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Integrated Practical Solutions

Report on
Preliminary Site Investigation (Contamination)

Proposed Unit Development
3 Ellis Street, Chatswood

Prepared for
MPG AU Pty Ltd

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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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Executive Summary

This report presents the results of a preliminary site investigation (PSI) for contamination undertaken for the proposed unit development at 3 Ellis Street, Chatswood. The area of assessment comprises Lots 21 and 22 in DP 3559.

The assessment comprised a brief desktop review of site history, site inspection by a senior engineer, limited intrusive investigation and testing of selected samples for a range of potential contaminants.

The assessment has been undertaken with reference to the National Environment Protection (Assessment of Site Contamination) Measure 2013 and NSW EPA "Guidelines for Consultants Reporting on Contaminated Sites".

The results of the historical aerial photo review have identified that the main potential for contamination at the site is from possible importation of filling and demolition of previous buildings on the site.

Ten (10) soil samples (including one field replicate) were analysed for a range of potential contaminants and compared against NEPM for Health Based Investigation / Screening Levels, Ecological Investigation / Screening Levels for residential land use.

The samples tested were below the relevant criteria for Health investigation and screening levels, Ecological investigation and screening levels and total petroleum hydrocarbon management limits.

The soil samples tested also recorded contamination concentrations below the maximum concentrations for General Solid Waste after leachate testing. The filling may also be suitable for classification as Excavated Natural Material (ENM), although further sampling and testing would be required once further details of the proposed earthworks are known.

Based on the results of the preliminary assessment, the site is generally considered to be suitable for the proposed development from a contamination perspective, subject to appropriate inspections, assessment and management during construction, due to the potential for variable fill materials to be present within the site.

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Report on Preliminary Site Investigation (Contamination)
Proposed Unit Development
3 Ellis Street, Chatswood

1. Introduction

This report presents the results of a preliminary site investigation (contamination) undertaken for a proposed unit development at 3 Ellis Street, Chatswood. The investigation was commissioned in an order to proceed dated 9 November 2017 by Wesley Chong of MPG AU Pty Ltd and was undertaken with reference to Douglas Partners' Pty Ltd (DP) proposal NCL170668 dated 9 November 2017.

It is understood that the development of the site will include the demolition of the existing structures at the site followed by the construction of a multi-storey unit development with possibly up to two levels of basement for car parking.

The aim of the investigation was to assess possible past and present contamination activities, assess the current site condition and provide preliminary waste classification of the material which is likely to be removed from the site during construction:

The investigation included a review of previous investigation in the vicinity of the site, a brief site history review, followed by the drilling of four boreholes and laboratory testing of selected samples. The details of the field work are presented in this report, together with comments and recommendations on the items listed above.

The assessment has been undertaken with reference to the National Environment Protection (Assessment of Site Contamination) Measure 1999 amended 2013 (NEPC 2013) [Ref 1] and SEPP55 (Ref 5). Assessment of material which may be removed from site has been undertaken with reference to NSW EPA "Waste Classification Guidelines, Part 1: Classifying Waste" (Ref 3) and NSW EPA, Resource Recovery Order "The Excavated Natural Material Order 2014" (Ref 4).

DP has undertaken a concurrent geotechnical investigation at the site, the details of which are contained within Ref 2.

2. Site Description and Regional Geology

The site is located at 3 Ellis Street, Chatswood and is identified as Lots 21 and 22 in DP 3559. It is rectangular in shape with an approximate area of 816 m². It has an approximately 25 m southern frontage to Ellis Street. The site has a slight fall from north-west to south-east between RL 97.4 and RL 94.8 relative to Australian Height datum (AHD).

The site is currently occupied by a three storey residential unit development with undercroft carparking (refer Figure 1).

Figure 1: View of existing development on site from Ellis Street (looking north)

Figure 2: View looking to the south from eastern side of building

The building is surrounded by a combination of concrete pavements and grassed areas (refer Figure 2 to Figure 4).

Surface soils were observed to comprise sandy silt. Minor anthropogenics, such as brick fragments were observed near the edges of the existing concrete pavements.

Figure 3: View along eastern boundary (looking north)

Figure 4: View of area at the back of the site (looking east)

Reference to the Sydney 1:100 000 Geological Sheet indicates that the site is underlain by Ashfield Shale of Triassic age. The field work for this investigation confirmed the presence of siltstone which included sandy laminae consistent with rocks of the Ashfield shale.

3. Hydrogeology

The regional groundwater flow direction is believed to be to the east towards Middle Harbour. It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time.

An on-line records search of groundwater wells registered with the NSW Office of Water indicated that the nearest registered groundwater wells are located approximately 200 m to the east of the site (Bore GW107757 and GW029731). Review of the work summary for these bores indicated the following:

- GW107757 – Drilled to 25.6 m depth and registered for recreation (groundwater) in 2005, with water bearing zones from 16.80 m to 17.50 m and a yield of 0.6 L/s. A second water bearing zone was recorded from 28.7 m to 29 m which had a yield of 0.3 L/s. Standing water was recorded at 25.6 m depth;
- GW029731 – Drilled to 162.6 m depth and registered for recreation (groundwater) in 1967. No water bearing zone details were recorded.

4. Site History

4.1 Extent of Site History Review

The brief site history review comprised the following:

- Search for historical title deeds;
- Review of historical aerial photos;
- Review of Section 149 certificates; and
- Searches with the NSW Environmental Protection Authority (EPA).

Details are presented in Sections 4.2 to 0.

4.2 Historical Title Search

A historic title deeds search was carried out by Scott Ashwood Pty Ltd, the results of which are provided in Appendix B and summarised in Table 1 below. The results of the search indicated that different parts of the site have a different ownership history (refer Figure 5).

Figure 5: Key to historic title search

Table 1: Historic Title Search Results

Lot / DP	Date of Acquisition and term held	Registered Proprietor(s) & Occupations where available
Green shaded area	12.09.1903 (1903 to 1920)	Thomas Frederick Moss (Salesman)
	17.02.1920 (1920 to 1924)	Dora Marion Winifred Hill (Spinster)
	08.09.1924 (1924 to 1949)	Joseph Graham (Master Carrier)
	04.07.1949 (1949 to 1966)	Emanuel Casimatis (Restaurant Proprietor)
	19.09.1966 (1966 to 1967)	Plymouth Pty. Limited
Yellow shaded area	14.03.1904 (1904 to 1918)	William Letham (Builder)
	20.03.1918 (1918 to 1924)	Dora Marion Winifred Hill (Spinster)
	08.09.1924 (1924 to 1949)	Joseph Graham (Master Carrier)
	04.07.1949 (1949 to 1966)	Emanuel Casimatis (Restaurant Proprietor)
	19.09.1966 (1966 to 1967)	Plymouth Pty. Limited
Whole Site	02.05.1967	Registration of Strata Plan No. 2715
		Search Continued as regards the Common Property areas
	02.05.1967 (1967 to Date)	# The Proprietors – Strata Plan No. 2715 Now # The Owners – Strata Plan No. 2715

Notes to Table 1:

# Denotes current property owner

No easements were noted that affect the site.

4.3 Review of Historical Aerial Photos

The historical aerial photos reviewed for the assessment are presented in Table 2 together with the main observations.

Table 2: Historical Aerial Photo Review

Year	Scale (Colour)	Main Observations
1930	unknown (B & W)	Poor quality image, however, a residential style building appears to be visible on the site (refer Figure 6) Surrounding land is also covered with residential development. The railway is visible to the east with playing fields further to the east.
1961	1:13,000 (B & W)	Similar to 1930 aerial photo with some minor changes to the surrounding residential developments.
1975	1:16,000 (B & W)	The residence visible in the 1930 photo appears to have been replaced with a larger structure. A number of the residences around the site have been demolished and replaced with multi-storey developments. These structures (to the north and west of the site) appear to be the same as the present day.
2002 Google Earth	Not to scale (Colour)	Similar to the 1975 photo.
2005 Google Earth	Not to scale (Colour)	Similar to the 2002 photo.
2007 Google Earth	Not to scale (Colour)	Similar to 2005 aerial photo. The structures to the east have been demolished.
2009 Google Earth	Not to scale (Colour)	Similar to 2007 aerial photo. A new structure has been partially constructed on the property to the east.
2013 Google Earth	Not to scale (Colour)	Similar to 2009 aerial photo. The structure to the east has been completed.
May 2017 Google Earth	Not to scale (Colour)	Similar to the 2013 photo.

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

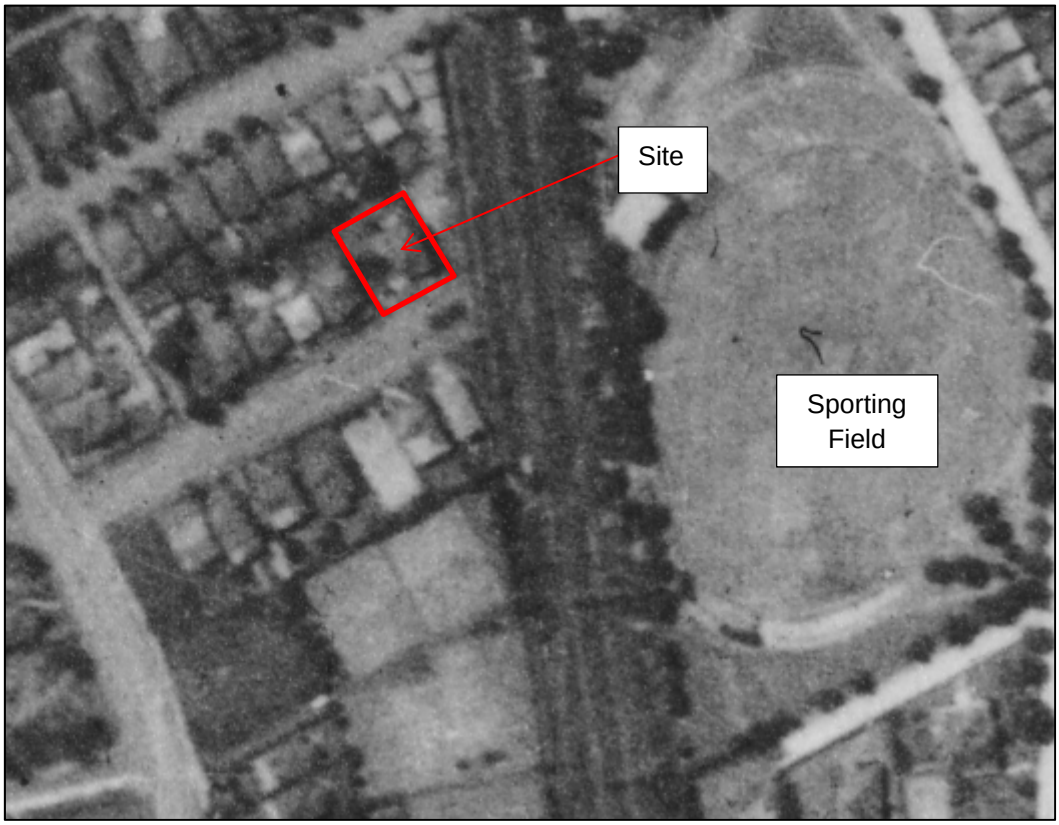


Figure 6: Aerial image from the 1930

The results of the historical aerial photo review have identified the following potential contamination considerations:

- Possible importation of filling for site regrading during various residential development at the site;
- Demolition of structures; and
- Proximity to railway.

4.4 NSW EPA Search

A review of the NSW EPA public registers indicated the following:

- The site is not on the NSW EPA Contaminated Land Management Register;
- The site is not on the list of contaminated sites notified to NSW EPA;
- The site was not listed on the NSW Cattle Dip Site Locator register; and
- Neither the site nor any nearby sites are on the Protection of the Environment Operations Act list for licences, notices etc.

4.5 Council Records Search

Review of Section 149 Planning Certificates (2 and 5) for the site indicated the following:

- The lot is currently zoned R4 High Density Residential under the Willoughby Local Environmental Plan 2012;
- The lots are not within a proclaimed mine subsidence district; and
- The lots are not affect by land reserved for acquisition.

A copy of the Section 149 planning certificates are provided in Appendix B.

5. Previous DP Investigations

DP has undertaken a previous investigation at 1 Ellis Street, Chatswood, located adjacent and to the east of the subject site. That investigation included the drilling of four bores to depths ranging from 8.9 m to 11.9 m. Subsurface conditions within the bores included sandy clay filling to less than 1m overlying stiff to very stiff clay, which continued to depths ranging from 5.5 m to 8.5 m. Extremely low to very low strength siltstone, with some bands of low and medium strength were encountered below the clay.

Groundwater was monitored in a well installed at the site and measured groundwater at depths ranging from 2.7 m to 3.1 m.

Relevant information from this previous report has been considered in preparation of the present investigation report.

6. Potential Contamination

On the basis of the desktop review, available site history information, observations made during the site inspection and conditions encountered in the bores, the sources of potential contamination for the site appear to be limited to the following:

- Possible localised importation of filling to the site associated with the construction of pavements and minor earthworks associated with the existing development. Imported filling may contain a range of contaminants included TRH, BTEX, PAH, OCP, OPP, PCB and asbestos depending on the source;
- Possible application of herbicides during weed control, particularly along the fence lines. Potential contaminants would include Herbicides, metals, TRH, Grease and Oil; and
- Former site demolition activities that may have resulted in soil impacts from hazardous building materials.

7. Preliminary Conceptual Site Model

A preliminary Conceptual Site Model (CSM) has been prepared for the investigation area with reference to the National Environment Protection (Assessment of Site Contamination) Measure 1999 amended 2013 (NEPC 2013) Schedule B2 (Ref 1). The CSM identifies potential contaminant sources and contaminants of concern, contaminant release mechanisms, exposure pathways and potential receptors. It should be noted that this preliminary conceptual site model will need to be revised following subsurface investigation. The preliminary CSM is presented in Table 2 below.

Table 2: Preliminary Conceptual Site Model

Known and Potential Primary Sources	Potential For Contamination and Area Affected	Primary Release Mechanism	Secondary Release Mechanism	Potential Impacted Media	Contaminants of Concern	Exposure Pathway	Potential Receptors	
							Current	Future
Possible importation of filling for construction of pavements and minor earthworks associated with existing development	Very Low	Placement of filling on site	Long-term leaching of contaminants via runoff, rain water infiltration / percolation	Soil, groundwater, surface water	TRH, PAH, BTEX, PCB, OCP, OPP, Metals, Asbestos	Dermal contact, inhalation (dust), ingestion	Site workers consultants trespassers, vegetation, surface water	Earthworks employees, remediation contractors, visitors and inmates, vegetation, trespasser
Herbicides used during weed control	Low	Spills and leaks from use or storage	Long-term leaching of contaminants via runoff, rain water infiltration / percolation	Soil, groundwater, surface water	Herbicides metals, hydrocarbons			
Demolition of previous buildings	Low to Moderate	Poor demolition practices	Repair / Maintenances of buildings and/or demountable buildings	Soil	Asbestos, Pb, PCB, OCP/OPP			

Notes to Table 2:

Heavy metals = Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc
TPH = Total Petroleum Hydrocarbons, BTEX = Benzene, Toluene, Ethyl Benzene and Xylene
PAH = Polyaromatic Hydrocarbons, PCB = Polychlorinated Biphenyls
OCP = Organochlorine Pesticides, OPP = Organophophorus Pesticides

8. Field Work Methods

The field work comprised the drilling of four boreholes (Bores 1 to 4) within accessible locations to assess general site conditions using a combination of track mounted rig and hand tools, as summarised in Table 3 below.

