, slightly weathered, dark grey siltstone stained orange										
	25	SILTSTONE - Medium strength, slightly weathered, dark grey siltstone, slightly fractured From 25.7m, fresh										
	26											
	27											
	27.8							27.67m: Cs, sh, pl, inf, 3mm clay 27.89m: PT, sh, ir, ro	C	100	100	
	28 28.05	TUFFACEOUS SILTSTONE - Low to medium strength, fresh, pale white tuffaceous siltstone										PL(A) = 0.37 PL(A) = 0.9 PL(D) = 0.93
	28.4	SILTSTONE - Medium strength, fresh, dark grey siltstone, slightly fractured Bore discontinued at 28.4m, limit of investigation										
	29											

RIG: TD106 **DRILLER:** Total Drilling (Keirnan) **LOGGED:** Parkinson **CASING:** HQ to 6m

TYPE OF BORING: Wash bore to 13m, rock roller to 24.5m, NMLC core to 28.4m

WATER OBSERVATIONS: No free groundwater observed observations obscured by drilling fluids

REMARKS: Strengths and strata pre 19m inferred from CPT 201

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 403
PROJECT No: 49797.01
DATE: 29-30/5/18
SHEET 1 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	0.8	FILLING - Generally comprising brown fine to medium grained sand filling with some brick, trace wire, humid										
	1	SILTY CLAY - Dark grey silty clay, some fine to medium grained sand, M>Wp										
	2											
	3											
	4											
	5											
	5.0	CLAYEY SAND - Brown, fine to medium grained clayey sand										
	6											
	6.0	SANDY CLAY - Brown, fine to medium grained sandy clay										
	7											
	8											
	9											

RIG: TD106 **DRILLER:** Total Drilling (Mark) **LOGGED:** Parkinson **CASING:** HW to 6m, HQ to 21m

TYPE OF BORING: Wash bore to 23.8m (refusal), NMLC core to 25m, rock roller from 25m to 26m, NMLC core to 29.1m

WATER OBSERVATIONS: No free groundwater observed observations obscured by drilling fluids

REMARKS: From 17.7m to 21m, gravel based on drilling observations and cuttings due to bore collapse. Strengths and strata pre ???m inferred from CPT 203

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 403
PROJECT No: 49797.01
DATE: 29-30/5/18
SHEET 2 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		SANDY CLAY - Brown, fine to medium grained sandy clay *(continued)*										
	11											
	12											
	13 13.0	SAND AND GRAVEL - Dense, brown, medium to coarse grained sand and gravel, gravel fine to coarse sized and subrounded with some possible cobbles										
	14								S			11,16,15 N = 31
	15											
	16								S			11,15,18 N = 33
	17								S			10,8,13 N = 21
	18											
	19								(S)			23,25/110mm,- refusal
	20.0	From 19.5m to 20m, possible large gravel / cobble										

RIG: TD106 **DRILLER:** Total Drilling (Mark) **LOGGED:** Parkinson **CASING:** HW to 6m, HQ to 21m

TYPE OF BORING: Wash bore to 23.8m (refusal), NMLC core to 25m, rock roller from 25m to 26m, NMLC core to 29.1m

WATER OBSERVATIONS: No free groundwater observed observations obscured by drilling fluids

REMARKS: From 17.7m to 21m, gravel based on drilling observations and cuttings due to bore collapse. Strengths and strata pre ???m inferred from CPT 203

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Maitland City Council
PROJECT: Proposed Administration Building
LOCATION: 263 High Street, Maitland

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 403
PROJECT No: 49797.01
DATE: 29-30/5/18
SHEET 3 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	21	SANDY SILTY CLAY - Stiff, brown-orange fine grained sandy silty clay, silt content increasing with depth, M>Wp							S			pp = 150 8,10,13 N = 23
	22											
	23								S			pp = 180 5,6,8 N = 14
	23.8											
	24	SANDY GRAVEL - Brown, fine to coarse grained sandy gravel, gravel medium to cobble sized and subrounded, possible boulders						24.08m: CORE LOSS: 540mm	C	60	0	
	24.08	CORE LOSS - 0.53m							C	54	0	
	24.62	SANDY GRAVEL - Brown, fine to coarse grained sandy gravel, gravel medium to cobble sized and subrounded, possible boulders						25m: CORE LOSS: 1000mm				
	25 25.0	ROCK ROLLER - Inferred siltstone at 25.3m depth from drilling observations							C	0	0	
	26 26.0	SILTSTONE - Medium strength, fresh, grey siltstone, trace coarse pebbles in parts, slightly fractured						26.04m: PT, 20°, pl, sm 26.09m: PT, 20°, pl, sm 26.24m: J, 10°, ir, ro 26.28m: J, 20°, ir, ro 26.61m: PT, sh, pl, ro 26.65m: PT, sh, pl, ro 27.08m: PT, sh, pl, sm 28.23m: PT, sh, pl, ro 28.74m: J, 10°, ir, ro, vn clay 28.81m: J, 10°, ir, ro, vn clay	C	100	94	PL(A) = 0.42 PL(D) = 0.12 PL(A) = 0.53 PL(D) = 0.44 PL(A) = 0.67 PL(D) = 0.61 PL(A) = 0.5 PL(D) = 0.53
	27											
	28											
	29											
	29.1	Bore discontinued at 29.1m, limit of investigation										

RIG: TD106 **DRILLER:** Total Drilling (Mark) **LOGGED:** Parkinson **CASING:** HW to 6m, HQ to 21m

TYPE OF BORING: Wash bore to 23.8m (refusal), NMLC core to 25m, rock roller from 25m to 26m, NMLC core to 29.1m

WATER OBSERVATIONS: No free groundwater observed observations obscured by drilling fluids

REMARKS: From 17.7m to 21m, gravel based on drilling observations and cuttings due to bore collapse. Strengths and strata pre ???m inferred from CPT 203

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Appendix B

Laboratory Reports

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 192766

Client Details

Client	Douglas Partners Newcastle
Attention	Patrick Heads, Paulo Sebastian
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**49797.01**
Number of Samples	2 Soil and Material, 13 Soil, 2 Soil and Material
Date samples received	29/05/2018
Date completed instructions received	29/05/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	05/06/2018
Date of Issue	05/06/2018

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Dragana Tomas, Senior Chemist
Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals
Lucy Zhu, Asbsestos Analyst
Priya Samarawickrama, Senior Chemist
Steven Luong, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		192766-1	192766-2	192766-3	192766-4	192766-5
Your Reference	UNITS	301	302	303	304	305
Depth		0.5	0.1-0.3	0.5	0.1	0.6
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil and Material	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	84	89	88	87	86

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		192766-6	192766-7	192766-8	192766-9	192766-10
Your Reference	UNITS	306	306	307	307	308
Depth		0.5	3.0	0.5	1.7	0.5
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil and Material
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	84	90	84	83	87

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		192766-11	192766-12	192766-13	192766-14	192766-15
Your Reference	UNITS	308	309	309	D1/JPS	D3/JPS
Depth		2.0	0-0.2	1.0	-	-
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	93	84	86	91	90

svTRH (C10-C40) in Soil						
Our Reference		192766-1	192766-2	192766-3	192766-4	192766-5
Your Reference	UNITS	301	302	303	304	305
Depth		0.5	0.1-0.3	0.5	0.1	0.6
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil and Material	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	140
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	190
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	190
Surrogate o-Terphenyl	%	100	100	103	100	102

svTRH (C10-C40) in Soil						
Our Reference		192766-6	192766-7	192766-8	192766-9	192766-10
Your Reference	UNITS	306	306	307	307	308
Depth		0.5	3.0	0.5	1.7	0.5
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil and Material
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	113	101	100	101	101

svTRH (C10-C40) in Soil						
Our Reference		192766-11	192766-12	192766-13	192766-14	192766-15
Your Reference	UNITS	308	309	309	D1/JPS	D3/JPS
Depth		2.0	0-0.2	1.0	-	-
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	150	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	150	<50
Surrogate o-Terphenyl	%	101	109	100	102	101

