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Report on
Detailed Site Investigation

Proposed Nihon University
9 Church Street, Newcastle

Prepared for
Nihon Daigaku Australia Newcastle Pty Ltd

Project 91667.02
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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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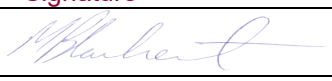
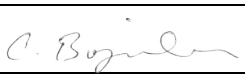
Author		23 April 2020
Reviewer		23 April 2020

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Executive Summary

This report presents the findings of a detailed site investigation (DSI) for contamination undertaken for the proposed Nihon University development at 9 Church Street, Newcastle. The DSI was undertaken for Nihon Daigaku Australia Newcastle Pty Ltd.

The DSI is part of a statutory site audit being conducted by the NSW EPA accredited site auditor Mr Ian Gregson of GHD Pty Ltd (GHD) for the development and was undertaken with reference to the sampling, analysis and quality plan (SAQP) which was prepared by DP (2019a) for the DSI.

It is understood that the proposed university development will comprise the demolition of the existing Administration Building and Supreme Court Building and a change of use to the original Court House Building from a 'Public Administration Building' to an 'Educational Establishment', together with the construction of two four-storey buildings consisting of a 108 bed 'Student Accommodation Building' (east wing) and an 'Education Building' (west wing).

The DSI comprised a desktop review of previous investigations by others, subsurface investigations including drilling of boreholes, excavation of test pits, installation of groundwater monitoring wells, soil and groundwater testing and gas monitoring to assess potential contaminant issues at the site.

The DSI identified widespread fill materials across the site to depths up to 3.3 m overlying natural soils and bedrock, with groundwater typically encountered within the underlying bedrock at depths of >6 m.

Fill materials across the site were identified to contain a range of anthropogenic materials including building materials (with bonded asbestos containing materials (ACM)) and some ash, slag and asphalt.

Due to the presence of underground mine workings at depth and the presence of underground fuel infrastructure (albeit decommissioned) on the adjacent Police Station site, an assessment of hazardous ground gases (HGG) was also undertaken for the DSI. The assessment indicated the general absence of HGG or volatile organic compounds (VOCs) during drilling, following well installation and within existing buildings / basements (including sumps / drains). Minor hydrocarbon odours were observed within some boreholes, however, laboratory testing in soils and groundwater indicated the absence of VOCs. It is noted that the proposed development does not include basements or deep excavations. Based on a weight of evidence approach and the results of the preliminary assessment above, the risk of adverse impacts associated with HGG at the site is considered to be low.

The groundwater quality assessment within the eastern portion of the site indicated the general absence of adverse impacts associated with the adjacent decommissioned fuel infrastructure. Some elevated heavy metal concentrations (namely nickel and zinc) were found within groundwater which were marginally above the adopted criteria. It is noted that the groundwater concentrations in the up-gradient well was typically higher or commensurate with concentrations detected in downgradient wells. There were also no obvious visual or olfactory indications of impacts to groundwater (ie no obvious staining, odours, slicks or free product) during purging / sampling and no detectable concentrations of hydrocarbons (TRH, BTEX, PAH, VOCs) within groundwater samples. The results of the investigations therefore suggest that the fuel infrastructure on the adjacent Police Station have not resulted in significant contamination to the subject site.

The assessment of soil conditions for potential contaminants identified bonded ACM impacts within filling across the site above the adopted site assessment criteria which will require remediation to render the site suitable for the proposed development.

While PAH, heavy metal and TRH impacts were identified on site exceeding the adopted Tier 1 health and conservative ecological investigation / screening levels, statistical analysis and consideration of the ecological setting and proposed development would suggest that remediation for these contaminants is not warranted.

It is also considered that the contaminated fill/soil materials identified on-site are unlikely to be having a significant adverse impact on the groundwater quality and down-gradient receiving water quality given the nature of the contaminants, distribution across the site and the depth and nature of the groundwater identified on-site.

Management of the ACM impacted fill / soil materials under a suitable capping layer to prevent access/exposure from a contamination perspective could be considered at the site. Given the proposed development will comprise buildings with concrete slabs and concrete pavements across the majority of the site (ie minimal landscaping), the proposed development could be used to manage site contamination. While statistical analysis and the ecological setting would suggest remediation of heavy metal, PAH and TRH impacts are not required, the proposed remediation approach (ie capping) would also prevent exposure to such soils.

The results indicate that the bonded ACM impacted soils are situated broadly across the site within filling. ACM has also been utilised as formwork at the perimeter of the former Courthouse building and tunnel structures which will be retained on-site. Remediation via excavation, stripping, removal and off-site disposal of impacted materials, is not likely to be feasible from both a practical, cost-effective or time-effective perspective based on discussions with the client/developer.

The adopted remediation approach (ie site capping to address ACM impacts across the site) should be aligned with the proposed development and detailed in a site-specific remediation action plan (RAP). It is noted that on-site management of contamination will attract a notice on the Section 10.7 planning certificate for the site and require the preparation of a long term site management plan (SMP) to outline management procedures for maintenance of the capping layer and procedures for future disturbance (if required). The SMP will also fulfil WHS regulation requirements due to the presence of ACM within the site. On-site management of site contamination will require approval by the Site Auditor and regulatory authority.

In summary, development of the site will require remediation and management of bonded asbestos impacted soil/fill. On-site management (ie capping) of ACM impacted soil is considered to be a practical and cost-effective remediation strategy. Remediation should be conducted in accordance with a site-specific Remediation Action Plan (RAP).

The site is considered to be suitable for the proposed educational development, subject to appropriate remediation / management of contamination and regulatory approvals.

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Report on Detailed Site Investigation
Proposed Nihon University
9 Church Street, Newcastle

1. Introduction

This report presents the results of a detailed site investigation (DSI) undertaken for the proposed Nihon University development at 9 Church Street, Newcastle. The DSI was commissioned in an email dated 30 October 2019 by Sita Vasanthakumar of Built Pty Limited (Built) on behalf of Nihon Daigaku Australia Newcastle Pty Ltd (NG) and was undertaken with reference to Douglas Partners Pty Ltd (DP) proposal NCL190520.P.001.Rev1 dated 16 September 2019 and email variation of 12 November 2019.

The DSI is part of a statutory site audit being conducted by the NSW EPA accredited site auditor Mr Ian Gregson of GHD Pty Ltd (GHD) for the development. The sampling, analysis and quality plan (SAQP) which was prepared by DP (2019a) for the DSI outlined the scope and quality assurance / quality control (QA/QC) requirements for the investigation and was approved by the site auditor as part of the development approval.

It is understood that the proposed development includes the following:

- Demolition of the existing Administration Building and Supreme Court Building;
- Change of use to the original Court House Building from a 'Public Administration Building' to an 'Educational Establishment';
- Construction of two four-storey buildings consisting of a 108 bed 'Student Accommodation Building' (east wing) and an 'Education Building' (west wing), both connected to the proposed 'Public Building' by atria. A carpark for 20 cars is contained in the lowest level of the 'Education Building'.

Further details regarding the proposed development are provided in Section 3.

The DSI has been conducted in a staged manner as detailed in the approved SAQP (DP, 2019a). This report presents the findings of pre-demolition and post-demolition DSI investigations. Further details regarding the staging of the investigations is provided below. This report supersedes the Pre-Demolition DSI prepared by DP on 3 March 2020 (DP, 2020c).