Table 3: Summary of Field Work

Bore	Drilling Method	Depth of Investigation (m)
1	75 mm diameter hand auger	1.5
2	Track mounted rig fitted with solid flight augers. NMLC coring of bedrock	2.45
3	Track mounted rig fitted with solid flight augers. NMLC coring of bedrock	19.0
4	75 mm diameter hand auger	17.3

Bores 3 and 4 were initially drilled with 110 mm spiral flight augers, then rotary drilled to rock and thereafter by NMLC (50 mm diameter) diamond coring techniques, for geotechnical investigation purposes.

Standard penetration tests (SPTs) were carried out within soils or weathered rock at from 1.0 m depths at 1.5 m intervals. Soil samples were retrieved from the cuttings returned by the auger blade and used for identification and laboratory testing purposes.

A standpipe was installed in Bore 4 to allow water level measurements following drilling.

The approximate locations of the boreholes are shown in Drawing 1. The surface level of the bores were levelled with reference to a temporary benchmark located on the south-western corner of the building (assigned RL 100).

Samples were collected and selected for environmental laboratory analysis based on material type, and visual or olfactory evidence of possible contamination for preliminary waste classification purposes.

The general sampling procedure comprised:

- Decontamination of all sampling equipment (where used) 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 samples for Quality Assurance / Quality Control (QA / QC) purposes;
- Collection of replicate soil samples in zip-lock plastic bags at each depth for Photo-ionisation Detector (PID) screening;

- Labelling of sample containers with individual and unique identification, including project number, sample location and sample depth;
- Placement of the sample jars and replicate sample bags into a cooled, insulated and sealed container with ice for transport to the laboratory; and
- Use of chain of custody (C-O-C) documentation ensuring that sample tracking and custody could be cross-checked at any point in the transfer of samples from the field to the laboratory. Copies of the completed forms are provided in Appendix D.

Replicate samples collected in zip-lock bags were screened for the presence of volatile organic compounds (VOCs) using a calibrated MiniRAE Lite PID, with a 10.6 eV lamp, calibrated to 100 ppm Isobutylene.

Following completion of drilling, all bores were reinstated using excavated spoil, which was compacted using the excavation equipment and manual tamping.

8.1 Data Quality Indicators (DQOs)

The scope of the PSI was devised generally in accordance with the seven step data quality objective (DQO) process, as documented in Appendix D, Schedule B2, National Environmental Protection Council (NEPC) National Environmental Protection (Assessment of Site Contamination) Measure 2013 (NEPC 2013). The DQO process is outlined in Table 4

Table 4: Data Quality Objectives

DQO	Achievement Evaluation Procedure
Step 1 – State the problem	Possible presence, extent and level of contamination
Step 2 – Identify the decision	Assess whether the site is suitable for the intended land use from a contamination perspective Refer Section 10 for adopted site assessment criteria
Step 3 - Identify the inputs to the decision	Site history review Selection of appropriate contaminants of concern 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 7. 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 was developed through reference to NEPC 1999 (amended 2013). The acceptance limits for laboratory QA/QC parameters were based on the laboratory reported acceptance limits and those stated in NEPC 1999.
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 documentation correct **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

8.2 Quality Assurance/Quality Control

8.2.1 Field QA/QC

Quality assurance (QA) and quality control (QC) procedures were adopted throughout the field sampling programme and comprised the following:

- Analysis of one field replicate samples;
- Following standard operating procedures;
- Storage of samples under secure, temperature controlled conditions; and
- Use of chain of custody documentation for the handling, transport and delivery of samples to the selected laboratory.

8.2.2 Laboratory QA/QC

The NATA accredited chemical laboratories 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.

9. Field Work Results

9.1 Geotechnical Conditions

The results of the subsurface investigation are shown in the borehole report sheets in Appendix C, together with notes defining classification methods and descriptive terms. The results of the DCP tests are presented graphically on the logs and are summarised on the attached dynamic penetrometer test result sheet.

The boreholes encountered relatively uniform conditions over the site. The general subsurface profile is summarised as follows:

Unit 1 (Filling)	Generally grey or brown sandy silt, sand or clay filling;
Unit 2 (residual Clay)	Generally very stiff to hard, orange brown clay;
Unit 3.1 (upper Siltstone)	Generally extremely low to low strength, grey siltstone with some low strength bands.
Unit 3.2 (lower Siltstone)	Generally medium strength, fresh stained to fresh, dark grey siltstone
Unit 3.3 (Sandstone)	High strength, slightly weathered to fresh, dark grey or pale grey sandstone

Similar conditions were encountered during the previous adjacent investigation at 1 Ellis Street, which encountered extremely low to very low strength siltstone from depths ranging from 5.5 m to 8.5 m with bands of low and medium strength.

Table 5 provides a summary of subsurface conditions encountered in the bores.

Table 5: Summary of Subsurface Conditions

Bore	Depth of Investigation[(1)] (m)	Depth to Base of Each Unit (m)				
		Unit 1 (Filling)	Unit 2 (residual Clay)	Unit 3.1 (upper Siltstone)	Unit 3.2 (lower Siltstone)	Unit 3.3 (Sandstone)
1	1.5	0.6	>1.5	NE	NE	NE
2	2.45	0.6	>2.45	NE	NE	NE
3	19.0	0.5	3.0	13.27	18.42	>19.0
4	17.3	0.7	3.1	11.4	>17.3	NE
Previous Investigation at 1 Ellis Street						
Bore 4	11.8	0.2	8.5	>11.8	NE	NE
Bore 5	8.9	0.5	5.5	>8.9	NE	NE

Notes to Table 5: NE – Not encountered

(1) below existing ground level

A summary of the groundwater observations are presented in Table 6.

Table 6: Summary of Groundwater Observations

Bore	Groundwater Observation	Groundwater Level (m AHD)	
		During Drilling	12/12/17
1	No free groundwater observed at whilst augering	-	-
2	No free groundwater observed at whilst augering	-	-
3	No free groundwater observed whilst augering, further observations precluded by introduction of drilling fluid from 2.95 m depth	-	-
4	No free groundwater observed whilst augering, further observations precluded by introduction of drilling fluid from 3.1 m depth	91.4	92.25
Previous Investigation in 2005 at 1 Ellis Street, Chatswood			
Bore 5	No free groundwater observed whilst augering, further observations precluded by introduction of drilling fluid	Measured at 2.7 – 3.1 m depth in piezometer in August 2005	

Notes to Table 6:
(1) Surface levels and consequently water levels based on surface levels for bores interpolated from temporary bench mark
- Not encountered

It should be noted that groundwater levels are affected by factors such as climatic conditions and soil permeability and will therefore vary with time.

9.2 Contaminant Observations

Observations of potential contamination during field work for the current assessment are summarised below in Table 7.

Table 7: Potential Contaminant Observations during Field Work

Potential Contaminant Observation	Test Bore / Depth Range
Coal/charcoal	Bore 2 (charcoal) from 0.4 m to 0.6 m depth Bore 3 (charcoal) from 0.4 m to 0.5 m depth Bore 4 (charcoal) from 0.45 to 0.7 m depth
Brick, concrete and tile fragments	Bore 1 (concrete pieces) to 0.15 m Bore 2 (brick, plaster) to 0.4 m depth Bore 3 (brick, concrete) to 0.4 m depth Bore 4 (brick and concrete fragments, steel) from 0.1 m to 0.45 m depth

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

Although asbestos containing materials (ACM) were not observed within the bores, building demolition materials (i.e. brick, concrete or tile fragments) were observed within the upper filling which are indicative of the possible presence of hazardous building materials (HBM), including asbestos.

There was no visual or olfactory evidence (i.e. staining or odours) to suggest the presence of gross contamination within the soils investigated.

10. Site Assessment Criteria

10.1 Introduction

At this stage, it is understood that the proposed development at the site includes the construction of a multi-storey residential unit development. Excavation to possibly 3 m or 6 m depth will be required. The excavated material is likely to be removed from the site and disposed of to a licensed landfill or re-used for beneficial off-site use.

The preliminary assessment and characterisation of the material on the site and the results of laboratory testing have been compared to the following guidelines:

- National Environmental Protection Council (NEPC), “National Environmental Protection (Assessment of Site Contamination) Measures” (NEPM), 1999 (amended 2013) [Ref 1];
- NSW EPA, 'Waste Classification Guidelines, Part 1: Classifying Waste', November 2014 [Ref 3];
- NSW EPA, Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 “The Excavated Natural Material Order 2014” [Ref 3].

For comparison to the NEPM guidelines, the investigation and screening levels applied in the current investigation comprise levels adopted for a generic residential land use scenario.

10.2 Health Investigation and Screening Levels

The generic health investigation levels (HIL) and health screening levels (HSL) are considered to be appropriate for the assessment of contamination at the site. The adopted soil HIL and HSL for the potential contaminants of concern are presented in Table 8.

Table 8: HIL and HSL in mg/kg Unless Otherwise Indicated

Contaminants		HIL- A	HIL-B	HSL- AB[4]
Metals	Arsenic	100	500	NC
	Cadmium	20	150	NC
	Chromium (VI)	100	500	NC
	Copper	6000	500	NC
	Lead	300	1200	NC
	Manganese	3800	14000	NC
	Mercury (inorganic)	40	120	NC
	Nickel	400	1200	NC
	Zinc	7400	NC	NC
	Iron	NC	NC	NC
PAH	Benzo(a)pyrene TEQ[1]	3	4	NC
	Naphthalene	NC	NC	3
	Total PAH	300	400	NC
TRH	C6 – C10 (less BTEX) [F1]	NC	NC	45
	>C10-C16 (less Naphthalene) [F2]	NC	NC	110
	>C16-C34 [F3]	NC	NC	NC
	>C34-C40 [F4]	NC	NC	NC
BTEX	Benzene	NC	NC	0.5
	Toluene	NC	NC	160
	Ethylbenzene	NC	NC	55
	Xylenes	NC	NC	40
OCP	Aldrin + Dieldrin	6	10	NC
	Chlordane	50	90	NC
	DDT+DDE+DDD	240	600	NC
	Endosulfan	270	400	NC
	Endrin	10	20	NC
	Heptachlor	6	10	NC
	HCB	10	15	NC
	Methoxychlor	300	500	NC
OPP	Chlorpyrifos	160	340	NC
PCB [2]		1	1	NC

Notes to Table 8:

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 conservative sand soil (based on nature of filling) and an assumed depth to contamination of 0 m to <1 .

NC – No Criteria.

As shown in Table 8 the adopted HSLs are predicated on a potential vapour intrusion pathway. Although possible direct contact pathways are present at the site, 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.

10.3 Ecological Investigation Levels

EIL and Added Contaminant Limits (ACLs), where appropriate, have been derived in NEPC (2013) for only a short list of contaminants comprising As, Cu, Cr (III), DDT, naphthalene, Ni, Pb and Zn. The adopted EIL, derived using the *Interactive (Excel) Calculation Spreadsheet* (Standing Council on Environment and Water (SCEW) website (http://www.scew.gov.au/node/941)) are shown in the following Table 9.

Table 9: EIL in mg/kg

Analyte		EIL (Residential / Open Space)	Comments
Metals	Arsenic	100	**Adopted parameters** pH = 5 CEC = 3 $cmol_c$/kg]; assumed clay content [5%] Organic content 1% "Aged" (>2 years) source of contamination High traffic volumes in NSW
	Copper	80	
	Nickel	15	
	Chromium III	330	
	Lead	1100	
	Zinc	210	
PAH	Naphthalene	170	
OCP	DDT	180	

10.4 Ecological Screening Levels

ESL are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. The adopted ESL are shown in the following Table 10.

Table 10: ESL in mg/kg

Analyte		ESL[1]	Comments
TRH	C6 – C10 (less BTEX) [F1]	180*	All ESLs are low reliability apart from those marked with * which are moderate reliability
	>C10-C16 (less Naphthalene) [F2]	120*	
	>C16-C34 [F3]	300	
	>C34-C40 [F4]	2800	
BTEX	Benzene	50	
	Toluene	85	
	Ethylbenzene	70	
	Xylenes	105	
PAH	Benzo(a)pyrene	0.7	

Notes to Table 10:

1. The ESL have been calculated for a coarse soil based on a conservative sand soil and Urban residential.

NC – No Criteria

10.5 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 11.

Table 11: Management Limits in mg/kg

Analyte		Management Limit	
TRH	$C_6 – C_{10}$ (F1) #	700	The management limits have been calculated for a conservative coarse sand based on the nature of the filling and residential land use
	$>C_{10}-C_{16}$ (F2) #	1000	
	$>C_{16}-C_{34}$ (F3)	2500	
	$>C_{34}-C_{40}$ (F4)	10000	

Notes to Table 11:

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

10.6 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.

10.7 Waste Classification

The results of chemical testing were also compared against NSW EPA Waste Classification Guidelines (2014) (Ref 3) for a preliminary assessment of possible off-site disposal options to a licenced facility.

For potential beneficial reuse, the results of chemical testing were also compared against the NSW EPA ENM RRO criteria (Ref 4).

For assessment of the natural soils for Virgin Excavation Natural Material (VENM) the NSW Environment Protection Authority (EPA) currently, has not issued any official threshold criteria. In absence of such criteria, the results were compared against the ENM RRO (Ref 4).

11. Laboratory Testing

Laboratory testing for preliminary waste classification purposes was undertaken by Envirolab Services, a National Association of Testing Authorities, Australia (NATA) registered laboratory. Analytical Methods used are shown on the laboratory sheets in Appendix D.

A total of 10 samples (including 1 duplicate) were selected for analysis for the following potential contaminants:

- Metals (Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc, Manganese, Iron);
- Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene, Xylene (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAH);
- Polychlorinated Biphenyls (PCBs);
- Organochlorine (OCP) and Organophosphate (OPP) Pesticides; and
- Asbestos.

The detailed results of chemical analysis on the tested samples are presented in the laboratory report sheets in Appendix D, and are summarised in Table 12 to Table 14 below. Based on a review of the report QC results, it is considered that the laboratory test data obtained are reliable and useable for this assessment.