PAHs in Soil						
Our Reference		192766-1	192766-2	192766-3	192766-4	192766-5
Your Reference	UNITS	301	302	303	304	305
Depth		0.5	0.1-0.3	0.5	0.1	0.6
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil and Material	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	0.7	0.2	1
Anthracene	mg/kg	<0.1	<0.1	0.1	<0.1	0.3
Fluoranthene	mg/kg	0.3	<0.1	2.1	0.7	2.6
Pyrene	mg/kg	0.3	<0.1	2.0	0.7	2.5
Benzo(a)anthracene	mg/kg	0.1	<0.1	0.9	0.4	2.3
Chrysene	mg/kg	0.1	<0.1	0.9	0.4	2.2
Benzo(b,j+k)fluoranthene	mg/kg	0.3	<0.2	2	0.7	5.3
Benzo(a)pyrene	mg/kg	0.2	<0.05	1.2	0.4	3.5
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	0.7	0.2	2.2
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	0.2	<0.1	0.8
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	0.9	0.3	2.3
Total +ve PAH's	mg/kg	1.5	<0.05	12	4.0	25
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	1.7	0.5	5.3
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	1.7	0.6	5.3
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	1.7	0.6	5.3
Surrogate p-Terphenyl-d14	%	89	84	86	88	87

PAHs in Soil						
Our Reference		192766-6	192766-7	192766-8	192766-9	192766-10
Your Reference	UNITS	306	306	307	307	308
Depth		0.5	3.0	0.5	1.7	0.5
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil and Material
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.2	<0.1	<0.1	0.3	1.3
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Fluoranthene	mg/kg	0.5	<0.1	0.2	0.7	2.7
Pyrene	mg/kg	0.5	<0.1	0.2	0.7	2.5
Benzo(a)anthracene	mg/kg	0.4	<0.1	0.1	0.6	1.2
Chrysene	mg/kg	0.4	<0.1	0.2	0.6	1.2
Benzo(b,j+k)fluoranthene	mg/kg	0.8	<0.2	0.3	1	2.0
Benzo(a)pyrene	mg/kg	0.54	<0.05	0.2	0.60	1.2
Indeno(1,2,3-c,d)pyrene	mg/kg	0.3	<0.1	0.1	0.3	0.7
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Benzo(g,h,i)perylene	mg/kg	0.4	<0.1	0.1	0.4	0.9
Total +ve PAH's	mg/kg	4.0	<0.05	1.3	5.1	14
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.7	<0.5	<0.5	0.8	1.8
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.8	<0.5	<0.5	0.8	1.8
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.8	<0.5	<0.5	0.9	1.8
Surrogate p-Terphenyl-d14	%	87	83	84	87	86

PAHs in Soil						
Our Reference		192766-11	192766-12	192766-13	192766-14	192766-15
Your Reference	UNITS	308	309	309	D1/JPS	D3/JPS
Depth		2.0	0-0.2	1.0	-	-
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Naphthalene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.3	1.2	0.5	0.7
Anthracene	mg/kg	<0.1	0.1	0.2	0.1	0.2
Fluoranthene	mg/kg	<0.1	0.7	3.0	1.4	2.1
Pyrene	mg/kg	<0.1	0.7	2.8	1.3	2.0
Benzo(a)anthracene	mg/kg	<0.1	0.6	1.5	0.8	1.6
Chrysene	mg/kg	<0.1	0.6	1.6	0.7	1.4
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.7	2.7	1	3.2
Benzo(a)pyrene	mg/kg	<0.05	0.4	1.6	0.88	2.0
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.1	0.9	0.5	0.8
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	0.3	0.1	0.3
Benzo(g,h,i)perylene	mg/kg	<0.1	0.2	1.1	0.6	0.9
Total +ve PAH's	mg/kg	<0.05	4.4	17	8.5	15
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	0.5	2.4	1.3	2.9
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	0.6	2.4	1.3	2.9
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	0.6	2.4	1.3	2.9
Surrogate p-Terphenyl-d14	%	79	88	85	92	89

Organochlorine Pesticides in soil						
Our Reference		192766-1	192766-2	192766-3	192766-4	192766-5
Your Reference	UNITS	301	302	303	304	305
Depth		0.5	0.1-0.3	0.5	0.1	0.6
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil and Material	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	106	107	105	106	107

Organochlorine Pesticides in soil						
Our Reference		192766-6	192766-7	192766-8	192766-9	192766-10
Your Reference	UNITS	306	306	307	307	308
Depth		0.5	3.0	0.5	1.7	0.5
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil and Material
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	31/05/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	105	105	105	107	105

Organochlorine Pesticides in soil						
Our Reference		192766-11	192766-12	192766-13	192766-14	192766-15
Your Reference	UNITS	308	309	309	D1/JPS	D3/JPS
Depth		2.0	0-0.2	1.0	-	-
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	103	108	101	101	102

Organophosphorus Pesticides						
Our Reference		192766-1	192766-2	192766-3	192766-4	192766-5
Your Reference	UNITS	301	302	303	304	305
Depth		0.5	0.1-0.3	0.5	0.1	0.6
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil and Material	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	106	107	105	106	107

Organophosphorus Pesticides						
Our Reference		192766-6	192766-7	192766-8	192766-9	192766-10
Your Reference	UNITS	306	306	307	307	308
Depth		0.5	3.0	0.5	1.7	0.5
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil and Material
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	31/05/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	105	105	105	107	105

Organophosphorus Pesticides						
Our Reference		192766-11	192766-12	192766-13	192766-14	192766-15
Your Reference	UNITS	308	309	309	D1/JPS	D3/JPS
Depth		2.0	0-0.2	1.0	-	-
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	103	108	101	101	102

PCBs in Soil						
Our Reference		192766-1	192766-2	192766-3	192766-4	192766-5
Your Reference	UNITS	301	302	303	304	305
Depth		0.5	0.1-0.3	0.5	0.1	0.6
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil and Material	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	106	107	105	106	107

PCBs in Soil						
Our Reference		192766-6	192766-7	192766-8	192766-9	192766-10
Your Reference	UNITS	306	306	307	307	308
Depth		0.5	3.0	0.5	1.7	0.5
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil and Material
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	31/05/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	105	105	105	107	105

PCBs in Soil						
Our Reference		192766-11	192766-12	192766-13	192766-14	192766-15
Your Reference	UNITS	308	309	309	D1/JPS	D3/JPS
Depth		2.0	0-0.2	1.0	-	-
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	103	108	101	101	102

Acid Extractable metals in soil						
Our Reference		192766-1	192766-2	192766-3	192766-4	192766-5
Your Reference	UNITS	301	302	303	304	305
Depth		0.5	0.1-0.3	0.5	0.1	0.6
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil and Material	Soil	Soil	Soil	Soil
Date prepared	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Arsenic	mg/kg	<4	6	<4	<4	5
Cadmium	mg/kg	<0.4	<0.4	0.8	<0.4	<0.4
Chromium	mg/kg	10	7	32	28	18
Copper	mg/kg	35	10	46	35	47
Lead	mg/kg	210	6	130	140	250
Mercury	mg/kg	0.2	<0.1	0.5	0.8	0.8
Nickel	mg/kg	11	10	33	30	27
Zinc	mg/kg	520	40	300	190	280
Iron	mg/kg	11,000	18,000	27,000	26,000	18,000
Manganese	mg/kg	210	430	610	470	330

Acid Extractable metals in soil						
Our Reference		192766-6	192766-7	192766-8	192766-9	192766-10
Your Reference	UNITS	306	306	307	307	308
Depth		0.5	3.0	0.5	1.7	0.5
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil and Material
Date prepared	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Arsenic	mg/kg	<4	<4	<4	<4	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	1
Chromium	mg/kg	26	36	27	25	29
Copper	mg/kg	39	30	25	36	83
Lead	mg/kg	480	9	83	230	810
Mercury	mg/kg	0.4	<0.1	0.3	0.8	<0.1
Nickel	mg/kg	30	40	28	28	29
Zinc	mg/kg	140	59	93	150	550
Iron	mg/kg	26,000	36,000	27,000	24,000	23,000
Manganese	mg/kg	330	870	440	440	420