The investigation has comprised the following:

- Review of previous investigations / reports as follows:
  - Coffey Environments (Coffey) Phase 1 Environmental Site Assessment (Coffey, 2012);
  - Prensa Pty Ltd (Prensa) Detailed Site Investigation (Prensa, 2016);
  - Cardno (NSW/ACT) Pty Ltd (Cardno) Conceptual Remediation Action Plan and Report on Geotechnical Investigation (Cardno, 2019; 2018).
- Brief site history review to update previous site history information presented in the PSI (Coffey, 2012) and DSI (Prensa, 2016);

- Site inspection by a senior environmental engineer to identify areas of potential contamination and assess current site conditions;
- Pre-demolition drilling of three boreholes and installation of groundwater monitoring wells in each to assess potential impacts from the Police Station USTs and associated infrastructure (ie fill point, bowser, fuel lines);
- Preliminary monitoring of ground gases within geotechnical and environmental boreholes (during drilling and following installation of casing into mine works and groundwater wells) and across the site using a calibrated landfill gas meter;
- Excavation of nine test pits to assess fill / soil conditions across the site (post-demolition);
- Inspection and sampling of one stockpile to assess fill / soil conditions in the north eastern portion of the site which was inaccessible at the time of test pitting (post-demolition);
- Laboratory testing of selected soil and groundwater samples for a range of potential organic and inorganic contaminants;
- Preparation of this report presenting the results of the DSI findings.

The DSI was undertaken with reference to NSW EPA (2011), NEPC (2013) and NSW EPA (2019).

2. Site Description

The site is described as part Lot 1 DP 1199904, 9 Church Street, Newcastle, NSW and comprises a rectangular shaped area of approximately 4880 m^2. The site (investigation area) excludes a variable width easement for services along the western boundary of Lot 1 which falls outside the development footprint.

The site was formerly known as the Newcastle Court House and comprises three adjoining structures – the original Court House (Building B), the Administration Building (Building A) and the Supreme Court Building (Building C) with a rear carpark (south-east corner) and landscape areas.

The site is shown on Drawing 1 in Appendix E.

The site contains a number of easements, which are outlined on the ADW Johnson Pty Ltd (ADW) detailed survey plan (provided in Appendix E), including the following:

- A 3 m wide easement for water through the site on the eastern side of the original Court House building;
- A 1.7 m wide easement for services along the northern portion of the eastern site boundary;
- A 3 m wide restriction of use easement on the eastern site boundary adjacent to the Police Station.

3. Proposed Development

It is understood that the proposed development includes the following:

- Demolition of the existing Administration Building and Supreme Court Building;
- Change of use to the original heritage listed Court House Building from a 'Public Administration Building' to an 'Educational Establishment';
- Construction of two four-storey buildings consisting of a 108 bed 'Student Accommodation Building' (east wing) and an 'Education Building' (west wing), both connected to the proposed 'Public Building' by atria. A carpark for 20 cars is contained on the lowest level of the 'Education Building';
- Heritage listed retaining walls along the southern and western boundary of the site are to remain;
- Construction of retaining walls up to 6 m in height along the southern and western boundaries;
- Decommissioning of the existing tunnel which connects the site to the adjacent Police Station.

While proposed cut / fill drawings were not available at the time of preparing this report, it is understood that finished floor levels of approximately RL 22.3 (AHD) are proposed for the two new buildings, with localised cuts typically up to 1 m to 2 m required. Localised deeper cuts are likely to be required for the proposed rainwater tank and lift wells.

Reference should be made to the attached site development plans and cross sections in Appendix E for further details.

4. Background

A State Significant Development Application (SSD-9787) has been submitted to redevelop the former Newcastle Court House site into a new university campus. The proposed development will involve the demolition of two buildings on the site, changing the original Court House building to an educational establishment, and construction of two new four-storey buildings.

Limited contamination investigations had been undertaken at the site (restricted due to the presence of buildings and hardstand over most of the site), and a conceptual Remedial Action Plan (cRAP) had been prepared (Cardno, 2019). A hazardous materials investigation has also been carried out (NB, 2008).

Interim site auditor advice was required by Newcastle City Council (NCC) to confirm the adequacy of the submitted contaminated land information (ie cRAP) and to confirm land use suitability with respect to site contamination.

The appointed site auditor conducted a review of the following previous reports;

- Cardno (2019), Conceptual Remediation Action Plan, 9 Church Street, Newcastle NSW, Cardo (NSW/ACT) Pty Ltd, 28 May 2019;
- Coffey (2012), Phase 1 Environmental Site Assessment Newcastle Courthouse and Former Newcastle East Public School, Coffey Environments, 25 July 2012;
- Prensa (2016), Detailed Site Investigation, 9 Church St, Newcastle, NSW 2300, Prensa Pty Ltd, October 2016.

The following deficiencies were identified by the auditor as presented in the interim advice (GHD, 2019):

- Absence of a dangerous goods search;
- Absence of Council historical records search (relating to fuel / oil storage and use at the police station adjoining the site to the east);
- Cardno conducted a Geotechnical Assessment in 2018 (Cardno, 2018) which contained some useful information that was not documented in the cRAP (Cardno, 2019);
- Limited field investigations have been conducted (mainly due to limited site access), and hence further detailed investigations are recommended;
- No consideration of potential for impact to groundwater or vapour intrusion risks associated with off-site fuel storage activities (ie underground storage tanks (USTs) within police station basement adjacent to the eastern site boundary);
- Potential impacts associated with a potential breather point observed in the north-east portion of the site in driveway pavement have not been considered (note - subsequent inspection suggests the absence of a breather point or associated infrastructure at this location);
- The potential impacts from building demolition have not been fully considered;
- An updated conceptual site model (CSM) and detailed SAQP was recommended prior to undertaking the proposed detailed investigations, taking into account the issues that have not been adequately addressed to date;
- Hazardous ground gas has not been considered as a potential contamination issue. This could include methane from shallow coal workings as well as potential vapour intrusion if fuel impacts are present in soil or groundwater;
- The DSI is to be carried out following demolition works and should be reviewed by an accredited site auditor.

A summary of site information from previous investigations and the cRAP (Cardno, 2019) is provided in Table 1, Appendix B. Reference should be made to the previous reports for details.

5. Geology and Hydrogeology

Reference to the Newcastle Coalfields Surface Geology Sheet, published by BHP, indicates that the site is underlain by the Lambton sub-group rocks of the Newcastle Coal Measures. The rocks are of Permian age and typically comprise sandstone, siltstone, claystone and multiple coal seams.

Subsurface conditions were reported (Presna, 2016) to comprise the following based on limited site investigations:

- Fill material consisting of Gravelly, Clayey and Silty SAND (generally ranging from the surface to 1.2 m bgl, except for BH10 where fill was encountered to 3.3 m bgl);
- Underlain by Sandy CLAY and Silty CLAY and weathered sandstone (at depths between 0.55 m and 0.8 m bgl in BH5 to BH7 and BH9).

Based on acid sulfate soils (ASS) mapping, there are no known occurrences of ASS in the immediate area of the proposed development.

Groundwater was reported to be present (Cardno, 2018) as a shallow rock aquifer approximately 8 m bgl to 12 m bgl. It is noted that shallow (perched) groundwater may be present within the fill (or soil) / bedrock interface. It is understood that the Cardno (2018) geotechnical report encountered groundwater inflow during drilling of BH01 (south-east corner of the site) at a depth of 8 m bgl, and seepage during drilling of BH3 to the north of north-western corner of the site at about 12 m bgl, both in extremely weathered bedrock (silty CLAY). Based on site topography, the groundwater flow direction is likely to be towards the north/north-west. Refer to Drawing 1 in Appendix E for approximate previous test locations.