Table 12: Laboratory Results for Metals in Soil

Bore	Fill or Natural (F/N)	As	Cd	Cr	Cu	Fe	Pb		Hg	Ni	Zn	Mn
							Total (mg/kg)	TCLP (mg/L)				
BH1/0.2	F	<4	<0.4	6	5	6800	20	NT	<0.1	3	51	120
BH1/0.45	F	4	<0.4	28	<1	37000	19	NT	<0.1	3	6	26
BH2/0.1	F	7	<0.4	34	18	39000	100	NT	<0.1	6	81	87
BH2/0.5	F	13	<0.4	65	<1	79000	20	NT	<0.1	2	2	6
BH2/0.7	N	10	<0.4	58	<1	73000	24	NT	<0.1	2	4	6
BH3/0.05	F	6	<0.4	22	20	27000	160	0.04	0.2	6	100	150
BH3/0.8	N	7	<0.4	47	<1	60000	20	NT	<0.1	4	5	8
BH4/0.3	F	8	<0.4	35	8	53000	88	NT	<0.1	4	83	130
D3 (4/0.3)	F	9	<0.4	28	14	40000	97	NT	<0.1	5	87	210
BH4/0.5	F	8	<0.4	38	<1	60000	26	NT	<0.1	3	12	19
Laboratory PQL		4	0.4	1	1		1	0.03	0.1	1	1	1
Average Concentration (filling)		7	<0.4	32	7	43110	*61*	-	0.1	4	48	77
Average Concentration (natural)		9	<0.4	52	<1	66500	*22*	NT	<0.1	3	5	7
Maximum Concentration (filling)		13	<0.4	65	20	NC	160	NC	0	6	100	NC
Maximum Concentration (natural)		10	<0.4	58	<1	73000	24	NC	<0.1	3	5	8
General Solid Waste (CT1/SCC1*)		**100**	**20**	**100**	**NC**	**NC**	**100 /1500***	**5**	**4**	**40**	**NC**	**NC**
Restricted Solid Waste (CT2/SCC2*)		400	80	400	NC	NC	400 /6000*	20	16	160	NC	NC
ENM Order (2014) – Absolute Maximum Concentration		40	1	150	200	NC	100	NC	NC	60	300	NC
ENM Order (2014) – Maximum Average Concentration		*20*	*0.5*	*75*	*100*	*NC*	*50*	*NC*	*NC*	*30*	*150*	*NC*
NEPM 2013 HILs Res A soil		100	20	100	6000	NC	300	NC	40	400	7400	3800
NEPM 2013 EILs Res/Open Space Aged		100	NC	330	80	NC	1100	NC	NC	15	210	NC

Notes to Table 12:

All results in mg/kg on a dry weight basis, except TCLP which is in mg/L

CT - Concentration Threshold * SSC1 Criterion when used with TCLP testing

NA - Not Applicable NC - No Criteria

NT - Not Tested PID - Photoionisation Detector

PQL - Practical Quantitation Limits

Table 13: Laboratory Results for TRH, BTEX in Soil

Bore	TRH										Napthalene	BTEX			
	PID (ppm)	Fill or Natural (F/N)	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	F1 (C_6 – C_{10})	F2 (>C_{10} – C_{16})	F3 (>C_{16} – C_{34})	F4 (>C_{34} – C_{40})		Benzene	Toluene	Ethyl Benzene	Xylene
BH1/0.2	<1	F	<25	<50	<100	<100	<25	<50	<100	<100	<0.1	<0.2	<0.5	<1	<3
BH1/0.45	<1	F	<25	<50	<100	<100	<25	<50	<100	<100	<0.1	<0.2	<0.5	<1	<3
BH2/0.1	<1	F	<25	<50	<100	<100	<25	<50	<100	<100	<0.1	<0.2	<0.5	<1	<3
BH2/0.5	<1	F	<25	<50	<100	<100	<25	<50	<100	<100	<0.1	<0.2	<0.5	<1	<3
BH2/0.7	<1	N	<25	<50	<100	<100	<25	<50	<100	<100	<0.1	<0.2	<0.5	<1	<3
BH3/0.05	<1	F	<25	<50	<100	<100	<25	<50	<100	<100	<0.1	<0.2	<0.5	<1	<3
BH3/0.8	<1	N	<25	<50	<100	<100	<25	<50	<100	<100	<0.1	<0.2	<0.5	<1	<3
BH4/0.3	<1	F	<25	<50	<100	<100	<25	<50	<100	<100	<0.1	<0.2	<0.5	<1	<3
D3 (4/0.3)	<1	F	<25	<50	<100	<100	<25	<50	<100	<100	<0.1	<0.2	<0.5	<1	<3
BH4/0.5	<1	F	<25	<50	<100	<100	<25	<50	<100	<100	<0.1	<0.2	<0.5	<1	<3
Laboratory PQL			25	50	100	100	25	50	100	100	0.1	0.2	0.5	1	3
Average Concentration (fill and natural)			<25	<50			<25	<50	<100	<100	<0.1	<100	<100	<0.2	<0.5
Maximum Concentration (fill and natural)			<25	<50			<25	<50	<100	<100	<0.1	<100	<100	<0.2	<0.5
General Solid Waste (CT1)			**650**	**10000 total**			**NC**	**NC**	**NC**	**NC**	**NC**	**10**	**288**	**600**	**80**
Restricted Solid Waste (CT2)			2600	40000 total			NC	NC	NC	NC	NC	40	1152	2400	200
ENM RRO 2014 – Abs Max			NC	500			NC	NC	NC	NC	NC	0.5	65	25	NC
ENM RRO 2014 – Max Ave			*NC*	*250*			*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*
NEPM 2013 ESLs Residential, Coarse Soil			NC	NC			180	120	300	2800	NC	50	85	70	105
NEPM HSL A/B – Low / High density residential			NC	NC			45	110	NC	NC	3	0.5	55	160	40
Management Limits for TPH in coarse soils			NC	NC			700	1000	2500	10000	NC	NC	NC	NC	NC

Notes to Table 13:
All results in mg/kg on a dry weight basis CT - Concentration Threshold NC - No Criteria
PID - Photoionisation Detector PQL - Practical Quantitation Limits
ESL apply from the ground surface to 2 m depth below the finished surface
Soil HSLs for vapour intrusion (mg/kg) based on sand soils with a contamination source within 1 m depth.

Table 14: Laboratory Results for PAH, OCP and OPP

Bore	Fill or Natural (F/N)	Total Positive PAH	B(a)P	B(a)P (TEQ)	Total PCB[2]	Total OPP	Chlorphyriphos	Total OCP	Aldrin + Dieldrin	Chlordane	DDT	Heptachlor
BH1/0.2	F	0.4	0.06	<0.5	0.7	<1.2	<0.1	<2	<0.2	<0.1	<0.1	<0.1
BH1/0.45	F	3.8	0.4	0.5	0.7	<1.2	<0.1	<2	<0.2	<0.1	<0.1	<0.1
BH2/0.1	F	0.3	0.05	<0.5	0.7	<1.2	<0.1	<2	<0.2	<0.1	<0.1	<0.1
BH2/0.5	F	<0.05	<0.05	<0.5	0.7	<1.2	<0.1	<2	<0.2	<0.1	<0.1	<0.1
BH2/0.7	N	<0.05	<0.05	<0.5	0.7	<1.2	<0.1	<2	<0.2	<0.1	<0.1	<0.1
BH3/0.05	F	7	0.6	0.7	0.7	<1.2	<0.1	<2	<0.2	<0.1	<0.1	<0.1
BH3/0.8	N	<0.05	<0.05	<0.5	0.7	<1.2	<0.1	<2	<0.2	<0.1	<0.1	<0.1
BH4/0.3	F	0.3	0.06	<0.5	0.7	<1.2	<0.1	<2	<0.2	<0.1	<0.1	<0.1
D3 (BH4/0.3)	F	1.4	0.1	<0.5	0.7	<1.2	<0.1	<2	<0.2	<0.1	<0.1	<0.1
BH4/0.5	F	<0.05	<0.05	<0.5	0.7	<1.2	<0.1	<2	<0.2	<0.1	<0.1	<0.1
Laboratory PQL		0.05	0.05	0.5	0.1 ea	0.1 ea	0.1	0.1 ea	0.1 ea	0.1	0.1	0.1
General Solid Waste (CT1)		**200**	**0.8**	**NC**	**50**	**NC**	**50**	**NC**	**50**	**50**	**50**	**NC**
Restricted Solid Waste (CT2)		800	3.2	NC	50	1000	50	NC	50	50	50	NC
ENM RRO 2014 – Abs Max		40	1	NC	NC	NC	NC	NC	NC	NC	NC	NC
ENM RRO 2014 – Max Ave		*20*	*0.5*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*	*NC*
EIL/ESL Residential[1]		NC	0.7	NC	NC	NC	NC	NC	NC	NC	180	NC
NEPM HIL A		300	NC	3	1	NC	160	NC	6	50	NC	6

Notes to Table 14: All results in mg/kg on a dry weight basis
CT - Concentration Threshold
NA - Not Applicable
PID - Photoionisation Detector
PQL - Practical Quantitation Limits
Total PAH - Sum of positive and PQL values
1 - Health Based Criteria for Residential Land Use
2- PCB HILs relates to non-dioxin-like PCB only

Table 15: Laboratory Results of Asbestos Testing

Bore	Depth (m)	Description	Asbestos*
2	0.1	Filling	Not detected
3	0.05	Filling	Not detected
4	0.3	Filling	Not detected

Notes to Table 15:

*Not detected at the reporting limit of 0.1g/kg

11.1 Contamination Status

Ten (10) soil samples (including one field replicate) were analysed for the suite of testing outlined in Section 11. The results were compared against NEPM for Health Based Investigation / Screening Levels, Ecological Investigation / Screening Levels, Total Petroleum Hydrocarbon Management Limits for residential land use as discussed in Section 10.

All samples tested were below the relevant criteria for:

- Health investigation and screening levels;
- Ecological investigation and screening levels; and
- Total petroleum hydrocarbon management limits

There was no obvious visual or olfactory evidence of gross contamination (i.e. no obvious staining or odour) observed at the surface or within the investigation bores.

The laboratory results were generally consistent with the visual and olfactory “screening” that suggested the absence of gross contamination within the test bores.

Although hazard building material (HBM) including asbestos, were not observed within the bores, the presence of brick, tile and concrete fragments in the filling are indicative of the possible presence of HBM. There is, therefore, a risk of HBM in unobserved or untested parts of the site.

The site is considered to be suitable for the intended use, based on the results of the preliminary assessment. Due to the observed presence of building demolition materials in the upper filling, it is recommended that an unexpected finds protocol is incorporated with the site development as a precautionary measure.

11.2 Preliminary Waste Classification

The soil samples tested were within the maximum concentrations for General Solid Waste (Ref 3) with the exception of the sample of sandy clay filling in Bore 3, which recorded a lead concentration of 160 mg/L. Leachability testing (TCLP) was undertaken on this sample with total and leachable concentrations of less than the revised permissible concentrations for General Solid Waste.

In summary, based on the site historical information, site investigations and preliminary laboratory testing, the following waste classifications are provided:

Existing Filling
The fill materials tested are classified General Solid Waste (GSW) with reference to NSW EAP Waste Classification guidelines (Ref 3).

Selected fill materials not containing anthropogenic inclusions such as concrete or brick fragments may also be suitable for classification as Excavated Natural Material (ENM), although additional sampling and testing would be required once further details of the proposed earthworks are known. The results of the contamination testing undertaken during the present investigation and further testing should then be compared against the Excavated Natural Material Order (Ref 4).

It is recommended that during construction an inspection regime should be implemented to identify any areas of filling which may warrant further assessment. In this regard, it is noted that assessment of materials under covered areas (i.e. pavements and building slabs) was not possible during the present investigation. The inspection regime should include the following:

- Stripping of the overlying filling over the excavation area;
- Inspection of the exposed soils by a geo-environmental engineer to assess for the presence of material which may affect the waste classification;
- Supplementary laboratory testing of soil for characterisation (where required); and
- Regular inspections and testing during construction to ensure that the excavated materials are appropriately handled and that material different to those encountered during the investigation are appropriate assessed.

Natural Soils and Bedrock
The underlying natural soils, described as orange brown clay and the underlying bedrock would be classified VENM, subject to appropriate segregation of upper fill materials. VENM would be suitable for off-site re-use from a contamination standpoint, subject to prior acceptance by the receptor site/relevant authority to receive the material. The natural soils and bedrock should not be mixed/cross contaminated with non-VENM materials (e.g. overlying filling, topsoil or anthropogenic inclusions). During construction an unexpected finds protocol should be implemented for the site to outline how to handled, assess and dispose of any materials different to those observed during the investigation which may be encountered during the proposed works.

12. References

1. National Environmental Protection Council (NEPC), “National Environmental Protection (Assessment of Site Contamination) Measures”, 1999 (amended 2013).
2. Douglas Partners Pty Ltd, “Report on Geotechnical Investigation, Proposed Unit Development, 3 Ellis Street, Chatswood”, Project 91234.00, dated December 2017.
3. NSW EPA, 'Waste Classification Guidelines, Part 1: Classifying Waste', November 2014.

4. NSW EPA, Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 “The Excavated Natural Material Order 2014”.
5. Department of Urban Affairs and Planning, Environmental Protection Authority, Managing Land Contamination, “Planning Guidelines, SEPP 55 – Remediation of Land”, 1998.

13. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report (or services) for this project at 3 Ellis Street, Chatswood in accordance with DP’s proposal NCL170688 dated 8 November 2017 and acceptance received from Mr Wesley Chong of MPG AU Pty Ltd dated 9 November 2017. The work was carried out under DP’s Conditions of Engagement. This report is provided for the exclusive use of MPG AU Pty Ltd 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.

Asbestos has not been detected by observation or by laboratory analysis, either on the surface of the site, or in filling materials at the test locations sampled and analysed. Building demolition materials, such as tile and brick fragments, were, however, located in previous 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, or to parts of the site being inaccessible and not available for inspection/sampling. It is therefore considered possible that 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 asbestos is not present.

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.

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
Rock Descriptions
Symbols and Abbreviations

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.

Rock Strength

Rock strength is defined by the Point Load Strength Index ($Is_{(50)}$) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 1993. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index $Is_{(50)}$ MPa	Approx Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2 - 6
Medium	M	0.3 - 1.0	6 - 20
High	H	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and loner sections
Unbroken	Core lengths mostly > 1000 mm

Rock Descriptions

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq \text{100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

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

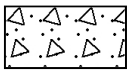
Symbols & Abbreviations

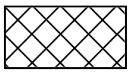
Graphic Symbols for Soil and Rock

General

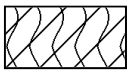

Asphalt

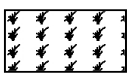

Road base

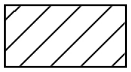

Concrete

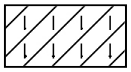

Filling

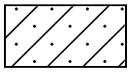
Soils


Topsoil

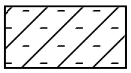

Peat

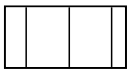

Clay

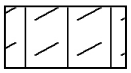

Silty clay

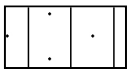

Sandy clay

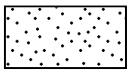

Gravelly clay

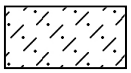

Shaly clay

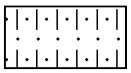

Silt


Clayey silt


Sandy silt

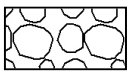

Sand

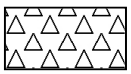

Clayey sand


Silty sand


Gravel

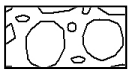

Sandy gravel


Cobbles, boulders

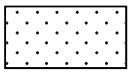

Talus

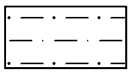
Sedimentary Rocks

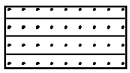

Boulder conglomerate

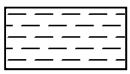

Conglomerate


Conglomeratic sandstone

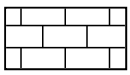

Sandstone


Siltstone

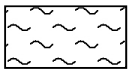

Laminite

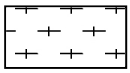

Mudstone, claystone, shale

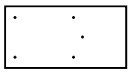

Coal


Limestone

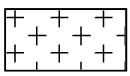
Metamorphic Rocks

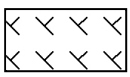

Slate, phyllite, schist

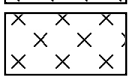

Gneiss

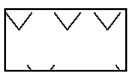

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

Appendix B

Site History Information

WILLOUGHBY
CITY COUNCIL

PLANNING CERTIFICATE ISSUED UNDER SECTION 149(2&5) ENVIRONMENT PLANNING AND ASSESSMENT ACT, 1979

Certificate No:	39294
Receipt No:	1788906
Issue date:	11-Aug-2017
Customer Ref:	45899695:23853

SAI Global Property Pty Ltd
Level 3/355 Spencer St
WEST MELBOURNE VIC 3003

Property Location: **8/3 Ellis Street, CHATSWOOD NSW 2067.**

Legal Description: **LOT 8 SP 2715**

Disclaimer

1. *The information provided in this certificate has been obtained from Council's records. The Council advises that:*

   (a) other authorities may hold information in respect of the property not contained in the Council's records; and
   (b) the Council's records themselves may not be complete or accurate in respect of the property.