Acid Extractable metals in soil						
Our Reference		192766-11	192766-12	192766-13	192766-14	192766-15
Your Reference	UNITS	308	309	309	D1/JPS	D3/JPS
Depth		2.0	0-0.2	1.0	-	-
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Arsenic	mg/kg	<4	<4	5	4	5
Cadmium	mg/kg	<0.4	<0.4	1	0.8	0.9
Chromium	mg/kg	25	19	22	24	24
Copper	mg/kg	17	19	77	69	73
Lead	mg/kg	6	81	650	810	2,200
Mercury	mg/kg	<0.1	0.2	1.0	1.1	2.4
Nickel	mg/kg	25	21	28	26	30
Zinc	mg/kg	35	120	720	510	800
Iron	mg/kg	22,000	21,000	23,000	22,000	25,000
Manganese	mg/kg	520	320	320	350	400

Acid Extractable metals in soil			
Our Reference		192766-16	192766-17
Your Reference	UNITS	D3/JPS - [TRIPLICATE]	308 - [TRIPLICATE]
Depth		-	0.5
Date Sampled		19/05/2018	19/05/2018
Type of sample		Soil	Soil and Material
Date prepared	-	30/05/2018	30/05/2018
Date analysed	-	30/05/2018	30/05/2018
Arsenic	mg/kg	4	6
Cadmium	mg/kg	0.7	1
Chromium	mg/kg	26	24
Copper	mg/kg	67	70
Lead	mg/kg	460	650
Mercury	mg/kg	1.2	0.6
Nickel	mg/kg	29	27
Zinc	mg/kg	560	550
Iron	mg/kg	24,000	34,000
Manganese	mg/kg	390	440

Misc Inorg - Soil				
Our Reference		192766-1	192766-7	192766-9
Your Reference	UNITS	301	306	307
Depth		0.5	3.0	1.7
Date Sampled		19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil and Material	Soil	Soil
Date prepared	-	01/06/2018	01/06/2018	01/06/2018
Date analysed	-	01/06/2018	01/06/2018	01/06/2018
pH 1:5 soil:water	pH Units	7.7	8.0	8.0
Electrical Conductivity 1:5 soil:water	µS/cm	160	91	88
Chloride, Cl 1:5 soil:water	mg/kg	10	<10	<10
Sulphate, SO4 1:5 soil:water	mg/kg	57	24	23

Moisture						
Our Reference		192766-1	192766-2	192766-3	192766-4	192766-5
Your Reference	UNITS	301	302	303	304	305
Depth		0.5	0.1-0.3	0.5	0.1	0.6
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil and Material	Soil	Soil	Soil	Soil
Date prepared	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018
Moisture	%	12	8.9	19	17	16

Moisture						
Our Reference		192766-6	192766-7	192766-8	192766-9	192766-10
Your Reference	UNITS	306	306	307	307	308
Depth		0.5	3.0	0.5	1.7	0.5
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil and Material
Date prepared	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018
Moisture	%	16	26	16	20	15

Moisture						
Our Reference		192766-11	192766-12	192766-13	192766-14	192766-15
Your Reference	UNITS	308	309	309	D1/JPS	D3/JPS
Depth		2.0	0-0.2	1.0	-	-
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/05/2018	30/05/2018	30/05/2018	30/05/2018	30/05/2018
Date analysed	-	31/05/2018	31/05/2018	31/05/2018	31/05/2018	31/05/2018
Moisture	%	17	6.3	14	13	15

Asbestos ID - soils					
Our Reference		192766-1	192766-5	192766-6	192766-10
Your Reference	UNITS	301	305	306	308
Depth		0.5	0.6	0.5	0.5
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil and Material	Soil	Soil	Soil and Material
Date analysed	-	01/06/2018	01/06/2018	01/06/2018	01/06/2018
Sample mass tested	g	Approx. 30g	Approx. 25g	Approx. 30g	Approx. 30g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - materials			
Our Reference		192766-1	192766-10
Your Reference	UNITS	301	308
Depth		0.5	0.5
Date Sampled		19/05/2018	19/05/2018
Type of sample		Soil and Material	Soil and Material
Date analysed	-	31/05/2018	31/05/2018
Mass / Dimension of Sample	-	150x95x5mm	76x41x5mm
Sample Description	-	Grey fibre cement material	Grey fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Organic fibres detected	Chrysotile asbestos detected Organic fibres detected

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Alternatively determined by colourimetry/turbidity using Discrete Analyer.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.

Method ID	Methodology Summary
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	192766-3
Date extracted	-			30/05/2018	2	30/05/2018	30/05/2018		30/05/2018	30/05/2018
Date analysed	-			31/05/2018	2	31/05/2018	31/05/2018		31/05/2018	31/05/2018
TRH C_6 - C_9	mg/kg	25	Org-016	<25	2	<25	<25	0	102	91
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	2	<25	<25	0	102	91
Benzene	mg/kg	0.2	Org-016	<0.2	2	<0.2	<0.2	0	88	76
Toluene	mg/kg	0.5	Org-016	<0.5	2	<0.5	<0.5	0	98	86
Ethylbenzene	mg/kg	1	Org-016	<1	2	<1	<1	0	109	98
m+p-xylene	mg/kg	2	Org-016	<2	2	<2	<2	0	108	97
o-Xylene	mg/kg	1	Org-016	<1	2	<1	<1	0	113	100
naphthalene	mg/kg	1	Org-014	<1	2	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	97	2	89	81	9	100	88

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	30/05/2018	30/05/2018		[NT]	[NT]
Date analysed	-			[NT]	15	31/05/2018	31/05/2018		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	15	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	15	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	15	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	15	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	15	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	15	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	15	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	15	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	15	90	86	5	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	192766-3
Date extracted	-			30/05/2018	2	30/05/2018	30/05/2018		30/05/2018	30/05/2018
Date analysed	-			30/05/2018	2	31/05/2018	31/05/2018		30/05/2018	31/05/2018
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	2	<50	<50	0	113	107
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	2	<100	<100	0	107	104
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	2	<100	<100	0	92	108
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	2	<50	<50	0	113	107
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	2	<100	<100	0	107	104
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	2	<100	<100	0	92	108
Surrogate o-Terphenyl	%		Org-003	101	2	100	108	8	112	103

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	30/05/2018	30/05/2018		[NT]	[NT]
Date analysed	-			[NT]	15	31/05/2018	31/05/2018		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	15	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	15	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	15	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	15	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	15	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	15	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	15	101	100	1	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	192766-3
Date extracted	-			30/05/2018	2	30/05/2018	30/05/2018		30/05/2018	30/05/2018
Date analysed	-			30/05/2018	2	30/05/2018	30/05/2018		30/05/2018	30/05/2018
Naphthalene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	94	82
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	92	88
Phenanthrene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	94	84
Anthracene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	96	87
Pyrene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	96	84
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	93	87
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	2	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	2	<0.05	<0.05	0	117	80
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	91	2	84	83	1	113	104

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	30/05/2018	30/05/2018		[NT]	[NT]
Date analysed	-			[NT]	15	30/05/2018	30/05/2018		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	15	0.7	0.6	15	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	15	0.2	0.2	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	15	2.1	1.6	27	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	15	2.0	1.5	29	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	15	1.6	1.1	37	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	15	1.4	1.0	33	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	15	3.2	2.3	33	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	15	2.0	1.5	29	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	15	0.8	0.7	13	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	15	0.3	0.2	40	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	15	0.9	0.8	12	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	15	89	87	2	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	192766-3
Date extracted	-			30/05/2018	2	30/05/2018	30/05/2018		30/05/2018	30/05/2018
Date analysed	-			30/05/2018	2	30/05/2018	30/05/2018		30/05/2018	30/05/2018
HCB	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	109	108
gamma-BHC	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	96	94
Heptachlor	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	90	93
delta-BHC	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	108	106
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	99	98
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	107	106
Dieldrin	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	112	110
Endrin	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	94	95
pp-DDD	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	98	98
Endosulfan II	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	75	75
Methoxychlor	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	105	2	107	107	0	127	126