It is noted that DP have conducted additional geotechnical and preliminary mine subsidence investigations for the proposed development (DP, 2020a; 2020b). Drilling was conducted to locate the depth, condition and extent of mine workings within the site. It is understood that the Dudley, Yard and Borehole Seams are present beneath the site at depths in the order of 20 m, 40 m and 80 m respectively below existing ground levels, with results (DP, 2020b) indicating that the Dudley Seam is possibly mined under the site and the Borehole Seam has been mined under the site.

6. Site History Review

6.1 Extent of Site History Review

A brief site history review was undertaken in order to update previous site history information presented in the PSI (Coffey, 2012) and DSI (Prensa, 2016) for the site. The brief review of site history comprised the following:

- NCC on-line application search;
- Searches with NSW EPA;
- Review of the current Section 10.7 (2 and 5) Planning Certificate for the site (not available at the time of preparing this report);
- Review of historical aerial photographs;
- A Hazardous Chemicals Register search through SafeWork NSW for the site;
- A brief on-line search;
- A brief inspection within the basement of the adjoining Police Station (1 Church Street) containing underground fuel storage tanks (USTs) in conjunction with review of the subsequently supplied decommissioning certificate (Petrolink, 2017) and vapour risk assessment (WSP, 2017) for the diesel UST.

6.2 NCC Records Search

A search of NCC on-line development application search portal on 18 November 2019 identified no accessible development applications (DAs) and building applications (BAs) for the site.

6.3 NSW EPA Searches

A review of the NSW EPA contaminated land management register indicated the site and immediately surrounding properties have no notices issued under the Contaminated Land Management Register.

A review of the list of contaminated sites notified to the NSW EPA indicated the site and immediate surrounding properties have no listings. Some properties within Newcastle were listed including former gas works, service station, foreshore properties etc, however, these sites are not considered to pose a significant risk to the subject site given the distance from the site and topography (ie located down gradient of subject site).

A search of the NSW EPA POEO Public Register indicated that the site and immediately surrounding properties have no licences. There were a number of licences however, registered to NCC, Port of Newcastle (PoN), Hunter and New England Area Health Service, State of NSW and several commercial enterprises in Newcastle. These licensed premises are not considered to pose a significant risk to the site given the distance from the site and topography.

6.4 Review of Section 10.7 Planning Certificates

The current Section 10.7 planning certificate for the site was not available at the time of preparing the previous SAQP.

6.5 Review of Historical Aerial Photographs

A brief review of historical aerial photos between 2010 to present (ie between the time of the original PSI by Coffey (2012) and present) indicated the following pertinent details:

- In March 2010 the western easement of the property (outside the investigation site) was being utilised as a construction area for renovations / construction on the adjoining property to the west of the site. Several site sheds, stored parts and bare ground is evident;
- By August 2010 this western easement had been turfed and had a garden bed along the top of the retaining wall associated with the landscaping for the adjacent building;
- A blue tarp is present on the rooftop of the eastern building (assumed to be a roof leak) in early 2015, with new roof sheeting evident later in 2015;
- A similar blue tarp is present on the rooftop in 2016 of the eastern building and remains to present, although only partially covering the original roof space;
- Vehicles are present in the rear carpark until late 2015. After this time the grounds appear to be unmaintained with vegetation progressively getting denser at the rear of the property;
- No major changes to the site or immediately surrounding properties were evident in this time period with the exception of renovations to the building to the west of the site as described above.

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

6.6 SafeWork NSW Hazardous Chemicals

A SafeWork NSW search for information on storage of hazardous chemicals on site was initiated for this assessment. The search identified no records for the subject site (refer to Worksafe NSW letter in Appendix B).

A sketch (refer to Figure 1 below) was provided for the adjacent Police Station property (for preliminary information only) which indicated a 21 000 L diesel tank was located under the second level basement of the Police Station with a bowser along the north-western boundary of the Police Station (adjacent to the driveway entrance) and a fuel line running parallel to the western property boundary ending at the northern property boundary at the driveway entrance (likely fill point).

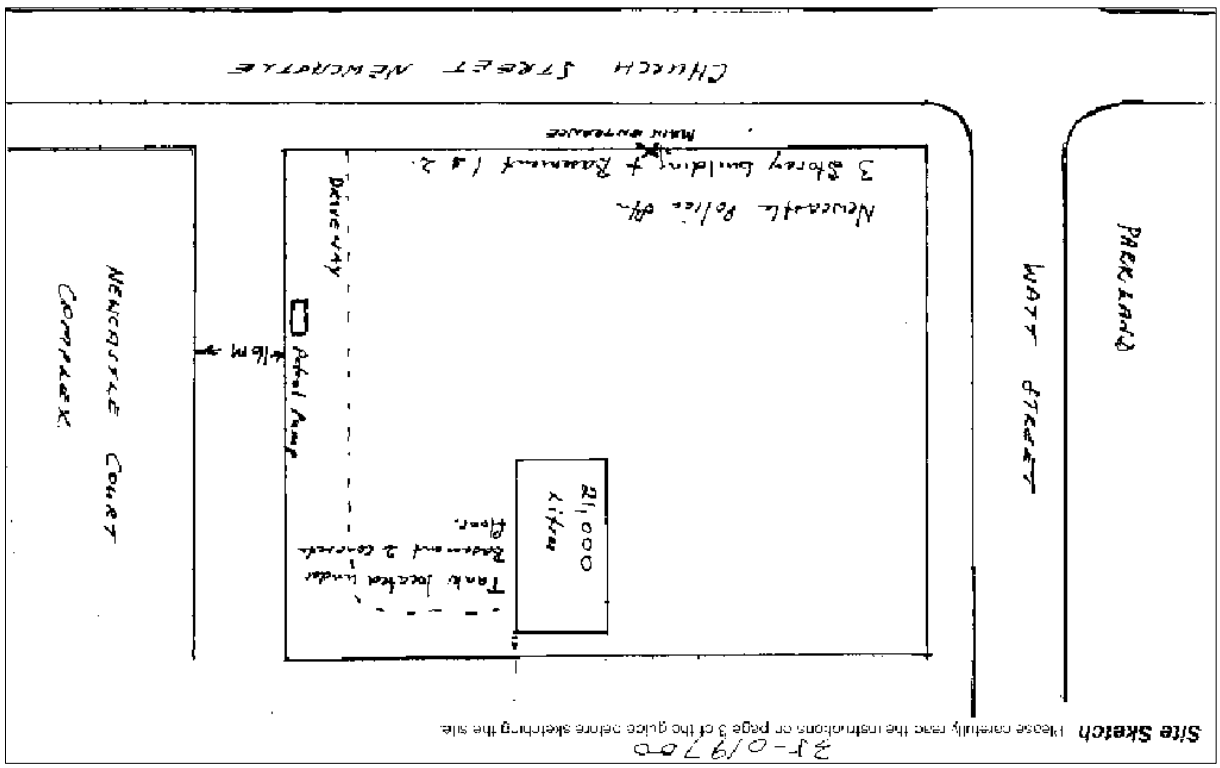

Figure 1 – Site sketch from WorkSafe NSW

6.7 UST Inspection (adjacent Police Station Site)

A brief inspection of the Police Station basement was undertaken on 14 November 2019 to identify potential UST infrastructure. Based on the brief inspection and discussions with the accompanying Police Station employees the following is understood:

- A diesel and petrol UST are located in the second level carpark basement of the Police Station;
- The diesel UST was decommissioned in 2017 removing remnant fuel and filling with foam. The tank had not been used for at least 10 years prior to decommissioning;

- The petrol UST was decommissioned 10 to 15 years ago, no details on decommissioning were available;
- Metal plates / signs were embedded in the concrete basement floor indicating the alignment of fuel lines. The lines from both tanks ran to the north-western corner of the basement (towards the external fill point). Lines were also noted to run towards the western basement wall (likely to be vent lines / bowser lines), north of a concrete underground access tunnel between the Police Station site and the subject site;
- A bowser footprint (Figure 2) and vent pipes (Figure 3) were evident along the western boundary of the Police Station. The fill points (Figure 4) were shown to be situated behind an access panel at the entrance to the Police Station driveway (north-west corner of Police Station site);
- A wash down bay is also present on the first level basement along the western property boundary (concrete floor observed to contain hydrocarbon stating);
- A diesel generator is also situated within the second level basement adjacent to the western boundary and has a small above-ground diesel tank (it was noted that the area formerly contained a larger above-ground tank at this location) supplying diesel fuel when required. The generator and tanks are situated on concrete floor slabs.

Approximate diesel and petrol UST locations within the adjacent Police Station site, based on the abovementioned reports and the brief site inspection, are shown on Drawing 1, Appendix E. Approximate photo locations and orientations are also provided in Drawing 1.

Figure 2 – Former Bowser Location on western edge of Police Station (looking south-west)

Figure 3 – Vent pipes on western edge of Police Station (looking south)

Figure 4 – Fill points on north western wall of Police Station (looking east)

The diagram (cross-section) below provides a schematic of the potential sources of contamination within the adjacent Police Station site in relation to the subject site.

Bores 201 and 202 were drilled along the eastern site boundary with the Police Station to depths of 10 m and 12 m in order to intercept potential contamination migrating from the identified sources.

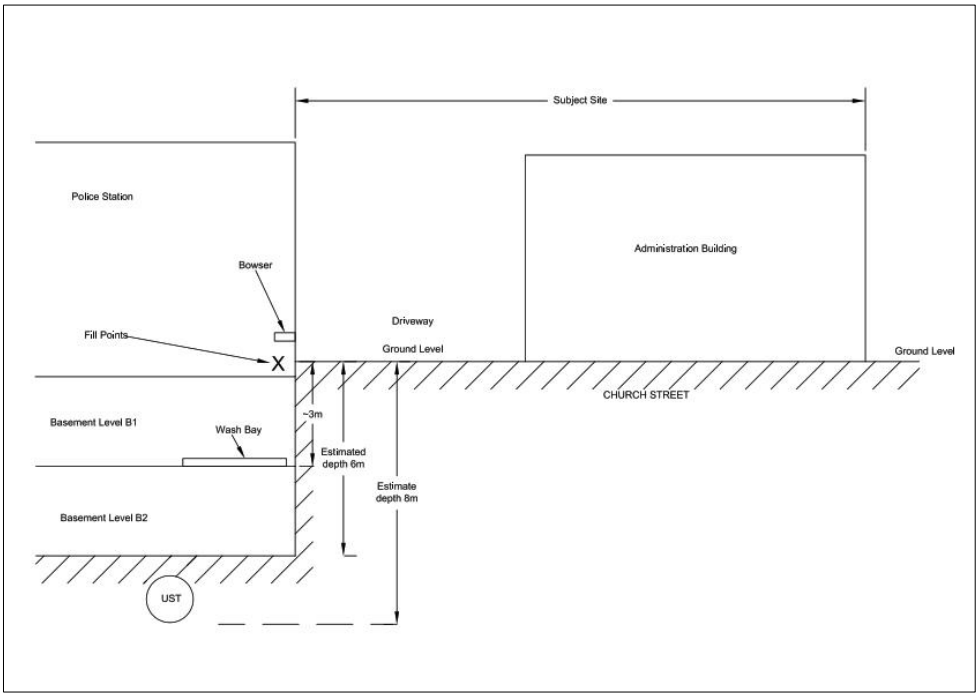

Figure 5 – Schematic Cross Section – Potential Sources of Contamination – Police Station Site

6.8 WSP (2017) and Petrolink (2017)

Following the above UST inspection at the Police Station, a vapour risk assessment report by WSP Australia Pty Ltd (WSP, 2017) and contractors certificate (Petrolink, 2017) following the decommissioning of the underground diesel storage tank at Newcastle Police Station in 2017 was provided to DP. A summary of the findings of the reports is provided below:

- A 5.5 kL steel UST, previously containing diesel, was decommissioned in situ (filled with inert foam following residual diesel fuel removal) in August 2017 by Petrolink Engineering Pty Ltd;
- The objective of WSP (2017) was to assess the vapour inhalation risk resulting from the migration of vapours from potentially contaminated soil surrounding the diesel UST into the basement air;
- The assessment comprised soil sampling via hand auguring at four locations around the perimeter of the UST and vapour sampling from four sub-slab active soil vapour ports;
- Laboratory analyses was conducted on one primary soil sample and four primary soil vapour samples;
- Boreholes refused at 0.4 m to 0.85 m below ground level (BGL) (ie bores did not extend to the invert level of the UST - shallow only);
- The potential human receptors at the site were reported to be the users (commercial workers) of the basement of the Newcastle Police Station. The exposure pathway identified was vapour intrusion into the basement. Therefore, the HSLs for vapour intrusion were considered relevant for assessing the site;

- Results:
  - Photo-ionisation detector (PID) readings ranged between 0 ppm and 3.2 ppm. One sample, namely BH2_0.8, showed hydrocarbon odours and the highest PID reading;
  - Soil sample BH2_0.8 showed concentrations of the TRH F2 and F3 fractions, as well as naphthalene, above the laboratory limit of reporting (LOR), but below the adopted assessment criteria. These detections were indicative of a diesel hydrocarbon source;
  - Sub-slab soil vapour concentrations for a suite of VOCs were measured at four locations beneath the site concrete slab (SV1, SV2, SV3 and SV4);
  - Some detections were noted for TRH C_{10}-C_{12} fraction;
  - Relatively low concentrations of volatile hydrocarbon (eg below the assessment criteria) in soil vapour may be indicative of a diesel source. This corresponds with the historical use of the UST, which was diesel storage and handling.
- The report concluded that the vapour and soil sampling undertaken indicated that the risk to workers at the site, through vapour intrusion and inhalation, was low and acceptable.

The following is noted:

- The vapour assessment was conducted for the decommissioned diesel tank within the Police Station basement;
- Boreholes around the diesel UST refused at relatively shallow depths (ie up to 0.85m). Soils with residual hydrocarbon impacts may therefore be present at depth in the vicinity of the UST;
- It is understood that a former petrol UST was also present within the basement (exact location unknown, however suspected to be located south of the diesel tank);
- Vapour inhalation risk resulting from the migration of vapours from potentially contaminated soil surrounding a petrol UST is likely to be greater that the risk from a diesel UST;
- Further assessment was recommended by DP (2019a) to assess impacts from possible migration of contaminants from the identified potential sources of contamination along the eastern site boundary with the Police Station site (ie USTs, associated infrastructure and washdown bay).

7. Site Condition

A brief site walkover was conducted on 14 November 2019 by a senior environmental engineer from DP to assess pre-demolition site conditions.

In general, the site conditions were similar to those observed by Coffey (2012) and Presna (2016).