2. *The instrument(s) referred to in this certificate may contain other important information in respect to the property. In order to understand the effects of the instrument(s) on the property, the Council advises that the whole of each instrument(s) should be read and considered. This certificate cannot be used as a substitute for reading the whole of the instrument(s) referred to in the certificate.*

3. *It may be appropriate or necessary to obtain legal or other expert advice in respect of the matters contained in the certificate or the instruments referred to in the certificate.*

4. *The Council cannot and will not accept any liability in respect of any error, inaccuracy, or omission in this certificate.*

Debra Just
GENERAL MANAGER

(Computer printed copy – No signature required)

PLANNING CERTIFICATE ISSUED UNDER SECTION 149(2&5)
ENVIRONMENT PLANNING AND ASSESSMENT ACT, 1979

WILLOUGHBY
CITY COUNCIL

Certificate No:	39294
Receipt No:	1788906
Issue date:	11-Aug-2017
Customer Ref:	45899695:23853

1. RELEVANT PLANNING INSTRUMENTS AND DEVELOPMENT CONTROL PLANS

(1) Environmental Planning Instruments

As at the date of this certificate the above mentioned land is affected by the following environmental planning instruments:

Willoughby Local Environmental Plan 2012

State Environmental Planning Policy No. 19 - Bushland in Urban Areas
State Environmental Planning Policy No. 21 - Caravan Parks
State Environmental Planning Policy No. 30 - Intensive Agriculture
State Environmental Planning Policy No. 32 - Urban Consolidation (Redevelopment of Urban Land)
State Environmental Planning Policy No. 33 - Hazardous and Offensive Development
State Environmental Planning Policy No. 50 - Canal Estate Development
State Environmental Planning Policy No. 55 - Remediation of Land
State Environmental Planning Policy No. 62 – Sustainable Aquaculture
State Environmental Planning Policy No. 64 - Advertising and Signage
State Environmental Planning Policy No. 65 - Design Quality of Residential Flat Development
State Environmental Planning Policy No. 70 - Affordable Housing (Revised Schemes)
State Environmental Planning Policy (Major Development) 2005
State Environmental Planning Policy (Infrastructure) 2007
State Environmental Planning Policy (Miscellaneous Consent Provisions) 2007
State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007
State Environmental Planning Policy (Exempt and Complying Development Codes) 2008
State Environmental Planning Policy (Affordable Rental Housing) 2009
State Environmental Planning Policy (State and Regional Development) 2011
State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004
State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004
Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

(2) Proposed Environmental Planning Instruments

As at the date of this certificate the above mentioned land is affected by the following proposed environmental planning instruments:

Draft State Environmental Planning Policy (Infrastructure) Amendment (Review) 2016

Draft State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017

WILLOUGHBY
CITY COUNCIL

Certificate No:	39294
Receipt No:	1788906
Issue date:	11-Aug-2017
Customer Ref:	45899695:23853

(3) Development Control Plans

As at the date of this certificate the above mentioned land is affected by the following development control plans:

Development Control Plan 2005 - Sydney Foreshore and Waterways Area

The plan applies to all development proposals within the foreshores and waterways area identified in SREP (Sydney Harbour Catchment) 2005 - (Refer to the Foreshores and Waterways Area Map).

Willoughby Development Control Plan

2. ZONING AND LAND USE

(a) Zone Identity
R4 High Density Residential

(b), (c), (d) (Development)
Zone R4 High Density Residential – under Willoughby Local Environmental Plan 2012

Objectives of zone

- *To provide for the housing needs of the community within a high density residential environment.*
- *To provide a variety of housing types within a high density residential environment.*
- *To enable other land uses that provide facilities or services to meet the day to day needs of residents.*
- *To allow for increased residential density in accessible locations, while minimising the potential for adverse impacts of such increased density on the efficiency and safety of the road network.*
- *To encourage innovative design in providing a comfortable and sustainable living environment that also has regard to solar access, privacy, noise, views, vehicular access, parking and landscaping.*

Permitted without consent

Nil

Permitted with consent

Boarding houses; Child care centres; Community facilities; Home businesses; Home occupations; Neighbourhood shops; Places of public worship; Recreation areas; Residential flat buildings; Respite day care centres; Roads; Shop top housing.

Prohibited

Any development not specified in item 2 or 3.

NOTE: You are advised that in addition to the matters set out above, the instrument may make further provisions with respect to the purposes for which development may be carried out on the land without consent and with consent and the purposes for which development of the land is prohibited. Applicants are advised that they should

WILLOUGHBY
CITY COUNCIL

Certificate No:	39294
Receipt No:	1788906
Issue date:	11-Aug-2017
Customer Ref:	45899695:23853

read the whole of the instrument(s) in order to determine whether that instrument prohibits, restricts or otherwise relates to the development of the land.

(e) Development Standards applying to the land fixing minimum dimensions for the erection of a dwelling house?

No
(NB: the erection of a dwelling house on the land requires development consent to be obtained which will require assessment of the particular application under section 79C of the Act. The Council makes no representation that development consent will be granted to any application.)

(f) Critical Habitat

- -

(g) Conservation Area

- -

(h) Heritage Item

- -

3. COMPLYING DEVELOPMENT

NOTE: This certificate only addresses matters raised in Clauses 1.17A (1) (c) to (e), (2), (3) and (4), 1.18 (1) (c3) and 1.19 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008. It is your responsibility to ensure that the development is permissible with consent in the land use zone and that you comply with any other requirements of the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 including Clauses 1.18 and 1.20 of that Policy, the Complying Development Codes in Parts 3 to 8 of that Policy, and the Willoughby Local Environmental Plan 2012. Failure to comply with these provisions may mean that a Complying Development Certificate issued under the provisions of the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 is invalid.

(a) General Housing Code and Rural Housing Code

The land is land on which complying development may be carried out under these Codes.

(b) Housing Alterations Code and General Development Code

The land is land on which complying development may be carried out under these Codes.

WILLOUGHBY
CITY COUNCIL

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Issue date: 11-Aug-2017
Customer Ref: 45899695:23853

(c) Commercial and Industrial Alterations Code

The land is land on which complying development may be carried out under this Code.

(d) Commercial and Industrial (New Buildings and Additions) Code

The land is land on which complying development may be carried out under this Code.

(e) Subdivisions Code

The land is land on which complying development may be carried out under this Code.

(f) Demolition Code

The land is land on which complying development may be carried out under this Code.

(g) Fire Safety Code

The land is land on which complying development may be carried out under this Code.

(h) Container Recycling Facilities Code

The land is land on which complying development may be carried out under this Code.

4. COASTAL PROTECTION

The land is not affected by Section 38 or 39 of the Coastal Protection Act 1979, (as advised by the Department of Public Works).

4A CERTAIN INFORMATION RELATING TO BEACHES AND COASTS

(1) - -
(2) - -
(3) - -

4B ANNUAL CHARGES UNDER LOCAL GOVERNMENT ACT 1993 FOR COASTAL PROTECTION SERVICES THAT RELATE TO EXISTING COASTAL PROTECTION WORKS.

- -

WILLOUGHBY
CITY COUNCIL

Certificate No:	39294
Receipt No:	1788906
Issue date:	11-Aug-2017
Customer Ref:	45899695:23853

5. MINE SUBSIDENCE

The land is not within a proclaimed mine subsidence district under Section 15 of the Mine Subsidence Compensation Act, 1961.

6. ROAD WIDENING AND REALIGNMENT

The land is not affected by road widening or road realignment under:-

1) Division 2 of Part 3 of the Roads Act 1993; or
2) An Environmental Planning Instrument; or
3) A resolution of Council.

7. COUNCIL AND OTHER PUBLIC AUTHORITY POLICIES ON HAZARD RISK

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

It is the Council's policy to consider previous land uses to determine whether land may be affected by contamination which restricts or prohibits the carrying out of development on the land. Depending on the previous uses of the land, the applicant may be required to investigate possible site contamination and/or carry out remediation as part of any proposed development and the development potential of the site may be restricted or prohibited. This is assessed by the Council on a case-by-case basis.

The Council will have regard to Clause 6.1 Acid Sulfate Soils of Willoughby Local Environmental Plan 2012 and the Acid Sulfate Soils Map in assessing any development applications relating to the land.

7A FLOOD RELATED DEVELOPMENT CONTROLS INFORMATION

(1) Development on that land or part of the land for the purposes of dwelling houses, dual occupancies, multi-dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) is not subject to flood related development controls

(2) Development on that land or part of the land for any other purpose is not subject to flood related development controls

NB. This response does not imply that development for particular purposes is permissible on the land. Development is permissible in accordance with the zoning and landuse as set out in Question 2. ZONING AND LANDUSE of this Certificate.

WILLOUGHBY
CITY COUNCIL

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Customer Ref: 45899695:23853

Based on the information currently available from Council's flood maps, this land is not affected by overland flooding. However, Council reviews flood studies on an on-going basis and new information may become available in future which may alter the flood affectation status of the subject parcel of land.

It is important to note that in some circumstances, a piece of land may experience inundation as a result of the creation of stormwater detention basins, channels or flow paths after the development of the land. The applicant is therefore advised to engage the services of a suitably qualified engineer to investigate whether remedial measures should be adopted to minimise the effects of any such inundation.

8. LAND RESERVED FOR ACQUISITION

The land is not affected by any environmental planning instrument, deemed environmental planning instrument or draft environmental planning instruments which provides for the acquisition of the land by a public authority, as referred to in section 27 of the Act.

9. CONTRIBUTION PLANS

Chatswood CBD Section 94A Development Contributions Plan 2011

9A. BIODIVERSITY CERTIFIED LAND

--

10. BIOBANKING AGREEMENTS

--

11. BUSH FIRE PRONE LAND

The land has not been identified as bush fire prone under the Rural Fires and Environmental Legislation Amendment Act 2002.

12. PROPERTY VEGETATION PLANS

--

13. ORDERS UNDER TREES (DISPUTES BETWEEN NEIGHBOURS) ACT 2006

--

WILLOUGHBY
CITY COUNCIL

Certificate No:	39294
Receipt No:	1788906
Issue date:	11-Aug-2017
Customer Ref:	45899695:23853

14. DIRECTIONS UNDER PART 3A

--

15. SITE COMPATIBILITY CERTIFICATES AND CONDITIONS AFFECTING SENIORS HOUSING

--

16. SITE COMPATIBILITY CERTIFICATES FOR INFRASTRUCTURE

--

17. SITE COMPATIBILITY CERTIFICATES AND CONDITIONS FOR AFFORDABLE RENTAL HOUSING

--

18. PAPER SUBDIVISION INFORMATION

--

19. SITE VERIFICATION CERTIFICATES

--

20. LOOSE-FILL ASBESTOS INSULATION

--

In addition to the information provided above, the following information is provided in respect of the abovementioned land.

--

NOTES:

Hand written or typed items appearing on this certificate at the time of issue are to be read as forming part of this certificate.

**PLANNING CERTIFICATE ISSUED UNDER SECTION 149(2&5)
ENVIRONMENT PLANNING AND ASSESSMENT ACT, 1979**

WILLOUGHBY
CITY COUNCIL

Certificate No:	39294
Receipt No:	1788906
Issue date:	11-Aug-2017
Customer Ref:	45899695:23853

In accordance with Section 149(5) and subject to Section 149(6) of the Environmental Planning and Assessment Act 1979, the following additional information is provided in respect of the abovementioned land:

Under Clause 5.10 of Willoughby Local Environmental Plan 2012 the Council, before granting consent to development on land in the vicinity of a heritage item or a heritage conservation area, may require the assessment of the effect the proposed development has on the heritage significance of the heritage item or heritage conservation area concerned.

The land is subject to Clause 5.9 Preservation of trees or vegetation of Willoughby Local Environmental Plan 2012 and Part C.9 Preservation of trees or vegetation of Willoughby Development Control Plan.
Further information on the preservation of trees and vegetation can be obtained from Council and on Council's website.

Council is unaware of whether the current use is in accordance with an approval which may have been issued. You are advised to rely on your own enquiries.

Registers of Planning Consents and Subdivision Approvals may be inspected at the Council offices for particulars relating to Development Consents / Subdivision Approvals which may have been issued for use or development of the land.

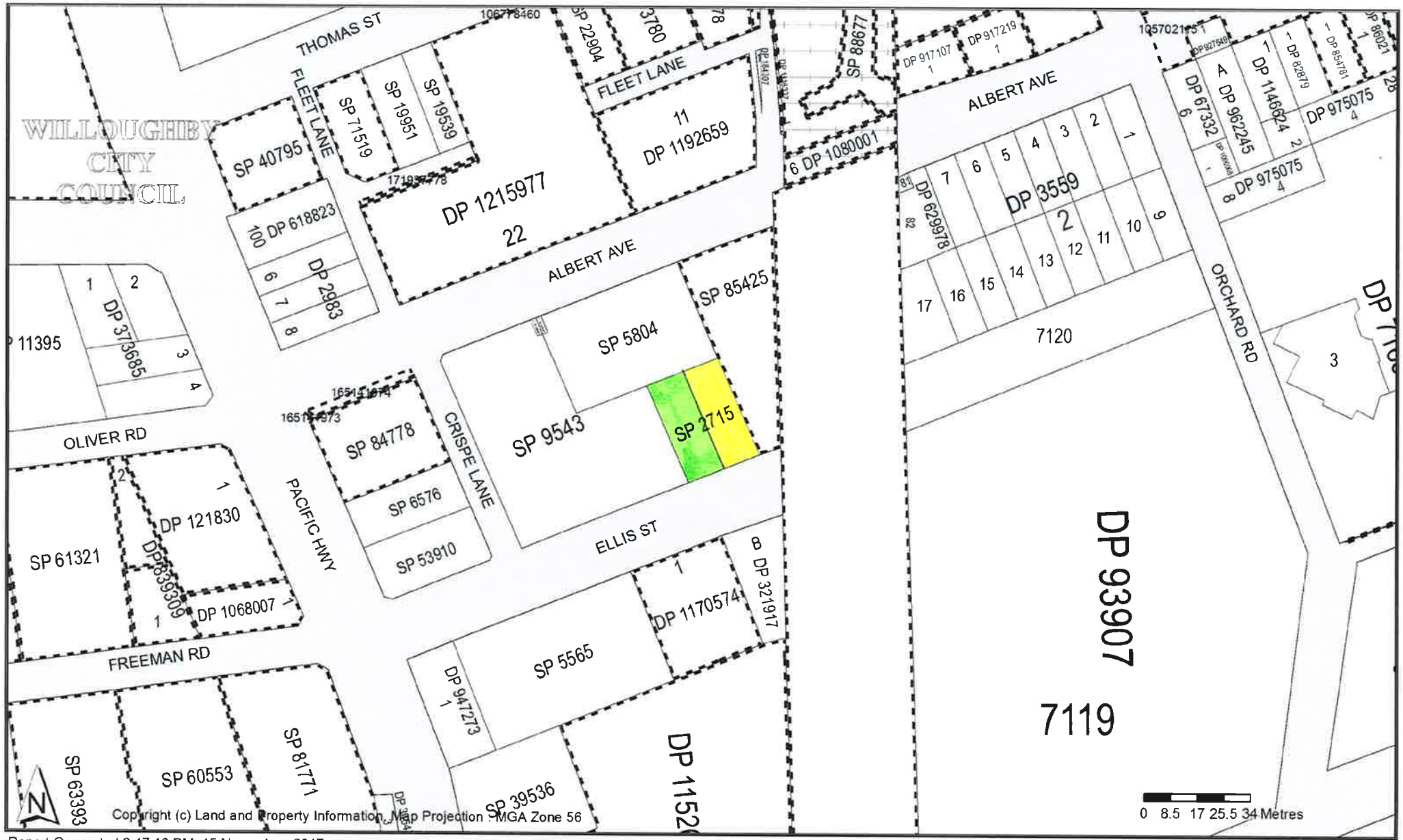
Council has not received notification from the Heritage Council of New South Wales that the property is subject to a Conservation Order or notice under the Heritage Act, 1977.

Land & Property Information

Cadastral Records Enquiry Report

Requested Parcel : SP 2715 **Identified Parcel** : SP 2715

Locality : CHATSWOOD **LGA** : WILLOUGHBY **Parish** : WILLOUGHBY **County** : CUMBERLAND



Report Generated 3:47:10 PM, 15 November, 2017

This information is provided as a searching aid only. While every endeavour is made to ensure the current cadastral pattern is accurately reflected, the Registrar General cannot guarantee the information provided. For all ACTIVITY PRIOR to SEPT 2002 you must refer to the RGs Charting and Reference Maps.

a) State if whole or part.

b) Refer to number of Lot, Allotment, or Portion and to the Deposited Plan, Town, or as the case may be.