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	30/05/2018	30/05/2018		[NT]	[NT]
Date analysed	-			[NT]	15	31/05/2018	31/05/2018		[NT]	[NT]
HCB	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-005	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	[NT]	15	102	98	4	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	192766-3
Date extracted	-			30/05/2018	2	30/05/2018	30/05/2018		30/05/2018	30/05/2018
Date analysed	-			30/05/2018	2	30/05/2018	30/05/2018		30/05/2018	30/05/2018
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	109	107
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	112	103
Dimethoate	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	103	101
Fenitrothion	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	109	101
Malathion	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	83	85
Parathion	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	120	111
Ronnel	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	116	113
Surrogate TCMX	%		Org-008	105	2	107	107	0	104	103

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	30/05/2018	30/05/2018		[NT]	[NT]
Date analysed	-			[NT]	15	31/05/2018	31/05/2018		[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-008	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-008	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-008	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-008	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-008	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-008	[NT]	15	102	98	4	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	192766-3
Date extracted	-			30/05/2018	2	30/05/2018	30/05/2018		30/05/2018	30/05/2018
Date analysed	-			30/05/2018	2	30/05/2018	30/05/2018		30/05/2018	30/05/2018
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	2	<0.1	<0.1	0	103	106
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	105	2	107	107	0	104	103

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	30/05/2018	30/05/2018		[NT]	[NT]
Date analysed	-			[NT]	15	31/05/2018	31/05/2018		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	[NT]	15	102	98	4	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	192766-3
Date prepared	-			30/05/2018	2	30/05/2018	30/05/2018		30/05/2018	30/05/2018
Date analysed	-			30/05/2018	2	30/05/2018	30/05/2018		30/05/2018	30/05/2018
Arsenic	mg/kg	4	Metals-020	<4	2	6	5	18	98	81
Cadmium	mg/kg	0.4	Metals-020	<0.4	2	<0.4	<0.4	0	97	87
Chromium	mg/kg	1	Metals-020	<1	2	7	7	0	97	85
Copper	mg/kg	1	Metals-020	<1	2	10	11	10	98	90
Lead	mg/kg	1	Metals-020	<1	2	6	6	0	94	74
Mercury	mg/kg	0.1	Metals-021	<0.1	2	<0.1	<0.1	0	110	104
Nickel	mg/kg	1	Metals-020	<1	2	10	10	0	91	77
Zinc	mg/kg	1	Metals-020	<1	2	40	37	8	94	#
Iron	mg/kg	1	Metals-020	<1	2	18000	18000	0	95	#
Manganese	mg/kg	1	Metals-020	<1	2	430	380	12	114	#

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	15	30/05/2018	30/05/2018		[NT]	[NT]
Date analysed	-			[NT]	15	30/05/2018	30/05/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	15	5	5	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	15	0.9	0.9	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	15	24	24	0	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	15	73	89	20	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	15	2200	530	122	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	15	2.4	1.8	29	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	15	30	29	3	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	15	800	830	4	[NT]	[NT]
Iron	mg/kg	1	Metals-020	[NT]	15	25000	23000	8	[NT]	[NT]
Manganese	mg/kg	1	Metals-020	[NT]	15	400	370	8	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	10	30/05/2018	30/05/2018		[NT]	[NT]
Date analysed	-			[NT]	10	30/05/2018	30/05/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	10	4	4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	10	1	1	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	10	29	31	7	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	10	83	73	13	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	10	810	540	40	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	10	<0.1	0.9	160	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	10	29	31	7	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	10	550	460	18	[NT]	[NT]
Iron	mg/kg	1	Metals-020	[NT]	10	23000	27000	16	[NT]	[NT]
Manganese	mg/kg	1	Metals-020	[NT]	10	420	450	7	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	192766-7
Date prepared	-			01/06/2018	9	01/06/2018	01/06/2018		01/06/2018	01/06/2018
Date analysed	-			01/06/2018	9	01/06/2018	01/06/2018		01/06/2018	01/06/2018
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	9	8.0	7.9	1	99	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	9	88	94	7	96	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	9	<10	<10	0	88	81
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	9	23	25	8	96	84

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 192766-15 for Pb. Therefore a triplicate result has been issued as laboratory sample number 192766-16.

Acid Extractable Metals in Soil:
Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples 192766-1, 5, 6, 10 were sub-sampled from jars provided by the client.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 192766-10 for Hg. Therefore a triplicate result has been issued as laboratory sample number 192766-17.

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CERTIFICATE OF ANALYSIS 192766-A

Client Details

Client	Douglas Partners Newcastle
Attention	Patrick Heads
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**49797.01**
Number of Samples	2 Soil and Material, 13 Soil, 2 Soil and Material
Date samples received	29/05/2018
Date completed instructions received	20/07/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	24/07/2018
Date of Issue	24/07/2018

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Results Approved By
Jeremy Faircloth, Organics Supervisor
Ken Nguyen, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

Metals in TCLP USEPA1311						
Our Reference		192766-A-3	192766-A-4	192766-A-5	192766-A-6	192766-A-9
Your Reference	UNITS	303	304	305	306	307
Depth		0.5	0.1	0.6	0.5	1.7
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/07/2018	23/07/2018	23/07/2018	23/07/2018	23/07/2018
Date analysed	-	23/07/2018	23/07/2018	23/07/2018	23/07/2018	23/07/2018
pH of soil for fluid# determ.	pH units	7.4	8.8	6.8	9.0	7.2
pH of soil TCLP (after HCl)	pH units	1.6	1.7	1.6	1.8	1.6
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	5.0	5.2	5.0	5.4	5.0
Lead in TCLP	mg/L	<0.03	<0.03	<0.03	0.06	<0.03

Metals in TCLP USEPA1311					
Our Reference		192766-A-10	192766-A-13	192766-A-14	192766-A-15
Your Reference	UNITS	308	309	D1/JPS	D3/JPS
Depth		0.5	1.0	-	-
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil and Material	Soil	Soil	Soil
Date extracted	-	23/07/2018	23/07/2018	23/07/2018	23/07/2018
Date analysed	-	23/07/2018	23/07/2018	23/07/2018	23/07/2018
pH of soil for fluid# determ.	pH units	8.8	7.9	9.0	8.2
pH of soil TCLP (after HCl)	pH units	2.1	1.7	2.0	1.7
Extraction fluid used	-	1	1	1	1
pH of final Leachate	pH units	6.0	5.1	5.8	5.2
Lead in TCLP	mg/L	<0.03	<0.03	0.08	<0.03

PAHs in TCLP (USEPA 1311)						
Our Reference		192766-A-3	192766-A-5	192766-A-10	192766-A-13	192766-A-14
Your Reference	UNITS	303	305	308	309	D1/JPS
Depth		0.5	0.6	0.5	1.0	-
Date Sampled		19/05/2018	19/05/2018	19/05/2018	19/05/2018	19/05/2018
Type of sample		Soil	Soil	Soil and Material	Soil	Soil
Date extracted	-	23/07/2018	23/07/2018	23/07/2018	23/07/2018	23/07/2018
Date analysed	-	24/07/2018	24/07/2018	24/07/2018	24/07/2018	24/07/2018
Naphthalene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Acenaphthylene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Acenaphthene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Fluorene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Phenanthrene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Fluoranthene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Pyrene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Chrysene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Total +ve PAH's	mg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	107	97	101	102	85

PAHs in TCLP (USEPA 1311)		
Our Reference		192766-A-15
Your Reference	UNITS	D3/JPS
Depth		-
Date Sampled		19/05/2018
Type of sample		Soil
Date extracted	-	23/07/2018
Date analysed	-	24/07/2018
Naphthalene in TCLP	mg/L	<0.001
Acenaphthylene in TCLP	mg/L	<0.001
Acenaphthene in TCLP	mg/L	<0.001
Fluorene in TCLP	mg/L	<0.001
Phenanthrene in TCLP	mg/L	<0.001
Anthracene in TCLP	mg/L	<0.001
Fluoranthene in TCLP	mg/L	<0.001
Pyrene in TCLP	mg/L	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Total +ve PAH's	mg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	88

Method ID	Methodology Summary
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP) using Zero Headspace Extraction (zHE) using AS4439 and USEPA 1311.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) using in house method INORG-004.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-012	Leachates are extracted with Dichloromethane and analysed by GC-MS.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.