Additional items of note are presented below:

- Landscape areas at the rear and front of the property are overgrown with thick vegetation, grass cover evident in garden areas (Figures 5 and 6). Soils, where exposed, appeared to be dark grey silty sands / sands with some building rubble evident (i.e. concrete fragments, asphalt, brick etc) and general rubbish evident in some areas;

- Fibro sheeting fragments (potential asbestos containing materials (ACM)) were observed at the ground surface near a service pit (south-east corner of former Court House – Figure 7) and north of the rear staircase between the Court House and Supreme Court Building (Figure 8) where building rubble and slag gravel was observed;
- Building rubble was also observed at the surface of the internal garden bed between the Court House and Supreme Court Building (Figure 9);
- The concrete associated with both the Supreme Court Building and the Administration Building was in poor condition in several places with cracking and chipping of concrete evident (Figure 10);
- The rear carpark is asphalt sealed (Figure 11), as is a small area in front of the Court House (Figure 12). Concrete pavements are present around the western and northern perimeter of the Supreme Court Building and the driveway to the east of The Administration Building (Figure 13) and in localised areas of landscaping to the south of the Court House and Supreme Court Building with some brick paved areas also present at the front of the site.

Further details regarding pavements and the site layout are shown in the ADW detailed survey plan provided in Appendix E.

Figure 6 – Gardens at rear of Administration Building / Court House (looking west - 14 November 2019)

Figure 7 – Gardens at rear of Court House (looking east - 14 November 2019)

Figure 8 – Fibro Sheeting Fragment (looking south - 14 November 2019)

Figure 9 – Surficial fill including fibro sheeting fragments adjacent Court House / Supreme Court Building (looking north - 14 November 2019)

Figure 10 – Surficial fill including building rubble at surface of internal garden bed (looking south - 14 November 2019)

Figure 11 – Cracking / spalling of concrete facade at the Supreme Court building (looking south east - 14 November 2019)

Figure 12 – Asphalt sealed car park at rear of Administration Building (looking west - 14 November 2019)

Figure 13 – Asphalt pavement at front of the Court House (looking south east - 14 November 2019)

Figure 14 – Concrete driveway along eastern side of Administration Building (looking south - 14 November 2019)

Additional observations of site conditions from 3 March 2020 following partial demolition of the former Administration Building (eastern building) are as follows:

Figure 15 – Rear of Administration Building (looking north – 3 March 2020) during demolition

There were no obvious indications of gross contamination (ie staining or odours) at the accessible surface following demolition. It is noted, however, that a significant portion of the surface was covered by demolition materials which precluded detailed inspection.

Figure 16 – Supreme Court Building – Subsurface investigation via hole in concrete slab (3 March 2020) during demolition activities

Due to the staging of demolition activities, further subsurface investigations within the Supreme Court Building footprint were conducted via holes cut into the existing slab (ie the Supreme Court Building slab had not been demolished) which precluded detailed inspection of underlying surface soils across this area. Further inspections are proposed following demolition activities as part of future site remediation works and will be reported in the validation report.

Inspections were also conducted by DP on 10, 12, 16 and 18 March 2020 within the Administration Building area during demolition activities as shown in the figures below. The upper fill materials observed were generally commensurate with those encountered during pre-demolition investigations and contained some to abundant anthropogenic inclusions (ie building waste) including potential ACM at some locations as well as ash and coal.

Figure 17 – Former car park at rear of the Administration Building (looking south-west - 10 March 2020). Concrete footings associated with a previous structure evident at stripped surface along with fill comprising ash and demolition waste (brick, concrete, plastic etc)

Figure 18 – Administration Building (looking north-east - 10 March 2020) during demolition activities

Figure 19 – Stockpile A fill materials stripped from the south eastern corner of the site (looking north-east - 10 March 2020) during demolition activities. Stockpiles comprised intermixed grey / brown gravelly silty sand fill with variable inclusions including concrete, brick, ash, coal gravel, plastic, geofabric, roots, PVC, tile, steel pipe, glass, slate, gravel / cobbles (concrete, brick and terracotta pipe fragments), some red/brown mottled grey

Figure 20 – North-east corner of Administration Building (looking south - 12 March 2020) during demolition activities

Figure 21 – Stockpile B materials stripped from the eastern portion of the former Administration Building (looking south east - 12 March 2020) during demolition activities. Stockpiled materials comprised intermixed grey / brown gravelly sandy clay fill with variable inclusions including concrete, brick, ash, wire, coal gravel, tile and some light grey mottled red/brown clay

Figure 22 – Fibro formwork and loose sheeting associated with the tunnel walls under the former Administration Building (looking north west - 16 March 2020) during demolition activities

Figure 23 – Fibro formwork on the underside of the concrete floor slab of the former Administration Building adjacent to the tunnel (looking north - 16 March 2020) during demolition activities

Figure 24 – Fibro formwork on the underside of the concrete floor slab of the former Administration Building, on the walls of the tunnel and the former Courthouse left in-situ (looking north west - 16 March 2020) during demolition activities

Figure 25 – Fibro formwork and abundant fibro sheeting material adjacent to the walls of the tunnel of the former Administration Building (looking west - 18 March 2020)

Figure 26 – Stockpile C materials stripped from the south eastern portion of the site comprising intermixed grey / brown gravelly sandy clay fill with variable inclusions including concrete, brick, steel reinforcement, fibro fragments (bonded, in sound condition), wire, terracotta, coal gravel, tile and some light grey mottled red/brown clay (looking south west – 18 March 2020)

8. Conceptual Site Model

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors (linkages). The CSM provides the framework for identifying how the site may have become contaminated and how potential receptors may be exposed to contamination either in the present or the future i.e. it enables an assessment of the potential source – pathway – receptor linkages.

The potential sources of contamination and contaminants of concern within the site based on the desktop reviewing, supplementary site history review and site inspection have been identified and summarised in Table 1, below.

Table 1: Conceptual Site Model

Known and Potential Primary Sources	Primary Release Mechanism	Secondary Release Mechanism	Potential Impacted Media	Contaminants of Concern	Exposure Pathway	Potential Receptors	
						Current	Future
Filling imported across the site (subject to source)	Placement of filling on-site	Long-term leaching of contaminants via runoff, rain water infiltration / percolation or exposure / disturbance during proposed development	Soil, groundwater, surface water	TRH, BTEX, PAH, Metals, Pesticides, PCB, asbestos	Dermal contact, inhalation (dust/vapours), ingestion	Site workers, maintenance workers, consultants, trespassers, surface water bodies, groundwater, neighbouring properties in the case of groundwater or surface water migration	Site workers, residents, maintenance workers, consultants, trespassers, surface water bodies, groundwater, neighbouring properties in the case of groundwater or surface water migration
USTs, ASTs & associated Infrastructure on adjacent site (Police Station)	Potential leaks and spills from USTs, bowsers and associated pipework (migration)	Long-term leaching of contaminants, percolation, groundwater migration	Soil, groundwater, soil vapour	TRH, BTEX, PAH, Metals	Dermal contact, inhalation (dust/vapours), ingestion		
Demolition of former structures or maintenance, renovations to existing / former buildings, underground services containing ACM	Demolition / maintenance of buildings / structures	Long-term leaching of contaminants via runoff, rain water infiltration / percolation or exposure / disturbance during proposed development	Soil, groundwater, surface water	Metals, PCB, asbestos	Dermal contact, inhalation (dust/vapours), ingestion		
Wash Bay (adjacent Police Station site)	Spills and leaks (migration)	Long-term leaching of contaminants, percolation, groundwater migration	Soil, groundwater, soil vapour	TRH, BTEX, PAH, Metals, VOC,	Dermal contact, inhalation (dust/vapours), ingestion		