Parcel comprises[a] WHOLE of[b] LOTS 21 & 22 OF SEC.I IN D.P. 3559.

Reference to Title Vol. 1488, 1524 Fol. 162, 43

Mun./~~Shire/City~~ WILLOUGHBY

Locality CHATSWOOD

Parish WILLOUGHBY County CUMBERLAND

Scale 20 FEET TO AN INCH.

STRATA PLAN 2715 (E)

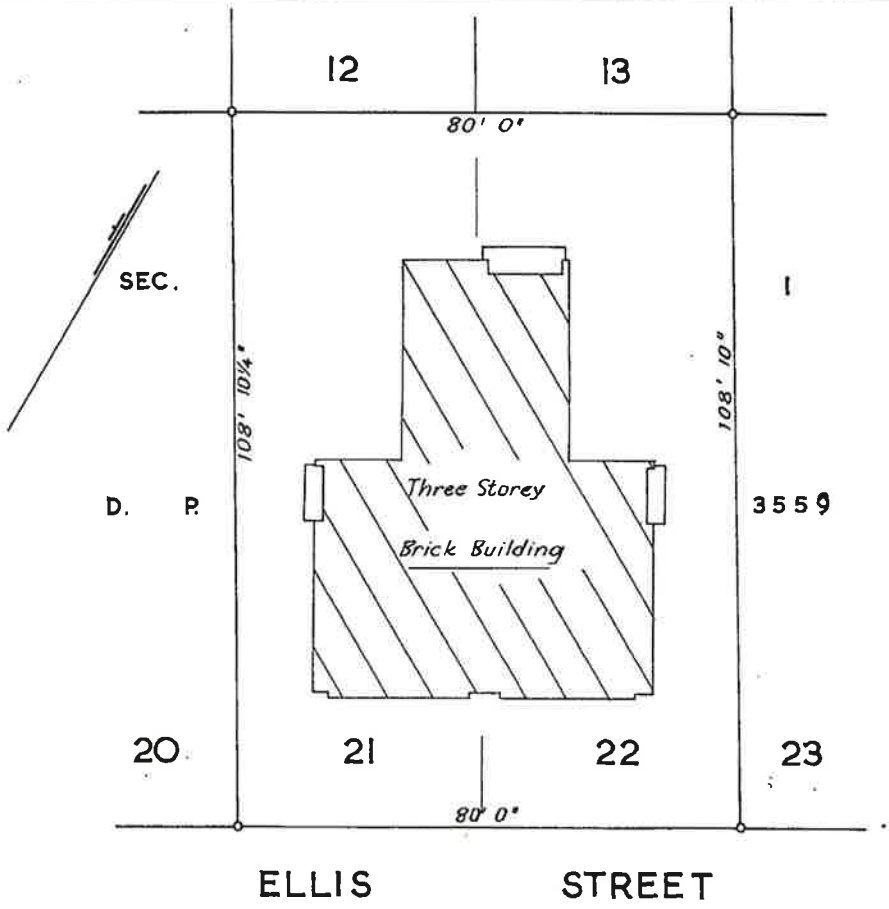
Registered: 2.5.1967

C.A.: 551/67 of 15-3-67

Ref Map: Willoughby Sh.11

Last Plan: D.P. 3559.

External surface boundaries of the parcel and location of the building in relation thereto to be delineated in space opposite.



(c) Additional lots should be shown in an annexure.

(d) Delete if inappropriate.

Schedule of Unit Entitlement[c]		OFFICE USE ONLY Current C's of T.	
Lot No.	Unit Entitlement	Vol.	Fol.
1	1	10552-103	
2	1	10552-104	
3	1	10552-105	
4	1	10552-106	
5	1	10552-107	
6	1	10552-108	
7	1	10552-109	
8	1	10552-110	
9	1	10552-111	
AGGREGATE	9		

I, Kevin Francis Brown.

of 17 Ramsay Ave, Pymble.

a surveyor registered under the Surveyors Act, 1929, as amended, hereby certify that:

(1) the building erected on the parcel described above is within the external boundaries of the parcel[d] ~~subject to eaves (2) of this certificate;~~

~~(d)(2) eaves or guttering of the building project beyond such external boundaries and an appropriate easement has been granted as an appurtenancy of the parcel by registered Transfer No.~~

Dated 7th February, 1967.

Signature Kevin F. Brown

Approved by the Council for the purposes of the Conveyancing (Strata Titles) Act, 1961.

Date 15/3/67.

Subdivision No. S. 51/67.

L. Rowsley.

Council Clerk

The address for service of notices on the body corporate is:— "ELLISWOOD" No. 3-5 ELLIS STREET CHATSWOOD.

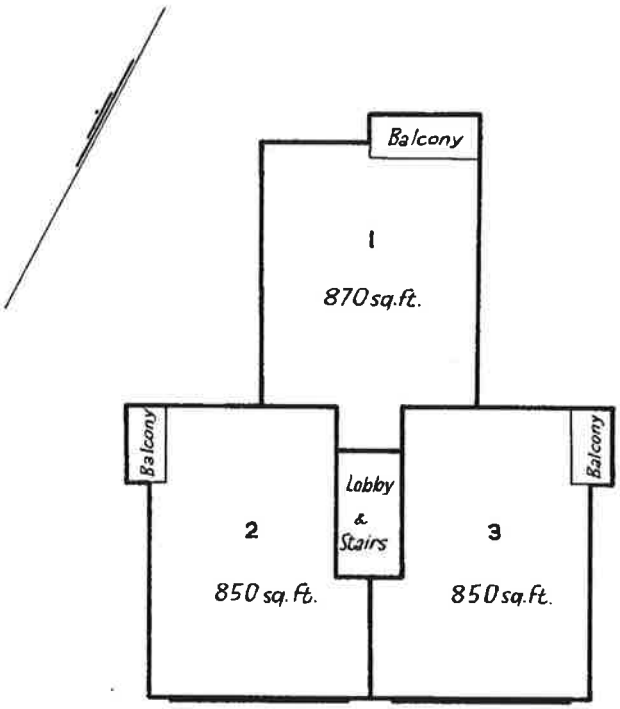
4445 4/65 K1212 V. C. N. Blight, Government Printer
MPD

Surveyor's Reference: SG7/37p, S1GG·76.

"ELLISWOOD"
No. 3-5 Ellis Street,
CHATSWOOD.

STRATA PLAN No. 2715

GROUND FLOOR PLAN



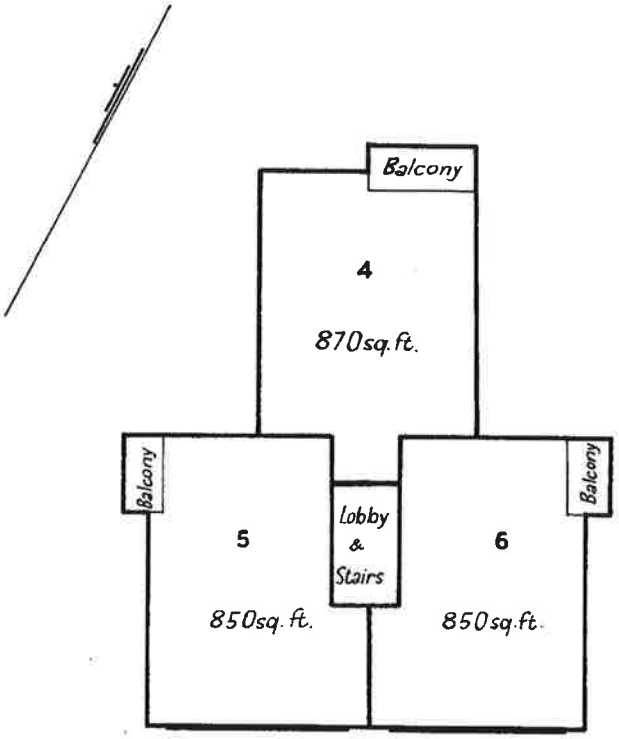
Council Clerk

Surveyor's Reference: S. 67/37D. P. 166-76

"Elliswood"
No. 3-5 Ellis Street,
Chatswood.

STRATA PLAN No. 2715

FIRST FLOOR PLAN



Council Clerk

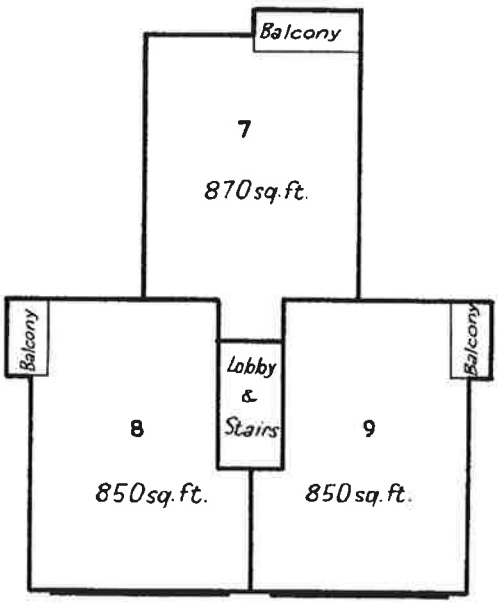
Surveyor's Reference: S. 67/37p.P. 166·76

"ELLISWOOD"
No. 3-5 Ellis Street,
CHATSWOOD.

Sheet 4 of FOUR Sheets

STRATA PLAN No. 2715

SECOND FLOOR PLAN



CONVERSION TABLE ADDED IN REGISTRAR GENERAL'S DEPARTMENT

STRATA PLAN 2715

FEET	INCHES	METRES
8	-	2.44
18	-	5.485
80	-	24.385
108	10	33.17
108	10 1/4	33.18

SQ FT	SQ M
850	79
870	80.8

NOTE: All second floor balconies are covered by the roof.

L. Lindsay
Council Clerk

Surveyor's Reference: S. 67/37p P. 166-76

NEW SOUTH WALES

CERTIFICATE OF TITLE

REAL PROPERTY ACT, 1900

TORRENS TITLE
Register

Vol. 8508 Fol. 215

CANCELLED
Issued 1-7-1974
See new edition

Fol. 215
(Page 1) Vol. 8508

I certify that The Proprietors—Strata Plan No. 2715 is the registered proprietor of an Estate in Fee Simple in the common property in the Strata Plan so numbered subject nevertheless to the exceptions, encumbrances and interests recorded hereon.

Registrar General.

ADDRESS FOR SERVICE OF NOTICES: See Strata Plan above referred to.

EXCEPTIONS ENCUMBRANCES AND INTERESTS REFERRED TO

1. Reservations and conditions, if any, contained in the Crown grant of the land comprised in the Strata Plan above referred to.
2. Easements, if any, benefiting or burdening the parcel and restrictions as to user, if any, burdening the parcel and other interests notified on the Strata Plan above referred to by virtue of the provisions of the Conveyancing (Strata Titles) Act, 1961.

SCHEDULE OF UNIT ENTITLEMENT: See Strata Plan above referred to.

Registrar General.

Change of By-laws P109991 11-12-74 By-laws 3-8 inclusive repealed, by-laws 28-43 inclusive added. 10-1-1975

CANCELLED
See new edition issued 24-1-1975
Vide P109991

REGISTRAR GENERAL

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

WARNING: THIS DOCUMENT MUST NOT BE REMOVED FROM THE LAND TITLES OFFICE.

CERTIFICATE OF TITLE

NEW SOUTH WALES

REAL PROPERTY ACT, 1900

CANCELLED

Vol. 8508 Fol. 215

SEE AUTO FOLIO

Edition Issued 27-1-1975

Crown Grant Vol. 938 Fol. 234

Prior Titles Vol.1488 Fol. 162
Vol.1524 Fol. 43

(Page 1) Vol. 8508 Fol. 215

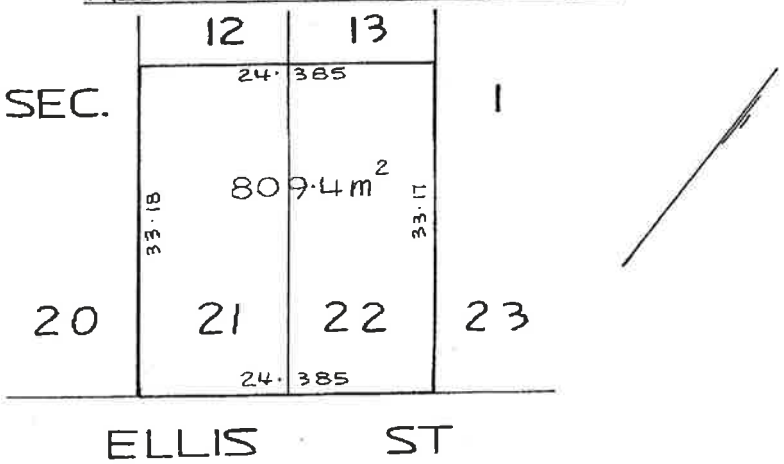
I certify that The Proprietors - Strata Plan No. 2715 is the registered proprietor of an Estate in Fee Simple in the common property in the strata scheme relating to the Strata Plan so numbered, within the land herein described, subject nevertheless to the exceptions encumbrances and interests recorded hereon and to the reservations and conditions, if any, contained in the Crown grant.

Registrar General.

PLAN SHOWING LOCATION OF LAND

LENGTHS ARE IN METRES

REDUCTION RATIO 1:500



P109991

ADDRESS FOR SERVICE OF NOTICES 3-5 ELLIS ST., CHATSWOOD. 2067

LAND REFERRED TO Lots 21 and 22 of Section 1 in Deposited Plan 3559 at Chatswood in the Municipality of Willoughby Parish of Willoughby and County of Cumberland.