QUALITY CONTROL: Metals in TCLP USEPA1311						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	192766-A-5
Date extracted	-			23/07/2018	3	23/07/2018	23/07/2018		23/07/2018	23/07/2018
Date analysed	-			23/07/2018	3	23/07/2018	23/07/2018		23/07/2018	23/07/2018
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	3	<0.03	<0.03	0	99	97

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	192766-A-5
Date extracted	-			23/07/2018	3	23/07/2018	23/07/2018		23/07/2018	23/07/2018
Date analysed	-			24/07/2018	3	24/07/2018	24/07/2018		24/07/2018	24/07/2018
Naphthalene in TCLP	mg/L	0.001	Org-012	<0.001	3	<0.001	<0.001	0	74	82
Acenaphthylene in TCLP	mg/L	0.001	Org-012	<0.001	3	<0.001	<0.001	0	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.001	Org-012	<0.001	3	<0.001	<0.001	0	[NT]	[NT]
Fluorene in TCLP	mg/L	0.001	Org-012	<0.001	3	<0.001	<0.001	0	85	100
Phenanthrene in TCLP	mg/L	0.001	Org-012	<0.001	3	<0.001	<0.001	0	79	94
Anthracene in TCLP	mg/L	0.001	Org-012	<0.001	3	<0.001	<0.001	0	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.001	Org-012	<0.001	3	<0.001	<0.001	0	78	92
Pyrene in TCLP	mg/L	0.001	Org-012	<0.001	3	<0.001	<0.001	0	80	96
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012	<0.001	3	<0.001	<0.001	0	[NT]	[NT]
Chrysene in TCLP	mg/L	0.001	Org-012	<0.001	3	<0.001	<0.001	0	71	92
Benzo(bjk)fluoranthene in TCLP	mg/L	0.002	Org-012	<0.002	3	<0.002	<0.002	0	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012	<0.001	3	<0.001	<0.001	0	81	94
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012	<0.001	3	<0.001	<0.001	0	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012	<0.001	3	<0.001	<0.001	0	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012	<0.001	3	<0.001	<0.001	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	70	3	107	112	5	80	88

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Appendix C

Data Quality Report
Chain of Custody (Field and Despatch)
Sample Receipt

Data Quality Assessment Report
Report on Detailed Site Investigation
Proposed Administration Building
High Street Maitland

1. Data Quality Objectives

The Detailed Site Investigation (DSI) was prepared with reference to the seven step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of the *National Environment Protection (Assessment of Site Contamination) Measure* 1999 as amended 2013 (NEPC, 2013). The DQO process is outlined as follows:

- Stating the Problem;
- Identifying the Decision;
- Identifying Inputs to the Decision;
- Defining the Boundary of the Assessment;
- Developing a Decision Rule;
- Specifying Acceptable Limits on Decision Errors; and
- Optimising the Design for Obtaining Data.

The DQOs have been addressed within the report as shown in Table 20.

2. Field and Laboratory Quality Control

2.1 General

The field and laboratory quality control (QC) procedures and results are summarised in Tables 1 and 2. Reference should be made to the field work and analysis procedures in Sections 9 and 10 and the laboratory results certificates in Appendix B for further details.

Table 1: Field QC

Item	Frequency	Acceptance Criteria	Achievement
Intra-laboratory replicates	5% primary samples	RPD <30% inorganics), <50% (organics)	yes[1]

Notes to Table 1:

1 qualitative assessment of RPD results overall; refer Section 2.1

Table 2: Laboratory QC

Item	Frequency	Acceptance Criteria	Achievement
Analytical laboratories used		NATA accreditation	yes
Holding times		In accordance with NEPC (2013) which references various Australian and international standards	yes
Laboratory / Reagant Blanks	1 per lab batch	<PQL	yes
Laboratory duplicates	10% primary samples	Laboratory specific [1]	
Matrix Spikes	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	yes
Surrogate Spikes	organics by GC	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	yes
Control Samples	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	yes

Notes to Table 2:

1 ELS: <5xPQL – any RPD; >5xPQL – 0-50%RPD

In summary, the QC data is considered to be of sufficient quality to be acceptable for the assessment.

2.2 Intra-Laboratory Replicates

Intra-laboratory replicates were analysed as an internal check of the reproducibility within the primary laboratory and as a measure of consistency of sampling techniques. The comparative results of analysis between original and intra-laboratory replicate samples are summarised in Table 3.

Table 3: Relative Percentage Difference Results – Intra-laboratory Replicates

Analyte		308/2.0	D1/JPS	RPD (%)	309/1.0	D3/JPS	RPD (%)
Metals	As	<4	4	N/A	5	5	0
	Cd	<0.4	0.8	N/A	1	0.9	11
	Cr	25	24	4	22	24	9
	Cu	17	69	**121**	77	73	5
	Pb	6	810	**197**	650	2200	**109**
	Hg	<0.1	1.1	N/A	1	2.4	**82**
	Ni	25	26	4	28	30	7
	Zn	35	510	**174**	720	800	11
TRH	C_6 - C_9	<25	<25	N/A	<25	<25	N/A
	C_{10} - C_{14}	<50	<50	N/A	<50	<50	N/A
	C_{15} - C_{28}	<100	<100	N/A	<100	<100	N/A
	C_{29} - C_{36}	<100	<100	N/A	<100	<100	N/A
BTEX	Benzene	<0.2	<0.2	N/A	<0.2	<0.2	N/A
	Toluene	<0.5	<0.5	N/A	<0.5	<0.5	N/A
	Ethyl Benzene	<1	<1	N/A	<1	<1	N/A
	Xylene	<3	<3	N/A	<3	<3	N/A
PAH	Total	<0.05	8.5	N/A	17	15	13
	Benzo(a)pyrene	<0.05	0.88	N/A	1.6	2	22
OCPs	Total	<0.1	<0.1	N/A	<0.1	<0.1	N/A
	Aldrin + Dieldrin	<0.2	<0.2	N/A	<0.2	<0.2	N/A
	Chlordane	<0.1	<0.1	N/A	<0.1	<0.1	N/A
	DDT	<0.1	<0.1	N/A	<0.1	<0.1	N/A
	Heptachlor	<0.1	<0.1	N/A	<0.1	<0.1	N/A
OPPs		<0.1	<0.1	N/A	<0.1	<0.1	N/A
PCBs		<0.1	<0.1	N/A	<0.1	<0.1	N/A

The calculated RPD values were within the acceptable range of ± 30 for inorganic analytes and ± 50% for organics with the with the exception of those in bold. However, this is not considered to be significant because

- The replicate pairs being collected from fill soils which were heterogeneous in nature;
- Soil replicates, rather than homogenised soil duplicates, were used to minimise the risk of possible volatile loss, hence greater variability can be expected;
- The majority of RPDs within a replicate pair being within the acceptable limits;
- All other QA/QC parameters met the DQIs.

Overall, the intra-laboratory replicate comparisons indicate that the sampling techniques were generally consistent and repeatable.

3. Data Quality Indicators

The reliability of field procedures and analytical results was assessed against the following data quality indicators (DQIs):

- Completeness – a measure of the amount of usable data from a data collection activity;
- Comparability – the confidence (qualitative) that data may be considered to be equivalent for each sampling and analytical event;
- Representativeness – the confidence (qualitative) of data representativeness of media present on site;
- Precision – a measure of variability or reproducibility of data; and
- Accuracy – a measure of closeness of the data to the 'true' value.