Table 1: Conceptual Site Model (continued)

Known and Potential Primary Sources	Primary Release Mechanism	Secondary Release Mechanism	Potential Impacted Media	Contaminants of Concern	Exposure Pathway	Potential Receptors	
						Current	Future
Potential Pesticide Use and Storage, possible under-slab/structures pesticide treatment	Spraying / application and spills/leaks from stored pesticides	Long-term leaching of contaminants via runoff, rain water infiltration / percolation or exposure / disturbance during proposed development	Soil, groundwater, surface water	Pesticides, heavy metals, TRH	Dermal contact, inhalation (dust/vapours), ingestion	As above	As above
Hazardous Ground Gases – Former Mine Workings	Migration from former underground mine workings	Migration via fractured rock	Soil vapour, groundwater	Methane, carbon monoxide, carbon dioxide, hydrogen sulphide	Inhalation, explosion and/or asphyxiation due to the accumulation of HGG in structures		

9. Field Work

9.1 Sampling Rationale

9.1.1 Pre-demolition Assessment

The following sampling strategy was proposed in the approved SAQP (DP, 2019a) to assess potential impacts from adjacent USTs and associated infrastructure where access permitted prior to demolition:

- Pre-demolition contamination assessment (Bores 201 to 203):
  - Drilling of two bores (Bores 201 and 202) along the eastern site boundary to assess potential impacts from the Police Station USTs and associated infrastructure (ie downgradient of fill point, bowser, fuel lines). Conduct soil sampling, and install groundwater wells for groundwater sampling and testing;
  - Drilling of one bore (Bore 203) along rear (southern boundary) and installation of groundwater well for background groundwater quality testing;
  - Bores containing groundwater wells will be drilled to bedrock/refusal to assess possible perched groundwater conditions and conditions at the soil / rock interface;
  - Preliminary monitoring of ground gases will be conducted during drilling and following well installation.
- Pre-demolition geotechnical and mine subsidence assessment:
  - Drilling of five bores (MS1, MS2, MS4 and GEO1 to GEO2) to assess general geotechnical conditions and preliminary mine subsidence investigation (DP, 2020a);
  - Soil samples will be collected from selected bores for contamination testing;
  - Preliminary monitoring of ground gases will be conducted during geotechnical drilling and following installation of casing into mine workings (where installed);
  - Geotechnical bores will be drilled to depths of up to 80 m, and will include coring of underlying bedrock.
- Pre-demolition interim report (DP, 2020a):
  - Preparation of a brief pre-demolition interim report presenting the results of supplementary contamination sampling and testing.

9.1.2 Post-Demolition Assessment

The following sampling strategy was proposed (DP, 2019a) following demolition to assess fill conditions that were not generally accessible prior to demolition. Potential impacts to the site following demolition of structures containing hazardous building materials were also proposed to be assessed. The frequency of testing has been adopted to meet NSW EPA sampling guidelines (EPA, 1995) for characterisation of the 0.49 ha site:

- Post-demolition contamination assessment (Bore 301, Pits 302 to 310):
  - Inspection of the surface post demolition. If there is evidence of hazardous building materials (ie asbestos), or potentially contaminated soils or variable soil conditions, the frequency of testing may be increased for site characterisation. The scope of work will be reviewed following the post demolition inspection;
  - Drilling of one bore (Bore 301) and excavation of nine pits (Pits 302 to 310) to assess general fill conditions across the site following demolition;
  - Pit 309 has been located to assess soils within the proposed excavation area for rainwater tank construction.

It is noted that due to time constraints with the construction program, Built instructed DP to conduct the 'post-demolition' investigation fieldwork prior to the complete demolition of the Administration Building and during demolition of the Supreme Court Building. Due to the associated access constraints and ongoing demolition activities, a systematic site coverage was not able to be achieved in some areas of the site as outlined in the SAQP (DP, 2019a) and one of the ten test pits proposed (Pit 305) was not able to be undertaken. Whilst one test location was not able to be excavated, the sampling conducted for the DSI exceeds the minimum sampling density with reference to the EPA sampling design guidelines (NSW EPA, 1995) considering current and previous testing for the site area.

Areas that were not accessible during post demolition investigations will be inspected as part of the site validation works with reference to the unexpected finds protocols to be outlined in the RAP. It is noted that post demolition inspections have taken place within the eastern portion of the site. Additional sampling and testing of striped fill / underlying natural soil was conducted for waste classification purposes in this area. The associated results have been included in this report for completeness.

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

9.2 Methods

The field work for the DSI was undertaken between 12 December 2019 and 12 March 2020 and comprised the following:

- Checking for underground services at proposed bore locations by a professional service locator;
- Concrete coring of concrete pavements to facilitate drilling (Bores 201 and 202). Bores 201 and 202 were drilled to depths of 10 m and 12 m to intercept potential migration from contamination sources identified within the adjacent Police Station site (refer to Figure 5 above);
- Drilling of three boreholes to depths of up to 12 m using a track-mounted drill rig utilising undisturbed push tube drilling methods and solid flight augering where required;
- Excavation of nine test pits (Pits 301 to 304, 306 to 310) using hand tools (shovel/hand auger) and excavator with mud bucket where access permitted during demolition. It is noted Built Pty Ltd selected test pit locations and arranged concrete cutting of basement floor slabs within the former Supreme Court Building (western building). Due to access constraints and demolition being underway at the time of test pitting, Pit 305 was inaccessible, and several pits were relocated by the client as discussed above in Section 9.1;

- Logging of the subsurface profile, including visual and olfactory assessment of potential contaminants in filling;
- Collection of discrete soil samples for contamination testing purposes from the three environmental boreholes (Bores 201 to 203), from the upper fill / soil profile of geotechnical boreholes, from the nine test pits (Pits 301 to 304, 306 to 310) and from a soil stockpile (Stockpile B – Samples S1 and S2) ;
- Collection of two material samples (Samples F1 and F2) from the ground surface for asbestos identification testing prior to demolition;
- Collection of additional material samples (where observed) and adjacent soil sampling from test pits during 'post demolition' investigations for asbestos identification testing (ie Pits 302, 307 and 310). Soil samples for asbestos identification testing were generally sub-sampled by the laboratory from the soil jars provided. Analysis of 500mL samples with reference to WA DoH guidelines was not undertaken given a detailed asbestos assessment was not proposed at the time as on-site management of contamination was likely to be the preferred remediation option selected by the client due to the presence of asbestos at numerous locations across the site;
- Installation, development, purging, gauging and sampling of three groundwater wells for contamination testing purposes;
- Measurement and recording of ground gas concentrations from the environmental (bores / wells) and geotechnical (bores / cased holes) using a calibrated landfill gas meter;
- Measurement and recording of ground gas concentrations within the existing building ground floor / basements, tunnel and selected service pits / drains (ie areas which could potentially accumulate ground gases if present);
- Levelling of groundwater wells.

Engineers from DP logged the subsurface profile and collected samples for identification and testing purposes. The test locations are shown on Drawing 1, Appendix E.

The process of obtaining samples and their transportation, storage and delivery to laboratories for analysis was documented on DP standard Chain of Custody (COC) forms. Copies of completed forms can be found in Appendix D.