EXCEPTIONS ENCUMBRANCES AND INTERESTS REFERRED TO

1. Change of By-laws No.P109991. By-laws 3-8 inclusive repealed; by-laws 28 to 43 inclusive added. Entered 10-1-1975.

SCHEDULE OF UNIT ENTITLEMENT

Aggregate unit entitlement: 9

Lot No.	Strata Plan No.	Unit Entitlement
1	2715	1
2	"	1
3	"	1
4	"	1
5	"	1
6	"	1
7	"	1
8	"	1
9	"	1

Vol. 8508 Fol. 215 CB

(Page 2 of 2 pages)

RECORDINGS (continued)

INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	PARTICULARS	ENTERED	Signature of Registrar General	CANCELLATION		
Change of By-laws	Q486736	—	By-law 44 added	12-1-1978				

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

Q486736 CB

R

AFTER REGN RETTR ALL DLGS & PLANS TO ST30

Historical Title

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
15/11/2017 3:39PM

FOLIO: CP/SP2715

First Title(s): VOL 938 FOL 234
Prior Title(s): VOL 8508 FOL 215

Recorded	Number	Type of Instrument	C.T. Issue
28/4/1986		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
11/7/1986		CONVERTED TO COMPUTER FOLIO	FOLIO CREATED CT NOT ISSUED
19/10/2006	AC679767	DEPARTMENTAL DEALING	
6/1/2007	AC849693	CHANGE OF ADDRESS OF ASSOCIATION/OWNERS CORPORATION	
6/1/2007	AC849694	CHANGE OF BY-LAWS	EDITION 1
18/7/2011	AG373600	DEPARTMENTAL DEALING	
17/8/2017	AM654528	DEPARTMENTAL DEALING	

*** END OF SEARCH ***

Chatswood PRINTED ON 15/11/2017

Title Search

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: CP/SP2715

SEARCH DATE	TIME	EDITION NO	DATE
15/11/2017	3:44 PM	1	6/1/2007

LAND

THE COMMON PROPERTY IN THE STRATA SCHEME BASED ON STRATA PLAN 2715 WITHIN THE PARCEL SHOWN IN THE TITLE DIAGRAM

AT CHATSWOOD
LOCAL GOVERNMENT AREA WILLOUGHBY
PARISH OF WILLOUGHBY COUNTY OF CUMBERLAND
TITLE DIAGRAM SHEET 1 SP2715

FIRST SCHEDULE

THE OWNERS - STRATA PLAN NO. 2715
ADDRESS FOR SERVICE OF DOCUMENTS:
C/- GILBEY BURGESS STRATA MANAGEMENT
PO BOX 147
MANLY
NSW 1655

SECOND SCHEDULE (6 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 ATTENTION IS DIRECTED TO BY-LAWS SET OUT IN SCHEDULE 2 STRATA SCHEMES MANAGEMENT REGULATION 2016
3 P109991 CHANGE OF BY-LAWS
4 Q486736 CHANGE OF BY-LAWS
5 AC849694 CHANGE OF BY-LAWS
* 6 ATTENTION IS DIRECTED TO CLAUSE 3 SCHEDULE 4 STRATA SCHEMES (FREEHOLD DEVELOPMENT) ACT 1973 REGARDING BOUNDARIES BETWEEN LOTS AND COMMON PROPERTY IN STRATA SCHEMES REGISTERED BEFORE 1-7-1974

SCHEDULE OF UNIT ENTITLEMENT (AGGREGATE: 9)

STRATA PLAN 2715

LOT	ENT	LOT	ENT	LOT	ENT	LOT	ENT
1	1	2	1	3	1	4	1
5	1	6	1	7	1	8	1
9	1						

NOTATIONS

END OF PAGE 1 - CONTINUED OVER

FOLIO: CP/SP2715 PAGE 2

NOTATIONS (CONTINUED)

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

Appendix C

Borehole Logs – Bores 1 to 4

BOREHOLE LOG

CLIENT: MPG Au Pty Ltd
PROJECT: Proposed Unit Development
LOCATION: 3 Ellis Street, Chatswood

SURFACE LEVEL: 99.80 AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 91234.00
DATE: 20/11/2017
SHEET 1 OF 1

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
99	0.15	FILLING - Generally comprising grey, fine to medium grained sandy silt filling, with some gravel and concrete up to 30mm in size, and some rootlets, moist							E			PID<1
									E			PID<1
	0.4	FILLING - Generally comprising yellow brown, fine to medium grained sand, with trace silt, humid							E			PID<1
	0.6	FILLING - Generally comprising brown clay filling, with trace charcoal, with some silt, humid (possible reworked natural)							E			PID<1
	1	CLAY - Very stiff to hard, orange brown clay, with some silt, M>Wp							U_{50}			pp >600
	1.5	Bore discontinued at 1.5m, slow progress										
98	2											
97	3											
96	4											
95												

RIG: Hand Tools **DRILLER:** West **LOGGED:** West **CASING:** Nil

TYPE OF BORING: 75mm diameter hand auger

WATER OBSERVATIONS: No free groundwater observed, whilst augering

REMARKS: *Surface levels measured relative to temporary benchmark assumed RL 100.00

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: MPG Au Pty Ltd
PROJECT: Proposed Unit Development
LOCATION: 3 Ellis Street, Chatswood

SURFACE LEVEL: 99.80 AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 91234.00
DATE: 20/11/2017
SHEET 1 OF 1

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 brown sandy clay filling, with fine to medium grained sand and some brick, plaster and gravel fragments up to 20mm in size, with some silt, M>Wp							E			PID<1
									E			PID<1
	0.4	FILLING - Generally comprising orange brown clay filling, with some charcoal and subrounded to subangular gravel up to 20mm in size, M>Wp (possible reworked natural)							E			PID<1
	0.6	CLAY - Very stiff, orange brown clay, with some silt, M>Wp							E			PID<1
99	1	From 1.0m, hard							S			7,11,12 N = 23 PID<1 pp >600
	1.4	CLAY - Hard, grey mottled red brown clay, with some silt and trace gravel, M<Wp							E			PID<1
98	2	From 1.8m, with some rock like structure (residual claystone)							S			pp >600 9,14,19 N = 33
	2.45	Bore discontinued at 2.45m, limit of investigation										
97	3											
96	4											
95												

RIG: Comacchio 305 **DRILLER:** Groundtest (L.Cooper) **LOGGED:** West **CASING:** Nil

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed, whilst augering

REMARKS: *Surface levels measured relative to temporary benchmark assumed RL 100.00

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: MPG Au Pty Ltd
PROJECT: Proposed Unit Development
LOCATION: 3 Ellis Street, Chatswood

SURFACE LEVEL: 99.63 AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 91234.00
DATE: 20/11/2017
SHEET 1 OF 4

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 brown sandy clay filling, with fine to medium grained sand, with some gravel, concrete, brick fragments and roots, moist							E			PID<1
									E			PID<1
	0.4	FILLING - Generally comprising orange brown clay filling, with some silt and trace charcoal, M>Wp							E			PID<1
99	0.5	CLAY - Very stiff, orange brown clay, with some silt and trace subrounded gravel up to 30mm in size, M>Wp							U_{50}			pp = 300-550 PID<1
	1	From 1.0m, hard							E			
									S			pp = 550 pp = 500 3,6,9 N = 15 PID<1
98	1.7	CLAY - Hard, grey mottled red brown clay, with some silt and ironstone gravel, M⩾Wp (residual claystone)										
	2											
97									S			pp = 400-450 8,11,20 N = 31
	3											
	3.0	COMPLETELY WEATHERED CLAYSTONE - Extremely low strength, extremely weathered, grey with iron staining claystone (soil like properties)										
	3.5	COMPLETELY WEATHERED SILTSTONE - Extremely low strength, extremely weathered, grey siltstone, with low strength, ironstone lenses up to 50mm thick at 50mm to 200mm spacings (soil like properties)										pp = 450
96								3.84m: P, 5°, pl, ro, fe				
	4							4.11m: P, sh, pl, ro, fe	C	100	0	
								4.36m: P, sh, pl, ro, fe				
								4.45m: P, sh, pl, ro, fe				
95												pp = 550
								4.77m: J, sv, un, ro, fe, discontinuous				

RIG: Comacchio 305 **DRILLER:** Groundtest (L.Cooper) **LOGGED:** West **CASING:** HW - 2.5m

TYPE OF BORING: Solid flight auger to 2.95m, washbore to 3.5m, then NMLC coring

WATER OBSERVATIONS: No free groundwater observed, whilst augering, then obscured by drilling fluids

REMARKS: *Surface levels measured relative to temporary benchmark assumed RL 100.00

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

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DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 91234.00
DATE: 20/11/2017
SHEET 2 OF 4

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
94		COMPLETELY WEATHERED SILTSTONE - Extremely low strength, extremely weathered, grey siltstone, with low strength, ironstone lenses up to 50mm thick at 50mm to 200mm spacings (soil like properties) *(continued)*							C	100	0	pp = 400
	6							5.89m: P, sh, pl, ro, fe				
	6.05	SILTSTONE - Extremely low strength, extremely weathered, dark grey siltstone, with 10% interbedded fine grained sandstone (soil like properties)							C	100	0	PL(A) = 0.02
93		At 6.4m, 10mm thick low strength iron cemented lense						6.41m: P, 5°, pl, ro, fe				pp = 550
	7	From 7.0m, very low strength										
92												pp >600 PL(A) = 0.06
								7.82m: P, 10°, pl, ro				
	8											PL(A) = 0.06
												pp >600
91									C	100	0	
		From 8.8m, extremely low strength										
	9											
								9.34m: J, 45°, pl, sm				
90												

RIG: Comacchio 305 **DRILLER:** Groundtest (L.Cooper) **LOGGED:** West **CASING:** HW - 2.5m

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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

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BORE No: 3
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DATE: 20/11/2017
SHEET 3 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		SILTSTONE - Extremely low strength, extremely weathered, dark grey siltstone, with 10% interbedded fine grained sandstone (soil like properties) *(continued)*							C	100	0	pp = 500
								10.3m: J, 45°, pl, sm				
89	11											pp = 350
								11.35m: J, 60°, pl, ro				
								11.5m: J, 5°, pl, sm				
88								11.59m: J, 45°, pl, sm				
		From 11.68m, very low strength						11.73m: J, 45°, pl, sm	C	100	28	
	12											PL(A) = 0.08
	12.35	SILTSTONE - Low strength, fresh, dark grey siltstone										PL(A) = 0.15
87												PL(A) = 0.28 PL(D) = 0.28
	13											
	13.27	SILTSTONE - Medium strength, fresh, dark grey siltstone						13.26m: P, sh, pl, ro				PL(A) = 0.47
86												
	14							14.07m: J, 50°-80°, cu, ro	C	100	79	
								14.13m: J, 30°, cu, ro				PL(A) = 0.55 PL(D) = 0.52
								14.23m: J, 30°, cu, ro				
								14.25m: J, 30°, cu, ro				
								14.33m: J, 30°, pl, sm				
								14.4m: J, 30°, pl, ro				
85								14.49m: J, 45°, pl, ti				
								14.5m: J, 30°, pl, sm				
								14.54m: P, 5°, pl, ro				
								14.74m: P, 5°, pl, ro				

RIG: Comacchio 305 **DRILLER:** Groundtest (L.Cooper) **LOGGED:** West **CASING:** HW - 2.5m

TYPE OF BORING: Solid flight auger to 2.95m, washbore to 3.5m, then NMLC coring

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REMARKS: *Surface levels measured relative to temporary benchmark assumed RL 100.00

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

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PROJECT: Proposed Unit Development
LOCATION: 3 Ellis Street, Chatswood

SURFACE LEVEL: 99.63 AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 91234.00
DATE: 20/11/2017
SHEET 4 OF 4

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
84		SILTSTONE - Medium strength, fresh, dark grey siltstone *(continued)*						From 14.95m tp 15.11m, possible shear zone with joint at 30° to 60° at 10mm to 50mm spacings				
		From 15.10m to 15.12m, extremely low strength, extremely weathered band						15.17m: J, 80°-sv, un, sm 15.29m: J, 75°, un, ti	C	100	79	PL(A) = 0.85 PL(D) = 0.91
	16							15.92m: P, sh, pl, ro				PL(A) = 0.85 PL(D) = 0.59
83								16.35m: J, 20°, pl, sm				
	17											PL(A) = 0.68 PL(D) = 0.36
									C	100	99	
82	18											PL(A) = 0.93 PL(D) = 0.8
								From 18.16m to 18.19m, fg				PL(A) = 0.47
	18.42	SANDSTONE - High strength, slightly weathered dark grey fine grained sandstone						18.6m: P, sh, un, ro, fe				PL(A) = 1.22
81	18.84	SANDSTONE - High strength, fresh, pale grey fine grained sandstone										PL(A) = 2.08 PL(D) = 1.7
	19 19.0	Bore discontinued at 19.0m, limit of investigation										
80												

RIG: Comacchio 305 **DRILLER:** Groundtest (L.Cooper) **LOGGED:** West **CASING:** HW - 2.5m

TYPE OF BORING: Solid flight auger to 2.95m, washbore to 3.5m, then NMLC coring

WATER OBSERVATIONS: No free groundwater observed, whilst augering, then obscured by drilling fluids

REMARKS: *Surface levels measured relative to temporary benchmark assumed RL 100.00

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: MPG Au Pty Ltd
PROJECT: Proposed Unit Development
LOCATION: 3 Ellis Street, Chatswood

SURFACE LEVEL: 100.72 AHD*
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 4
PROJECT No: 91234.00
DATE: 21/11/2017
SHEET 1 OF 4

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
100	0.1	FILLING - Generally comprising brown silty sand filling, with fine to medium grained sand and trace to some subrounded to subangular gravel, and rootlets, humid							E			PID<1
	0.45	FILLING - Generally comprising brown, fine to medium grained sandy clay filling, with brick, steel and concrete fragments							E			PID<1
	0.7	FILLING - Generally comprising brown clay filling, with some subrounded gravel up to 20mm in size and trace charcoal, M>Wp							E U_{50}			
99	1	CLAY - Very stiff, orange brown clay, with some silt and trace subrounded gravel up to 20mm in size, M<Wp From 1m, hard							E			pp >600 PID<1
	1.7	CLAY - Hard, grey mottled red brown clay, with some silt, M<Wp (rock like structure)							S			5,9,11 N = 20 PID<1 pp = 550
98	3								S			pp >600 7,16,19 N = 35
	3.1	COMPLETELY WEATHERED SILTSTONE - Extremely low strength, extremely weathered, pale grey siltstone, with low strength ironstone lenses with low strength ironstone lenses up to 20mm thick at 20mm to 500mm spacings (soil like properties)						3.3m: P, sh, pl, ro, fe 3.5m: P, sh, pl, ro, fe 3.6m: P, sh, pl, ro, fe				pp >600 pp = 550
97	4	From 4.2m, very low strength						4.2m: J, 80°-sv, un, ro, fe	C	100	0	pp = 550 pp >600 PL(A) = 0.1
96	5.0											

RIG: Comacchio 305 **DRILLER:** Groundtest (L.Cooper) **LOGGED:** West **CASING:** HW to 2.5m

TYPE OF BORING: Solid flight auger to 3.10m, then NMLC coring

WATER OBSERVATIONS: No free groundwater observed, whilst augering, the obscured by drilling fluids, 8.45m (12.12.17)

REMARKS: *Surface levels measured relative to temporary benchmark assumed RL 100.00

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)
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Douglas Partners
Geotechnics / Environment / Groundwater

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EASTING:
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BORE No: 4
PROJECT No: 91234.00
DATE: 21/11/2017
SHEET 2 OF 4

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
95		SILTSTONE - Very low strength, extremely weathered, grey with orange brown iron staining siltstone, with 10% interbedded fine grained sandstone							C	100	0	pp >600
	6											PL(A) = 0.05
												pp >600
94								6.51m: J, 20°, pl, ro, fe				PL(A) = 0.08 PL(D) = 0.05
								6.77m: J, 20°, pl, ro, fe				
	7	From 6.90m to 7.75m, extremely low strength						6.87m: J, sh, un, ro 7.06m: P, sh, pl, ro, fe	C	94	85	pp = 450
												pp >550
								7.41m: P, 5°, pl, ro, fe 7.46m: P, sh, pl, ro, fe 7.51m: J, 30°, pl, ro, fe				
93												pp >600 PL(A) = 0.06
	8							8.05m: P, sh, pl, ro, fe 8.15m: P, sh, pl, ro				
	8.25	CORE LOSS - 0.15m						8.25m: CORE LOSS: 150mm				
	8.4	SILTSTONE - Very low strength, extremely weathered grey siltstone with 10% fine grained sandstone				12-12-17		From 8.40m to 8.55m, fg				PL(A) = 0.08
92								From 8.75m to 8.80m, fg 8.85m: J, 80°, pl, ro				
	9							9.05m: J, 80°, pl, ro				
	9.05	SILTSTONE - Low strength, fresh, dark grey siltstone, with 10% interbedded fine grained sandstone							C	100	85	PL(A) = 0.15
								9.35m: J, 30°, pl, ro 9.55m: J, 70°, pl, ro				
91								9.75m: J, 60°, pl, ro 9.8m: J, 30°, pl, ro				PL(A) = 0.12

RIG: Comacchio 305 **DRILLER:** Groundtest (L.Cooper) **LOGGED:** West **CASING:** HW to 2.5m

TYPE OF BORING: Solid flight auger to 3.10m, then NMLC coring

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SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
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Douglas Partners
Geotechnics / Environment / Groundwater