The DQIs were assessed as outlined in the following Table 4.

Table 4: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Planned systematic and selected target locations sampled; Preparation of field logs, sample location plan and chain of custody (COC) records; Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody; Samples analysed for contaminants of potential concern (COPC) identified in the Conceptual Site Model (CSM); Completion of COC documentation; NATA endorsed laboratory certificates provided by the laboratory; Satisfactory frequency and results for field and laboratory QC samples as discussed in Section 2.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project; Works undertaken by appropriately experienced and trained DP environmental engineer; Use of NATA registered laboratory; Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled; Spatial and temporal distribution of sample locations; Sample numbers recovered and analysed are considered to be representative of the target media and complying with DQOs; Samples were extracted and analysed within holding times; Samples were analysed in accordance with the analysis request.
Precision	Acceptable RPD between original samples and replicates; Satisfactory results for all other field and laboratory QC samples.
Accuracy	Satisfactory results for all field and laboratory QC samples.

Based on the above, it is considered that the DQIs have been complied with. As such, it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

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CHAIN OF CUSTODY FIELD SHEET

Project No: 49797.01	**Client Project Name: Proposed Admin Building**
Client: Maitland City Council	**Location: 263 High St, Maitland**
Project Manager: Patrick Heads	**DP Lab Received** By: JBS Date: 21/5/13
Do samples contain 'potential' HBM? Yes ☑ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)	

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S-soil W water	Container Type G-glass P-plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn*	Enviro lab 28/5			
301	0-0.2		S	G	A	JBS	19/5/13	7	Fridge				
	0.5			G,P,B						✓			
	1.3-1.7			G,P									
	2.0			G,P									
	2.7			G,P									
302	0.1-0.3			↓						✓			
	0.75-0.9			G,P									
	1.5			B									
	2			G,P									
	2.4			↓									
303	0.1												
	0.5			↓									
	0.7-1.0			B									
	1.5			G,P									
304	0.1			↓						✓			
	0.5			↓									
	0.7-1.0			B									
	1.5			G,P	↓	↓	↓	3	↓				

*Default storage: glass containers in fridge, plastic containers shelved, ASS in freezer, water samples in fridge

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CHAIN OF CUSTODY FIELD SHEET

Project No: 49797.01	**Client Project Name: Proposed Admin Building**
Client: Maitland City Council	**Location: 263 High St, Maitland**
Project Manager: Patrick Heads	**DP Lab Received** By: JDS Date: 21/5/18
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)	

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S-soil W water	Container Type G-glass P-plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn*	Enviro lab 28/5			
305	0-0.2	D4	S	G,P	A	JDS	19/5	?	fridge				
	0.6			U						✓			
	0.3-0.7			USO									
	1.0			G,P									
	2.0												
	2.5												
306	0-0.2												
	0.5									✓			
	0.3-0.7			USO									
	1.0			G,P									
	2.0												
	3.0									✓			
307	0-0.2												
	0.5									✓			
	1.0												
	1.7									✓			
308	0-0.2												
	0.5	D1	✓	✓	✓	✓	✓	3					

*Default storage: glass containers in fridge, plastic containers shelved, ASS in freezer, water samples in fridge

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CHAIN OF CUSTODY FIELD SHEET

Project No: 49797.01	**Client Project Name: Proposed Admin Building**
Client: Maitland City Council	**Location: 263 High St, Maitland**
Project Manager: Patrick Heads	**DP Lab Received** By: SBS Date: 21/5/15
Do samples contain 'potential' HBM? Yes ☑ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)	

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S-soil W water	Container Type G-glass P-plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn*	Enviroloc 28/5			
308	1.0		S	G,P	A	SBS	19/5	7	Fridge				
	2.0		↓	↓	↓	↓	↓	↓	↓	✓			
309	0-0.2									✓			
	0.5	02											
	1.0	03								✓✓			
	1.5												
	2.0												
	2.7		↓	↓	↓	↓	↓	3	↓				
				↓									

*Default storage: glass containers in fridge, plastic containers shelved, ASS in freezer, water samples in fridge

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CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 49797.01	**Suburb/Town:** Maitland	**To:** Envirolab Services Pty Ltd 12 Ashley Street, CHATSWOOD NSW 2067
DP Order No: 137666	**DP Contact Person:** Paulo Sebastian/ Pat Heads	
Prior Storage: Esky ☐ Fridge ☑ Shelved ☐		**Ph:** (02) 9910 6200 **Attn:** Jacinta Hurst

Do samples contain 'potential' HBM? Yes ☑ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample				Analytes							Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH BTEX	PAH	Metals (10)	PCB/OPP/ OCP	Asbestos I.D Material	Asbestos I.D Soil	pH, EC, Chloride, Sulphate (Aggressivity Suite)	
301/0.5	19/5/2018	S and M	1	X	X	X	X	X	X	X	Combo 6 plus additional M = Material
302/0.1-0.3	19/5/2018	S	2	X	X	X	X				
303/0.5	19/5/2018	S	3	X	X	X	X				
304/0.1	19/5/2018	S	4	X	X	X	X				
305/0.6	19/5/2018	S	5	X	X	X	X		X		
306/0.5	19/5/2018	S	6	X	X	X	X		X		
306/3.0	19/5/2018	S	7	X	X	X	X			X	
307/0.5	19/5/2018	S	8	X	X	X	X				
307/1.7	19/5/2018	S	9	X	X	X	X			X	
308/0.5	19/5/2018	S and M	10	X	X	X	X	X	X		
308/2.0	19/5/2018	S	11	X	X	X	X				
309/0-0.2	19/5/2018	S	12	X	X	X	X				
309/1.0	19/5/2018	S	13	X	X	X	X				
D1/JPS	19/5/2018	S	14	X	X	X	X				
D3 ~~D2~~/JPS	19/5/2018	S	15	X	X	X	X				
PQL (S) mg/kg											
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐										

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 192766
29/5/18
Date Received:
Time Received: 10:45
Received By: MT 12.4
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe

Total number of samples in container: ....15.....

Date relinquished:.28/5/18..... By: .....JPS.....

Results required by:.....

☐ Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☑ Standard

SAMPLES RECEIVED BY LAB
Please sign and date to acknowledge receipt of samples and return by email

Signature: .....MT.....

Date: .....29/5/18.....

Lab Ref: .....192766.....

Send results to:

Douglas Partners Pty Ltd

Address:

.....

.....

....

.....

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CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 49797.01	**Suburb/Town: Maitland**	**To: Envirolab Services Pty Ltd**	
DP Order No:137821	**DP Contact Person: Patrick Heads**	**12 Ashley Street, CHATSWOOD NSW 2067**	
Prior Storage: Esky ☐ Fridge ☐ Shelved ☐ at lab (192766)		**Ph: (02) 9910 6200**	**Attn: Simon Song**
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)			

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TCLP Pb	TCLP B(a)P								
303/0.5	19/5/18	S	3	X	X							ELS :	192766-A
304/0.1	19/5/18	S	4	X								TAT :	2 days
305/0.6	19/5/18	S	5	X	X							Due :	24/7/18
306/0.5	19/5/18	S	6	X									
307/1.7	19/5/18	S	9	X									
308/0.5	19/5/18	S	10	X	X								
309/1.0	19/5/18	S	13	X	X								
D1/JPS	19/5/18	S	14	X	X								
D3/JPS	19/5/18	S	15	X	X								
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐												

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe

Total number of samples in container: .....at lab.....

Date relinquished:..... By: .....

Results required by:..24/7/18.....

☐ Same day ☐ 72 hours

SAMPLES RECEIVED BY LAB
Please sign and date to acknowledge receipt of samples and return by email

Signature: .....

Date: .....

Lab Ref: .....

Send results to:
Douglas Partners Pty Ltd
Address:
.....
.....
....
.....