Soil samples for contamination assessment were collected at regular depth intervals and/or changes in strata based on field observations, including from the near surface, from near the water table (if encountered) and upon possible signs of obvious contamination such as odours or staining.

Soil samples were collected from the new push tube sleeves or auger spiral for drilled bores and directly from the pits walls or auger flights during test pitting. Care was taken to remove any extraneous materials deposited on the sample.

All soil sampling data was recorded on DP COC sheets, with the general sampling procedure comprising:

- Decontamination of sampling equipment using a 3% solution of phosphate free detergent (Decon 90) and tap water prior to collecting each sample;
- The use of disposable gloves for each sampling event;
- Transfer of samples into laboratory-prepared glass jars, and capping immediately;
- Collection of 10% replicate samples for QA/QC purposes;

- Collection of replicate soil samples in zip-lock plastic bags at each depth for photoionisation 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 for transport to the laboratory;
- Use of COC 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.

9.3 Well Design and Installation

A groundwater well, constructed of 50 mm diameter flush threaded Class 18 PVC was installed in Bores 201 to 203 with reference to current industry standards, using dual push tubes and solid flight augers (where required to penetrate the highly to extremely weathered bedrock) from the drilling rig.

A 6 m / 7.5 m machine-slotted PVC screen with an end cap was installed from approximately 4 m / 4.5 m below ground level (approximately 4 m above the groundwater level observed at the time of installation) in Bores 201 to 203. A filter pack was installed in the bore annulus consisting of 2/5 mm graded washed sand to generally 0.5 m to 0.6 m above the slotted PVC screen. A bentonite seal was placed above the filter pack within the annulus.

The wells were completed at the surface with a flush-mounted well cover set in concrete. The well construction details are shown on the borehole logs in Appendix A.

Drilling and well installation were undertaken under QA/QC protocols to minimise the risk of cross contamination.

The wells were designed and installed in order to intercept groundwater and potential contaminant migration from the identified sources of contamination along the eastern site boundary with the Police Station (refer to Figure 5 above).

9.4 Well Development / Purging and Sampling

Following installation, the wells were developed by removing groundwater until steady pH and Electricity Conductivity (EC), Oxidation Reduction Potential (ORP), readings were achieved using new dedicated single check valve disposable bailers in order to provide an efficient hydraulic connection between the well and the formation. Regular measurements of the above field parameters were undertaken on groundwater during development using a calibrated portable meter until steady readings were achieved. It is noted that Bore 202 and Bore 203 were bailed dry following removal of 3 L and 15 L respectively.

Prior to sampling, the wells were purged until steady pH, EC, ORP, Dissolved Oxygen (DO), temperature, turbidity readings were achieved using a new dedicated single check valve disposable bailer. Due to the slow recharge, purging using a low flow micropurge, was not possible.

Groundwater samples from the wells were collected using new bailers and preserved in laboratory prepared containers for analysis. The samples were delivered to the laboratory within the recommended holding times for analysis. The groundwater level was allowed to recover from the effects of purging prior to sampling. Samples were collected under strict QA/QC protocols.

The headspace of the well and groundwater collected from the well was also screened for the presence of volatile organic compounds (VOC's) using a calibrated PID following development and purging. Following development and prior to purging, an oil-water interface meter was used to confirm the depth to groundwater in each well for groundwater contouring purposes and to assess the possible presence of floating product within each well.

Field sampling and laboratory analysis was undertaken with reference to standard environmental protocols, including a QA/QC plan consisting of 10% replicate sampling (intra and inter-laboratory replicate samples), trip spikes, trip blanks, appropriate Chain of Custody procedures and in–house laboratory QA/QC testing.

9.5 Gas Monitoring

Monitoring of gas concentrations and flow rates within the wells / boreholes was undertaken using a calibrated GA5000 or GEM2000 landfill gas meter. The monitoring of the wells was conducted according to the following general procedure:

- Record atmospheric pressure prior to monitoring;
- Connect the inlet hose of a GA5000 to the well gas cap using a 'quick connect' fitting with the pump switched on;
- Record readings of carbon dioxide, methane, hydrogen sulphide, carbon monoxide and oxygen at 30 second intervals for a period of up to five minutes including the peak and stabilised concentrations;
- Allow the well to stabilise for at least 30 minutes; and
- Connect the inlet hose of a GA5000 to the well gas cap using a 'quick connect' fitting and measure the gas flow rate.

Gas monitoring was also conducted periodically during drilling of both the environmental and geotechnical boreholes (ie from the top of the open borehole) and following completion of drilling of the geotechnical boreholes from the installed casing / open borehole using the GEM2000 unit. PVC and rubber fittings were utilised were possible for the completed geotechnical boreholes to provide a good seal with the casing / ground surface.

Monitoring of gas concentrations within buildings was undertaken on 18 December 2019 using a calibrated GEM2000 landfill gas meter at various locations within the building floor / basements and selected open pits, drains, pipes, cavities and open excavations etc.

10. Field Work Results

10.1 Subsurface Conditions

The subsurface conditions encountered in Bores 201 to 203, Pits 301 to 304, Pits 306 to 310 and Bores MS1, MS2, MS4, Geo1 and Geo2 (DP, 2020a) are presented in detail in the borehole / test pit logs in Appendix A and summarised below. These should be read in conjunction with the general notes preceding them, which explain definitions of the classification methods and descriptive terms. Soil units are described in detail in DP (2020a).

CONCRETE: Encountered in Bore 201, 202 and Geo1 and Pits 302, 303, 304 and 306 from the ground surface to a depth of 0.09 m to 0.15 m.

ASPHALT: Encountered in Bore 201 from 0.17 m to 0.19 m and Bores 203 and MS4 from the ground surface to depths of 0.09 m to 0.03 m respectively.

FILLING (Unit 1): Encountered in all bores / pits except Geo2 from the surface to 0.1 m / 3.3 m depth and generally comprised sandy gravel / gravelly sands pavement fill with trace slag, coal, ash, asphalt in some bores, underlain by silty clay, clayey sand, sand, silty sand, gravelly silt, sandy gravel, fill with trace coal, slag, ash, asphalt, brick, concrete, tiles, glass, metal, wood, plastic, geo-fabric, shell, fibro sheeting fragments (potential ACM) in some bores / pits.

SANDS (Unit 2A): Encountered in Bore 203 from 1.6 m to 2.6 m depth, Geo1 from 3.3 m to 11.7 m depth, Geo2 from 0.1 m to 2.5 m depth and Pits 301 to 304 and Pits 308, 309 from depths of 0.3 m / 0.8 m to depths of >0.8 m to >1.2 m and generally comprising pale grey / grey / brown mottled orange / yellow / dark brown clayey silty sand / clayey sand / sands / silty sands with trace coal / gravel.

SILTY CLAY / SANDY CLAY (Unit 2B): Encountered in all bores beneath fill / sands to depths of 4.8 m to 12.1 m and in Pits 306 and 310 beneath filling to termination at depths of 0.7 m to 0.9 m and generally comprised pale grey, brown or grey mottled red / orange clays / silty clays / sandy clays with trace coal and iron cementing.

SILTSTONE / CLAYSTONE (UNIT 3): Encountered in all bores beneath clays to termination at depths of 10 m and 12 m in Bores 201 to 203 and generally comprised pale grey to grey mottled red, slightly to extremely weathered siltstone / claystone. Dark grey carbonaceous bands were observed at 9 m in Bore 201. Refer to DP (2020a) for bedrock conditions in geotechnical bores.