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SHEET 3 OF 4

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90		SILTSTONE - Low strength, fresh, dark grey siltstone, with 10% interbedded fine grained sandstone *(continued)*							C	100	85	PL(A) = 0.15
	11							11.05m: J, 40°, pl, ro				PL(A) = 0.13
	11.4	SILTSTONE - Medium strength, fresh, dark grey siltstone										
89								11.75m: J, 30°, pl, ro 11.8m: J, 30°, pl, ro				
	12	From 11.93m to 12.01m, extremely low strength, extremely weathered band						11.93m: J, 50°, pl, sm				
								From 12.22m to 12.28m, fg				PL(A) = 0.48
88												PL(A) = 0.74
								12.87m: J, 30°, pl, ro 12.89m: J, 40°, pl, ro	C	100	94	
	13							13.13m: P, 5°, pl, ro				PL(A) = 0.97
								13.24m: J, 20°, pl, ro 13.27m: J, 20°, pl, ro 13.31m: J, 20°, pl, ro				
87								13.51m: J, 10°, pl, ro 13.61m: J, 20°, pl, ro				
	14							14.05m: J, 30°, pl, ro				PL(A) = 0.72
86									C	100	98	

RIG: Comacchio 305 **DRILLER:** Groundtest (L.Cooper) **LOGGED:** West **CASING:** HW to 2.5m

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85		SILTSTONE - Medium strength, fresh, dark grey siltstone *(continued)*						15.42m: J, sv, un, ro, discontinuous				PL(A) = 1.06 PL(D) = 0.9
	16							16.08m: J, 15°, pl, ro	C	100	98	PL(A) = 0.93 PL(D) = 0.63
84								16.53m: J, 20°, pl, ro 16.6m: J, 20°, stepped, ro				
	17											PL(A) = 0.81 PL(D) = 0.9
	17.3	Bore discontinued at 17.3m, limit of investigation										
83												
	18											
82												
	19											
81												

RIG: Comacchio 305 **DRILLER:** Groundtest (L.Cooper) **LOGGED:** West **CASING:** HW to 2.5m

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A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
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BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
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Douglas Partners
Geotechnics / Environment / Groundwater

Appendix D

Laboratory Report Sheets
Chain of Custody – field sheets
Chain of Custody – dispatch sheets
Quality Assurance / Quality Control for Soil Sampling

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 180606

Client Details

Client	Douglas Partners Newcastle
Attention	Michael Gawn
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**91234, Chatswood**
Number of Samples	12 Soil
Date samples received	24/11/2017
Date completed instructions received	24/11/2017

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	01/12/2017
Date of Issue	29/11/2017

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Matt Tang
Authorised by Asbestos Approved Signatory: Paul Ching

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

Authorised By

David Springer, General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		180606-1	180606-2	180606-3	180606-4	180606-5
Your Reference	UNITS	BH1/0.2	BH1/0.45	BH2/0.1	BH2/0.5	BH2/0.7
Date Sampled		20/11/2017	20/11/2017	20/11/2017	20/11/2017	20/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017
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	%	101	90	96	90	94

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		180606-6	180606-7	180606-8	180606-9	180606-10
Your Reference	UNITS	BH3/0.05	BH3/0.8	BH4/0.3	BH4/0.5	D3
Date Sampled		20/11/2017	20/11/2017	21/11/2017	21/11/2017	21/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	29/11/2017	29/11/2017	29/11/2017	29/11/2017	29/11/2017
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	%	97	93	93	97	94

svTRH (C10-C40) in Soil						
Our Reference		180606-1	180606-2	180606-3	180606-4	180606-5
Your Reference	UNITS	BH1/0.2	BH1/0.45	BH2/0.1	BH2/0.5	BH2/0.7
Date Sampled		20/11/2017	20/11/2017	20/11/2017	20/11/2017	20/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	28/11/2017	28/11/2017	28/11/2017	28/11/2017	28/11/2017
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	%	81	77	79	78	77

svTRH (C10-C40) in Soil						
Our Reference		180606-6	180606-7	180606-8	180606-9	180606-10
Your Reference	UNITS	BH3/0.05	BH3/0.8	BH4/0.3	BH4/0.5	D3
Date Sampled		20/11/2017	20/11/2017	21/11/2017	21/11/2017	21/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	28/11/2017	28/11/2017	28/11/2017	28/11/2017	28/11/2017
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	%	78	78	76	76	76

PAHs in Soil						
Our Reference		180606-1	180606-2	180606-3	180606-4	180606-5
Your Reference	UNITS	BH1/0.2	BH1/0.45	BH2/0.1	BH2/0.5	BH2/0.7
Date Sampled		20/11/2017	20/11/2017	20/11/2017	20/11/2017	20/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	28/11/2017	28/11/2017	28/11/2017	28/11/2017	28/11/2017
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	0.4	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	0.6	0.1	<0.1	<0.1
Pyrene	mg/kg	0.2	0.6	0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.6	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.06	0.4	0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	0.4	3.8	0.3	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	91	100	100	105	107

PAHs in Soil						
Our Reference		180606-6	180606-7	180606-8	180606-9	180606-10
Your Reference	UNITS	BH3/0.05	BH3/0.8	BH4/0.3	BH4/0.5	D3
Date Sampled		20/11/2017	20/11/2017	21/11/2017	21/11/2017	21/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	28/11/2017	28/11/2017	28/11/2017	28/11/2017	28/11/2017
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	0.7	<0.1	<0.1	<0.1	0.1
Anthracene	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	1.3	<0.1	0.1	<0.1	0.3
Pyrene	mg/kg	1.3	<0.1	0.1	<0.1	0.3
Benzo(a)anthracene	mg/kg	0.6	<0.1	<0.1	<0.1	0.2
Chrysene	mg/kg	0.6	<0.1	<0.1	<0.1	0.2
Benzo(b,j+k)fluoranthene	mg/kg	0.9	<0.2	<0.2	<0.2	0.3
Benzo(a)pyrene	mg/kg	0.60	<0.05	0.06	<0.05	0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	7.0	<0.05	0.3	<0.05	1.4
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.7	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.7	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.7	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	91	99	97	103	98

Organochlorine Pesticides in soil						
Our Reference		180606-1	180606-2	180606-3	180606-4	180606-5
Your Reference	UNITS	BH1/0.2	BH1/0.45	BH2/0.1	BH2/0.5	BH2/0.7
Date Sampled		20/11/2017	20/11/2017	20/11/2017	20/11/2017	20/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	28/11/2017	28/11/2017	28/11/2017	28/11/2017	28/11/2017
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	%	79	76	77	78	78

Organochlorine Pesticides in soil						
Our Reference		180606-6	180606-7	180606-8	180606-9	180606-10
Your Reference	UNITS	BH3/0.05	BH3/0.8	BH4/0.3	BH4/0.5	D3
Date Sampled		20/11/2017	20/11/2017	21/11/2017	21/11/2017	21/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	28/11/2017	28/11/2017	28/11/2017	28/11/2017	28/11/2017
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	%	77	78	76	81	78

Organophosphorus Pesticides						
Our Reference		180606-1	180606-2	180606-3	180606-4	180606-5
Your Reference	UNITS	BH1/0.2	BH1/0.45	BH2/0.1	BH2/0.5	BH2/0.7
Date Sampled		20/11/2017	20/11/2017	20/11/2017	20/11/2017	20/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	28/11/2017	28/11/2017	28/11/2017	28/11/2017	28/11/2017
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	%	79	76	77	78	78

Organophosphorus Pesticides						
Our Reference		180606-6	180606-7	180606-8	180606-9	180606-10
Your Reference	UNITS	BH3/0.05	BH3/0.8	BH4/0.3	BH4/0.5	D3
Date Sampled		20/11/2017	20/11/2017	21/11/2017	21/11/2017	21/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	28/11/2017	28/11/2017	28/11/2017	28/11/2017	28/11/2017
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	%	77	78	76	81	78

PCBs in Soil						
Our Reference		180606-1	180606-2	180606-3	180606-4	180606-5
Your Reference	UNITS	BH1/0.2	BH1/0.45	BH2/0.1	BH2/0.5	BH2/0.7
Date Sampled		20/11/2017	20/11/2017	20/11/2017	20/11/2017	20/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	28/11/2017	28/11/2017	28/11/2017	28/11/2017	28/11/2017
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	%	79	76	77	78	78

PCBs in Soil						
Our Reference		180606-6	180606-7	180606-8	180606-9	180606-10
Your Reference	UNITS	BH3/0.05	BH3/0.8	BH4/0.3	BH4/0.5	D3
Date Sampled		20/11/2017	20/11/2017	21/11/2017	21/11/2017	21/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	28/11/2017	28/11/2017	28/11/2017	28/11/2017	28/11/2017
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	%	77	78	76	81	78

Acid Extractable metals in soil						
Our Reference		180606-1	180606-2	180606-3	180606-4	180606-5
Your Reference	UNITS	BH1/0.2	BH1/0.45	BH2/0.1	BH2/0.5	BH2/0.7
Date Sampled		20/11/2017	20/11/2017	20/11/2017	20/11/2017	20/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Arsenic	mg/kg	<4	4	7	13	10
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	6	28	34	65	58
Copper	mg/kg	5	<1	18	<1	<1
Iron	mg/kg	6,800	37,000	39,000	79,000	73,000
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	mg/kg	120	26	87	6	6
Nickel	mg/kg	3	3	6	2	2
Lead	mg/kg	20	19	100	20	24
Zinc	mg/kg	51	6	81	2	4

Acid Extractable metals in soil						
Our Reference		180606-6	180606-7	180606-8	180606-9	180606-10
Your Reference	UNITS	BH3/0.05	BH3/0.8	BH4/0.3	BH4/0.5	D3
Date Sampled		20/11/2017	20/11/2017	21/11/2017	21/11/2017	21/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Arsenic	mg/kg	6	7	8	8	9
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	22	47	35	38	28
Copper	mg/kg	20	<1	8	<1	14
Iron	mg/kg	27,000	60,000	53,000	60,000	40,000
Mercury	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Manganese	mg/kg	150	8	130	19	210
Nickel	mg/kg	6	4	4	3	5
Lead	mg/kg	160	20	88	26	97
Zinc	mg/kg	100	5	83	12	87

Acid Extractable metals in soil		
Our Reference		180606-13
Your Reference	UNITS	BH1/0.2 - [TRIPLICATE]
Date Sampled		20/11/2017
Type of sample		Soil
Date prepared	-	27/11/2017
Date analysed	-	27/11/2017
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	5
Copper	mg/kg	2
Iron	mg/kg	8,800
Mercury	mg/kg	<0.1
Manganese	mg/kg	58
Nickel	mg/kg	2
Lead	mg/kg	20
Zinc	mg/kg	33

Moisture						
Our Reference		180606-1	180606-2	180606-3	180606-4	180606-5
Your Reference	UNITS	BH1/0.2	BH1/0.45	BH2/0.1	BH2/0.5	BH2/0.7
Date Sampled		20/11/2017	20/11/2017	20/11/2017	20/11/2017	20/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	28/11/2017	28/11/2017	28/11/2017	28/11/2017	28/11/2017
Moisture	%	3.6	19	11	21	20

Moisture						
Our Reference		180606-6	180606-7	180606-8	180606-9	180606-10
Your Reference	UNITS	BH3/0.05	BH3/0.8	BH4/0.3	BH4/0.5	D3
Date Sampled		20/11/2017	20/11/2017	21/11/2017	21/11/2017	21/11/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/11/2017	27/11/2017	27/11/2017	27/11/2017	27/11/2017
Date analysed	-	28/11/2017	28/11/2017	28/11/2017	28/11/2017	28/11/2017
Moisture	%	13	25	16	16	17

Misc Inorg - Soil			
Our Reference		180606-11	180606-12
Your Reference	UNITS	BH3/2.5-2.95	BH4/1.0-1.45
Date Sampled		20/11/2017	21/11/2017
Type of sample		Soil	Soil
Date prepared	-	27/11/2017	27/11/2017
Date analysed	-	27/11/2017	27/11/2017
pH 1:5 soil:water	pH Units	5.2	4.3
Electrical Conductivity 1:5 soil:water	µS/cm	45	74
Chloride, Cl 1:5 soil:water	mg/kg	23	31
Sulphate, SO4 1:5 soil:water	mg/kg	36	71

Asbestos ID - soils				
Our Reference		180606-3	180606-6	180606-8
Your Reference	UNITS	BH2/0.1	BH3/0.05	BH4/0.3
Date Sampled		20/11/2017	20/11/2017	21/11/2017
Type of sample		Soil	Soil	Soil
Date analysed	-	29/11/2017	29/11/2017	29/11/2017
Sample mass tested	g	Approx. 35g	Approx. 40g	Approx. 35g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibre detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibre detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibre detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos 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-8	180606-2
Date extracted	-			27/11/2017	1	27/11/2017	27/11/2017		27/11/2017	27/11/2017
Date analysed	-			29/11/2017	1	29/11/2017	29/11/2017		29/11/2017	29/11/2017
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	94	84
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	94	84
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	75	67
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	89	80
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	100	89
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	102	92
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	103	92
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	107	1	101	97	4	101	97

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	180606-2
Date extracted	-			27/11/2017	1	27/11/2017	27/11/2017		27/11/2017	27/11/2017
Date analysed	-			28/11/2017	1	28/11/2017	28/11/2017		28/11/2017	28/11/2017
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	116	102
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	111	101
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	94	89
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	116	102
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	111	101
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	94	89
Surrogate o-Terphenyl	%		Org-003	80	1	81	79	2	85	77

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	180606-2
Date extracted	-			27/11/2017	1	27/11/2017	27/11/2017		27/11/2017	27/11/2017
Date analysed	-			28/11/2017	1	28/11/2017	28/11/2017		28/11/2017	28/11/2017
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	94	91
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	96
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	0.1	0	99	91
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	0.2	0.3	40	94	85
Pyrene	mg/kg	0.1	Org-012	<0.1	1	0.2	0.3	40	101	93
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	<0.1	0.2	67	105	97
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	<0.2	0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	0.06	0.1	50	92	82
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	104	1	91	98	7	114	111

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	180606-2
Date extracted	-			27/11/2017	1	27/11/2017	27/11/2017		27/11/2017	27/11/2017
Date analysed	-			28/11/2017	1	28/11/2017	28/11/2017		28/11/2017	28/11/2017
HCB	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	83	95
gamma-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	88	101
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	90	102
delta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	78	89
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	80	93
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	92	110
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	85	100
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	77	91
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	98	107
Endosulfan II	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	75	92
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	77	1	79	79	0	97	107

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	180606-2
Date extracted	-			27/11/2017	1	27/11/2017	27/11/2017		27/11/2017	27/11/2017
Date analysed	-			28/11/2017	1	28/11/2017	28/11/2017		28/11/2017	28/11/2017
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	121	116
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	100	110
Dimethoate	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	122	102
Fenitrothion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	108	123
Malathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	97	125
Parathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	118	114
Ronnel	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	113	122
Surrogate TCMX	%		Org-008	77	1	79	79	0	79	80

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	180606-2
Date extracted	-			27/11/2017	1	27/11/2017	27/11/2017		27/11/2017	27/11/2017
Date analysed	-			28/11/2017	1	28/11/2017	28/11/2017		28/11/2017	28/11/2017
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	122	130
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	77	1	79	79	0	79	80

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	180606-2
Date prepared	-			27/11/2017	1	27/11/2017	27/11/2017		27/11/2017	27/11/2017
Date analysed	-			27/11/2017	1	27/11/2017	27/11/2017		27/11/2017	27/11/2017
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	110	84
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	103	89
Chromium	mg/kg	1	Metals-020	<1	1	6	4	40	107	95
Copper	mg/kg	1	Metals-020	<1	1	5	3	50	100	96
Iron	mg/kg	1	Metals-020	<1	1	6800	3700	59	103	#
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	99	103
Manganese	mg/kg	1	Metals-020	<1	1	120	62	64	125	107
Nickel	mg/kg	1	Metals-020	<1	1	3	2	40	104	90
Lead	mg/kg	1	Metals-020	<1	1	20	19	5	103	89
Zinc	mg/kg	1	Metals-020	<1	1	51	32	46	102	85

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			27/11/2017	[NT]	[NT]	[NT]	[NT]	27/11/2017	[NT]
Date analysed	-			27/11/2017	[NT]	[NT]	[NT]	[NT]	27/11/2017	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	102	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	102	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	109	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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:
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.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 180606-1 for Fe and Mn. Therefore a triplicate result has been issued as laboratory sample number 180606-13.