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Patrick Heads, Paulo Sebastian

Sample Login Details

Your reference	49797.01
Envirolab Reference	192766
Date Sample Received	29/05/2018
Date Instructions Received	29/05/2018
Date Results Expected to be Reported	05/06/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	2 Soil and Material, 13 Soil, 2 Soil and Material
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	12.4
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	**Phone: 02 9910 6200**
Fax: 02 9910 6201	**Fax: 02 9910 6201**
Email: ahie@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticidesin soil	Organophosphorus Pesticides	PCBsin Soil	Acid Extractable metalsin soil	pH1:5 soil:water	Electrical Conductivity1:5 soil:water	Chloride, Cl1:5 soil:water	Sulphate, SO41:5 soil:water	Asbestos ID - soils	Asbestos ID - materials
301-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
302-0.1-0.3	✓	✓	✓	✓	✓	✓	✓						
303-0.5	✓	✓	✓	✓	✓	✓	✓						
304-0.1	✓	✓	✓	✓	✓	✓	✓						
305-0.6	✓	✓	✓	✓	✓	✓	✓					✓	
306-0.5	✓	✓	✓	✓	✓	✓	✓					✓	
306-3.0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
307-0.5	✓	✓	✓	✓	✓	✓	✓						
307-1.7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
308-0.5	✓	✓	✓	✓	✓	✓	✓					✓	✓
308-2.0	✓	✓	✓	✓	✓	✓	✓						
309-0-0.2	✓	✓	✓	✓	✓	✓	✓						
309-1.0	✓	✓	✓	✓	✓	✓	✓						
D1/JPS	✓	✓	✓	✓	✓	✓	✓						
D3/JPS	✓	✓	✓	✓	✓	✓	✓						

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

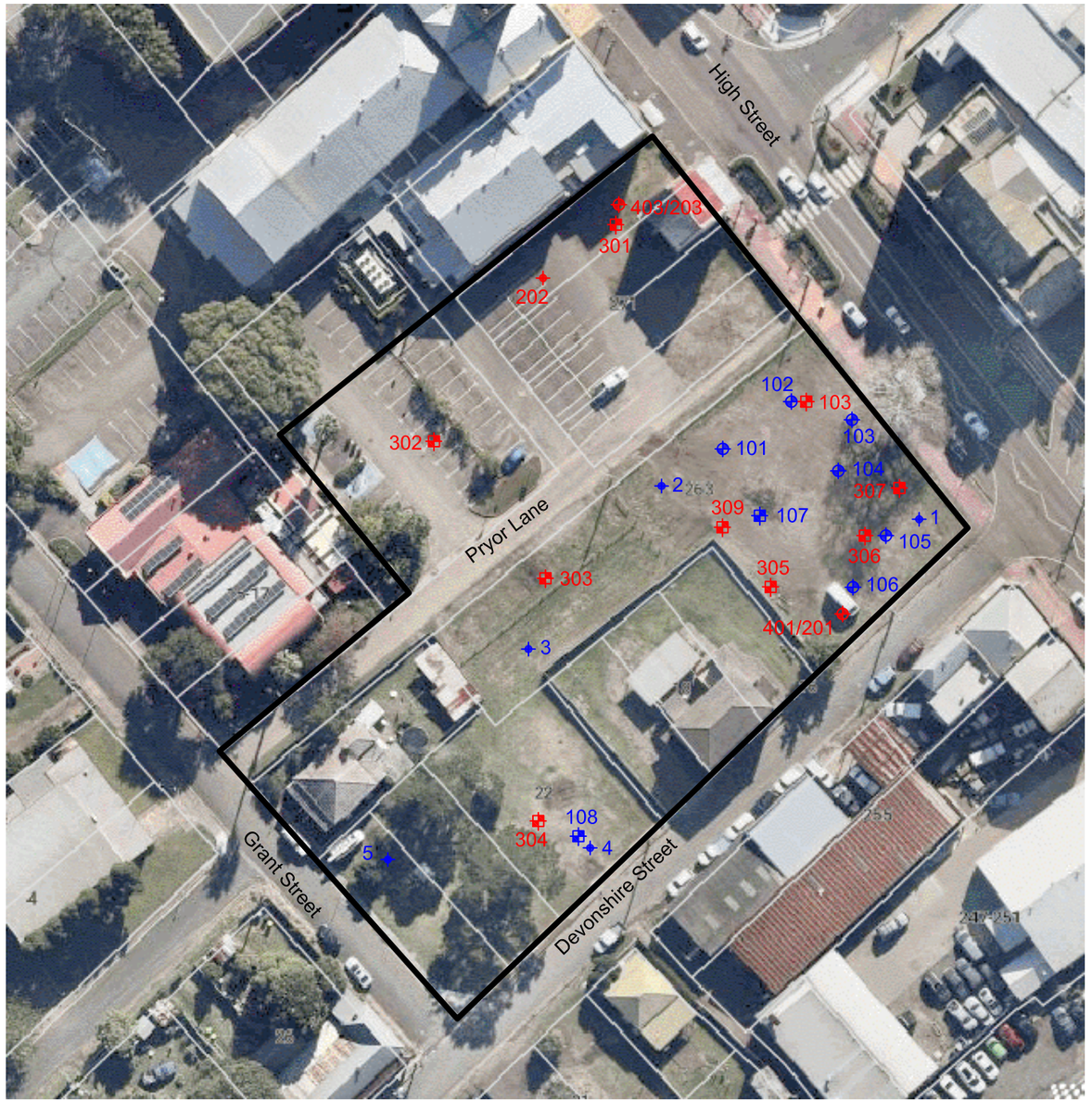
Requests for longer term sample storage must be received in writing.

Appendix D

Drawing 1 – Test Location Plan

Proposed Development Plan
(BVN Architecture, ref AR-A-XX-04, s1508005)

Former Service Station Layout (Ref BP Australia Ltd, Ref 6510)



Locality Plan

0 5 10 15 20 30 40 60 80m

1:800 @ A3

NOTES

1. Drawing adapted from Nearmap Image dated 14.6.2018.
2. Test locations are approximate only and were located using Hand-held GPS / Tape measurement from existing site features.