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 180606-3, 6 & 8 were sub-sampled from jars provided by the client.

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 180606-A

Client Details

Client	Douglas Partners Newcastle
Attention	Michael Gawn
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**91234, Chatswood**
Number of Samples	Additional testing 1 sample
Date samples received	24/11/2017
Date completed instructions received	04/12/2017

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

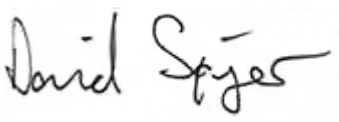
Date results requested by	11/12/2017
Date of Issue	07/12/2017

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Long Pham, Team Leader, Metals

Authorised By



David Springer, General Manager

Metals in TCLP USEPA1311		
Our Reference		180606-A-6
Your Reference	UNITS	BH3/0.05
Date Sampled		20/11/2017
Type of sample		Soil
Date extracted	-	05/12/2017
Date analysed	-	05/12/2017
pH of soil for fluid# determ.	pH units	7.4
pH of soil TCLP (after HCl)	pH units	1.5
Extraction fluid used	-	1
pH of final Leachate	pH units	5.0
Lead in TCLP	mg/L	0.04

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.

QUALITY CONTROL: Metals in TCLP USEPA1311					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			05/12/2017	[NT]	[NT]	[NT]	[NT]	05/12/2017	[NT]
Date analysed	-			05/12/2017	[NT]	[NT]	[NT]	[NT]	05/12/2017	[NT]
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	[NT]	[NT]	[NT]	[NT]	93	[NT]

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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.

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY FIELD SHEET

Project No:	Michael Gawn 91234	**Client Project Name:**	**Proposed Unit development**
Client:	**MPG AU PTY LTD**	**Location:**	**3 Ellis Street, Chatswood**
Project Manager:	**Michael Gawn**	**DP Lab Received**	By: Date:

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 *	Lab 1 [A] Date	Lab 2 [B] Date	Lab 3 [C] Date	
1	0.05	R	S	G, P		DTW	20/11/17	7:30	fridge				
	0.2							7:41					
	0.45							7:55					
	0.7							8:05					
2	0.1							8:27					
	0.3							8:33					
	0.5							8:42					
	0.7							8:51					
	1.0-1.45							9:08					
	1.5							9:17					
3	0.05	D1						9:46					
	0.3							9:52					
	0.5							10:01					
	0.8							10:11					
	1.0-1.45							10:19					

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

A Provide name of Lab 1 B Provide name of Lab 2 C Provide name of Lab 3

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY FIELD SHEET

Project No:	91234	**Client Project Name:**	Proposed Unit development
Client:	MPG AU PTY LTD	**Location:**	3 Ellis Street, Chatswood
Project Manager:	Michael Gawn	**DP Lab Received** By: DJW	Date: 21/11/17

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 *	Lab 1 [A] Date	Lab 2 [B] Date	Lab 3 [C] Date	
4	0.05	D2	S	G, P		DJW	21/11/17	8:00		fridge				
↓	0.3	D3	↓	↓		↓	↓	8:10		↓				
	0.5	↓						8:17						
	0.8							8:24						
	1.0-1.15							8:33						

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

A Provide name of Lab 1 B Provide name of Lab 2 C Provide name of Lab 3

Andrew Fitzsimons

From: Jacinta Hurst
Sent: Monday, 4 December 2017 10:07 AM
To: Michael Gawn
Cc: Andrew Fitzsimons
Subject: RE: Chatswood - 180606

ELS: 180606-1
Rec: 4/12/17 10:00
TAT: 5 days

A

No problem

Regards,

Jacinta Hurst | Laboratory Manager, Sydney | Envirolab Services Pty Ltd

Great Science, Great Service.

12 Ashley Street Chatswood NSW 2067
T 612 9910 6200 **F** 612 9910 6201 **M** 0407 003 037
E jhurst@envirolab.com.au | **W** www.envirolab.com.au

From: Michael Gawn [mailto:Michael.Gawn@douglaspartners.com.au]
Sent: Monday, 4 December 2017 10:04 AM
To: Jacinta Hurst <JHurst@envirolab.com.au>
Subject: Chatswood - 180606

Jacinta,

6

Could you please arrange for leachate testing for lead on the sample from 0.05 m in Bore 3. This relates to your certificate of analysis 180606.

Regards

Michael Gawn | Principal
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au
15 Callistemon Close Warabrook NSW 2304 | Box 324 Hunter Region Mail Centre NSW 2310
P: 02 4960 9600 | F: 02 4960 9601 | M: 0412 760 942 | E: Michael.Gawn@douglaspartners.com.au

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CHAIN OF CUSTODY Despatch Sheet

Project Name: Chatswood
Project No: 91234 DP Order No: 133743
DP Contact: Mchael Gawn
Prior Storage: Fridge

To: Envirolab Services Pty Ltd
12 Ashley Street
CHATSWOOD NSW 2067
Ph: 02 9910 6200
Attn: Simon Song

Sample ID	Date Sampled	Sample Type	Lab ID	Analytes												Notes
				Metals (10)	TRH	BTEX	PAH	PCB	OCP	OPP	PH	EC	Chloride	Sulfate		
BH 1 / 0.2	20/11/2017	Soil	1	X	X	X	X	X	X	X						Combo 6
BH 1 / 0.45	20/11/2017	Soil	2	X	X	X	X	X	X	X						Combo 6
BH 2 / 0.1	20/11/2017	Soil	3	X	X	X	X	X	X	X					X	Combo 6a
Bh 2 / 0.5	20/11/2017	Soil	4	X	X	X	X	X	X	X						Combo 6
BH 2 / 0.7	20/11/2017	Soil	5	X	X	X	X	X	X	X						Combo 6
BH 3 / 0.05	20/11/2017	Soil	6	X	X	X	X	X	X	X					X	Combo 6a
BH 3 / 0.8	20/11/2017	Soil	7	X	X	X	X	X	X	X						Combo 6
BH 4 / 0.3	21/11/2017	Soil	8	X	X	X	X	X	X	X					X	Combo 6a
BH 4 / 0.5	21/11/2017	Soil	9	X	X	X	X	X	X	X						Combo 6
D3	21/11/2017	Soil	10	X	X	X	X	X	X	X						Combo 6
BH3 / 2.5 - 2.95	20/11/25017	Soil	11								X	X	X	X		
BH 4/ 1.0-1.45	21/11/2017	Soil	12								X	X	X	X		
PQL Soil		mg/kg														
PQL Water		mg/L														

ENVIROLAB GROUP
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 180606
Date Received: 24/11/17
Time Received: 12:00
Received by: AB
Temp: Cool/Ambient
Cooling: Ice/icepack
Security: Intact/Broken/None

PQL = practical quantitation limit
# Metals to Analyse: As, Cd, Cr, Cu, Hg, Pb, Mn, Ni, Zn, Fe
Date relinquished: 23/11/2017
Total number of samples in container: 12
Turnaround time: Standard Results required by: standard

SAMPLES RECEIVED
Please sign and date to acknowledge receipt of samples return to michael.gawn@douglaspartners.com.au and daniel.west@douglaspartners.com.au
Signature: ABrady
Date: 24/11/17 Lab Ref: 180 606

Douglas Partners Pty Ltd
PO Box 324 Hunter Region Mail Centre
NSW 2310
Fax: 02 4960 9601

Amended CoC Form Rev 6/August 2008

Report on Preliminary Site Investigation (Contamination)
Proposed Unit Development
3 Ellis Street, Chatswood

Quality Assurance (QA) was maintained by:

- Compliance with a Project Quality Plan written for the objectives of the study;
- Using qualified engineers/scientists to undertake the field supervision and sampling;
- Following the Douglas Partners Pty Ltd (DP) operating procedures for sampling, field testing and decontamination as presented in Table 1;
- Using NATA registered laboratories for sample testing that generally utilise standard laboratory methods of the US EPA, the APHA and NSW EPA.

Table 1: Field Procedures

Abbreviation	Procedure Name
FPM LOG	Logging
FPM DECONT	Decontamination of Personnel and Equipment
FPM ENVID	Sample Identification, Handling, Transport and Storage of Contamination Samples
FPM PIDETC	Operation of Field Analysers
FPM ENVSAMP	Sampling of Contaminated Soils

Note to Table 1:
From DP Field Procedures Manual

Quality Control (QC) of the laboratory programme was achieved by the following means:

- Method blanks - the laboratory ran reagent blanks to confirm the equipment and standards used were uncontaminated;
- Laboratory replicates - the laboratory split samples internally and conducted tests on separate extracts;
- Laboratory spikes - samples were spiked by the laboratory with a known concentration of contaminants and subsequently tested for percent recovery.

Discussion

A. Sample Handling and Holding Times

A review of the laboratory reports and chain of custody forms associated with the Supplementary Contamination Assessment indicates the following:

- Samples were received chilled and in good order;
- Samples received were appropriately preserved for all tests;
- VOC/SVOC samples were received in Teflon sealed containers;
- Volatile samples were received with zero headspace;
- Samples were received within recommended holding times.

B. Method Blanks

All method blanks returned results lower than the laboratory detection limit, therefore are acceptable.

C. Laboratory Replicates

The average RPD for individual contaminants ranges from 0% to 50%, with the exception of several PAH results and manganese and iron concentrations in one sample (each). These elevated RPDs may be as a result of differences between small detected concentrations of the PAH and metals and are therefore considered to be acceptable.

D. Laboratory Spikes

Recoveries in the order of 70% to 130% are generally considered to be acceptable for inorganic material and 60% to 140% for organic material. The average percent recovery for individual contaminants ranged from 75% to 122%, which is generally within the quality control objectives. The results should however be qualified and may slightly under-estimate or over-estimate contaminant concentrations in certain samples (ie biased low or high respectively).

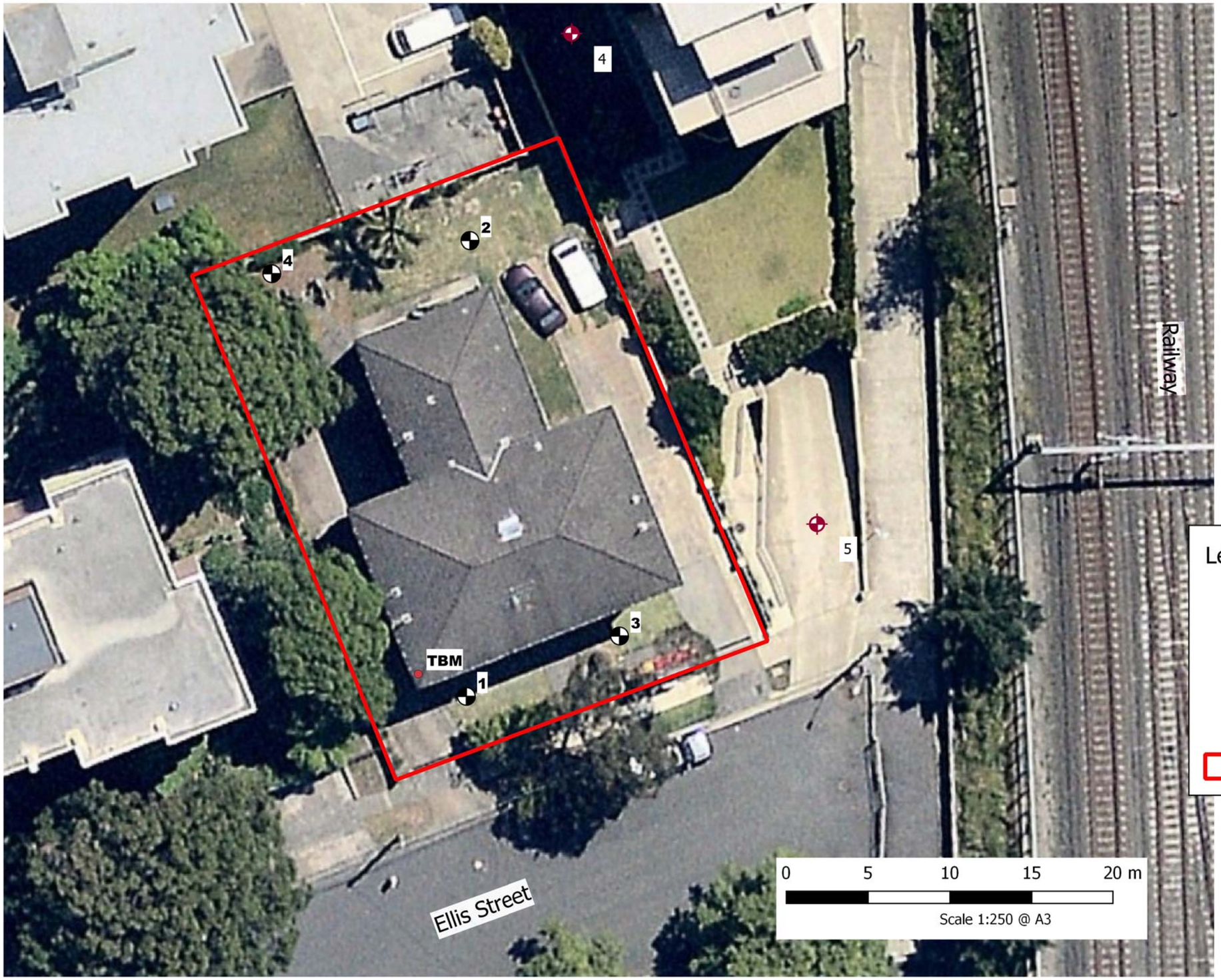
Conclusions

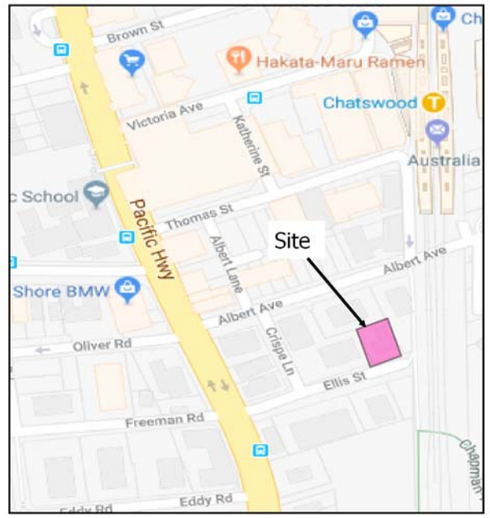
Laboratory replicates were not conducted by the laboratory for this report, however, were analysed at a frequency to meet or exceed NEPM requirements (ie in batches of 20 samples). The duplicate sample (D3 [Bore 4/0.3 m]) RPD for the batch were within the laboratory acceptance criteria.

The accuracy and precision of the soil testing procedures, as inferred by the laboratory QA/QC data is considered to be of sufficient standard to allow the data reported to be used in interpret site contamination conditions.

Appendix E

Drawing 1 – Test Location Plan





Locality Plan

Legend

- Approximate Bore Locations (current investigation)
- Previous bores (approximate location)
- Temporary Bench Mark (Base of south-westrn column of undercroft car parking area)
- Site Boundary

Drawing adapted from Nearmap Image

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	MPG AU Pty Ltd		
OFFICE:	Newcastle	DRAWN BY:	DJW
SCALE:	1:250 @ A3	DATE:	22.11.2017

TITLE: **Test Location Plan**
Proposed Unit Development
3 Ellis Street, Chatswood

PROJECT No:	91234.00
DRAWING No:	1
REVISION:	0