LEGEND

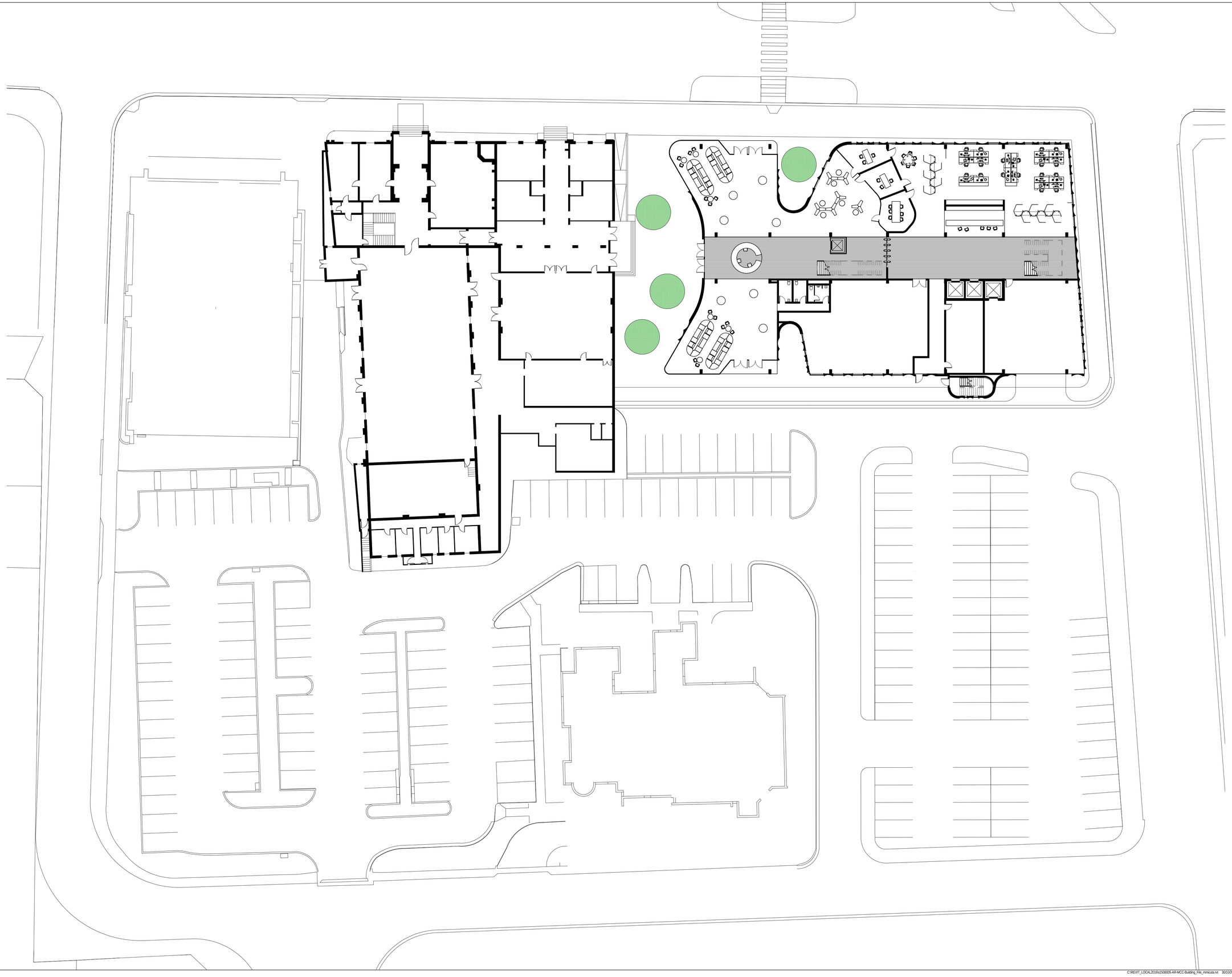
- Cone Penetration Test Location (DP 2011)
- Cone Penetration Test Location (DP 2018) (200 series)
- Borehole Location (DP 2011)
- Test Pit Location (DP 2011)
- Test Pit Location (DP 2018) (300 series)
- Borehole Location (DP 2018) (400 series)
- Site Boundary

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Maitland City Council		TITLE: **Test Location Plan** **Proposed Administration Building** **High Street, Maitland**
OFFICE: Newcastle	DRAWN BY: PLH	
SCALE: 1:800@A3 Sheet	DATE: 12.09.2018	

N

PROJECT No:	49797.01
DRAWING No:	1
REVISION:	1



BVN

Telephone +61 2 8297 7200
Facsimile +61 2 8297 7299
www.bvn.com.au

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
1	16.09.16	FOR INFORMATION
2	20.09.16	FOR INFORMATION
3	16.10.16	FOR INFORMATION
4	18.10.16	DRAFT
5	30.10.16	FOR INFORMATION

CONSULTANT

CONSULTANT

CONSULTANT

CONSULTANT

PROJECT MANAGER

CLIENT

MAITLAND CITY COUNCIL
CLIENT NUMBER

CLIENT 00001
PROJECT

MCC WORKPLACE
HIGH STREET, MAITLAND NSW
BVN PROJECT NUMBER

S1508005
DRAWING KEY

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

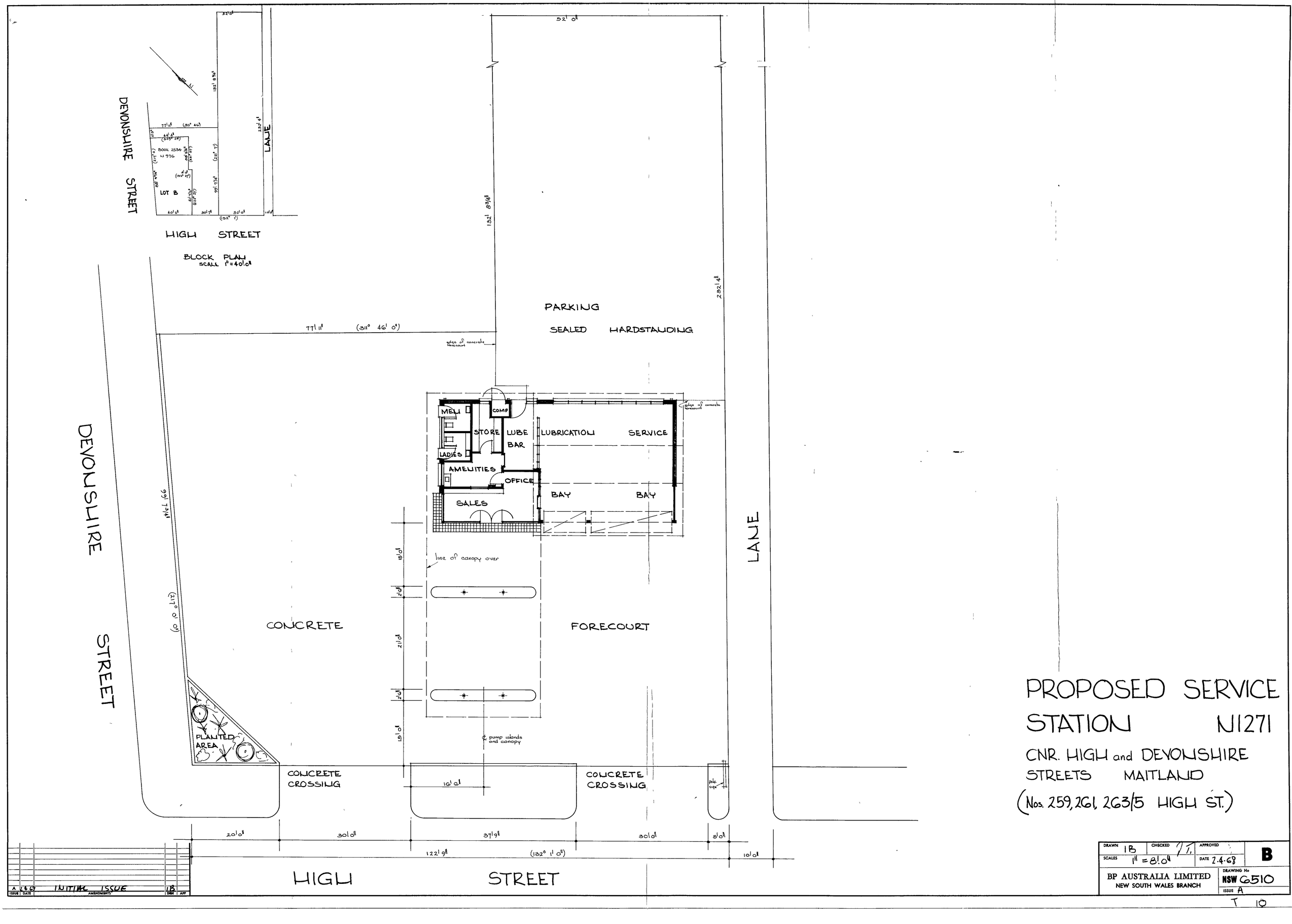
SCALE @ A1

1 : 250 DO NOT SCALE
STATUS

FEASIBILITY STUDY
DRAWING

SITE PLAN

AR-A-XX-04 | ISSUE 5



PROPOSED SERVICE STATION N1271

CNR. HIGH and DEVONSHIRE STREETS MAITLAND

(Nos. 259, 261, 263/5 HIGH ST.)

ISSUE	DATE	AMENDMENTS	DRN	APP
A	2.6.68	INITIAL ISSUE	IB	

DRAWN IB	CHECKED	APPROVED	B
SCALES 1" = 8'-0"		DATE 2.4.68	
BP AUSTRALIA LIMITED NEW SOUTH WALES BRANCH		DRAWING No NSW G510	
		ISSUE A	

T 10