Further details are provided in the borehole and test pit logs in Appendix A. Details of the subsurface conditions encountered within the geotechnical bores (particularly bedrock) are provided in DP (2020a).

Selected photos of subsurface conditions encountered within test pits conducted on 3 March 2020 are provided below:

Figure 27 – Pit 307 (3 March 2020) – Note abundant fibro sheeting fragments and demolition waste

It is noted that Pit 307 was terminated at approximately 0.5 m and immediately backfilled by the client due to the presence of abundant fibre cement sheeting fragments (ie potential ACM). The depth of fill was not assessed as a result nor a detailed log prepared, although it was noted that fill conditions were visually similar to those encountered in Pit 306.

Figure 28 – Pit 309 (3 March 2020) – Note demolition waste

Figure 29 – Pit 302 (3 March 2020) – Note fibro fragments within pit walls

Fill / natural materials observed within stockpiled materials stripped from the eastern portion of the site following demolition of the bulk of the former Administration Building were generally consistent with the fill / natural materials described in the above summary. A description of the materials inspected between the 10 March and 18 March 2020 are provided in Table 2 below: Photographs of each stockpile are provided in Section 7 above.

Table 2: Summary of Stockpile Conditions Stripped from Eastern Portion of Site

Stockpile	Date Inspected	Description
A	10 March 2020	Intermixed grey / brown gravelly silty sand fill with variable inclusions including concrete, brick, ash, coal gravel, plastic, geofabric, roots, PVC, tile, steel pipe, glass, slate, gravel / cobbles (concrete, brick and terracotta pipe fragments), some red/brown mottled grey
B[1]	12 March 2020	Intermixed grey / brown gravelly sandy clay fill with variable inclusions including concrete, brick, ash, wire, coal gravel, tile and some light grey mottled red/brown clay
C	18 March 2020	Intermixed grey / brown gravelly sandy clay fill with variable inclusions including concrete, brick, steel reinforcement, fibro fragments (bonded, in sound condition), wire, terracotta, coal gravel, tile and some light grey mottled red/brown clay

Notes to Table 2:

1 – Stockpile sampled for waste classification purposes. Results are provided in Section 13.

10.2 Groundwater Conditions

Groundwater was encountered within Bore 201 during drilling at approximately 8 m depth within the highly weathered siltstone. Groundwater was also measured at 7.65 m depth in Bore 203 within the highly weathered siltstone prior to recommencement of drilling (open borehole left open overnight). Groundwater was not encountered within any of the test pits while they remained open. It should be noted that groundwater levels are affected by factors such as climatic conditions and soil permeability and will therefore vary with time.

The results of gauging of groundwater wells conducted on 16 / 17 December 2019 (prior to well development) and 7 January 2020 (prior to well purging / sampling) are presented in Table 3 below.

Table 3: Groundwater Gauging Observations on 16/17 December 2019 and 7 January 2020

Bore / Well	Easting	Northing	RL TOC (AHD)	Depth to Groundwater below TOC (m) 16-17 Dec 2019	Depth to Groundwater below TOC (m) 7 Jan 2020	PID Well Headspace (ppm) 7 Jan 2020	RL Groundwater (m AHD) 7 Jan 2020
201	386206.04	6355797.97	22.49	6.69	6.71	2	15.78
202	386200.53	6355780.09	22.50	11.10	11.17	<1	11.33
203	386179.56	6355760.17	22.54	7.41	7.51	1	15.03

Notes to Table 3:
TOC – Top of casing

The above results indicate that the groundwater table is variable in height and present within the upper highly weathered bedrock, which is broadly consistent with previous investigations by Cardno (2018) and recent geotechnical investigation by DP (2020a).

Groundwater parameters measured during purging and sampling on 7 January 2020 are provided in Table 4 below.

Table 4: Groundwater Field Parameters Measured During Sampling on 7 January 2020

Location ID	PID (ppm)	Thickness of Product (mm)	pH (pH Units)	EC (µS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Temp (°C)	Comments
201	<1	ND	7.0	501	85	4.4	>1000	22.6	Very turbid, brown
202	<1	ND	6.7	561	63	3.6	>1000	22.0	Very turbid, brown, from 2 L going dry, slow recharge
203	<1	ND	6.4	555	63	5.1	>1000	21.6	Very turbid, light brown

Notes to Table 4:
EC – Electrical Conductivity
ORP – Oxidation Reduction Potential
ND – Not detected (ie < 1.2 mm)
DO – Dissolved Oxygen

The results of groundwater field testing indicated the following:

- Groundwater was generally neutral to slightly acidic (ie pH 6.4 to 7.0);
- Groundwater was generally fresh (ie EC 501 µS/cm to 561 µS/cm);
- Oxidative conditions were encountered (ie ORP 63 mV to 85 mV);
- Moderate dissolved oxygen levels were observed (ie DO 3.6 mg/L to 5.1 mg/L);
- Groundwater headspace reading were all low (ie <1 ppm);
- Product was not detected in any of the wells (ie <1.2 mm).

10.3 Contaminant Observations

Observations of potential contamination within the bores, test pits and stockpiles are summarised in Table 5 below.

Table 5: Potential Contamination Observations within Bores / Pits / Stockpiles

Potential Contamination Observation	Locations and Depths (m)
Ash	Bores 201 (0.19 m -0.4 m), Pit 303 (0.14 m to 0.3 m), 304 (0.12 m to 0.25 m), Stockpiles A & B
Slag	Bores 202 (0.13 m-0.35 m) and 203 (0.3 m-0.4 m), Pits 302 (0.09 m to 0.8 m), 304 (0.12 m to 0.25 m), 308 (0.3 m to 0.7 m), 309 (0.2 m to 0.4 m),
Asphalt	Bores 201 (0.17 m -0.4 m), 309 (0.2 m to 0.4 m), 310 (0 m to 0.1 m)
Coal	All bores, pits and stockpiles (A to C) within fill except Pit 310 – refer to logs/pits in Appendix A for details and stockpile descriptions in Table 3 above.
Hydrocarbon Odour	Bores 201 (0.4 m to 2.8 m), 202 (4.75 m – 4.85 m).
Concrete, Bricks, Tiles, Glass, Metal, Wood,[1]	Bore Geo1 (2.1 m to 2.3 m), Pits 301 (0 m to 0.65 m), 304 (0.12 m to 0.25 m), 306 (0.15 m to 0.55 m), 308 (0 m to 0.7 m), 309 (0 m to 0.4 m), and all stockpiles (A to C)
Fibre Cement Sheeting Fragments (potential ACM)	Pit 302 (0.09 m to 0.8 m), 307 (surface to unknown depth), 310 (0 m to 0.1 m), Stockpile C
Fill[2]	All bores, pits and stockpiles – refer to logs in Appendix A for details and stockpile descriptions in Table 3 above.

Notes to Table 5:

1 - May contain asbestos due to possible association with building wastes.

2 - Potential presence of a range of contaminants (source unknown)

It is noted that abundant ACM fragments were identified within filling at Pit 307 and within the eastern portion of the site, particularly in the vicinity of the former underground tunnel. ACM was also identified within fill materials in the former car park (Pit 310) and beneath the floor slab or the former Supreme Court (Pit 302) which was undergoing demolition at the time of preparing this report.

The fill materials across the site that were exposed following demolition contained intermixed building rubble including brick, concrete, tile etc. The risk of further ACM in filling is therefore likely to be high due to the occurrence of abundant building rubble and observed ACM at various locations across the site.

The observed bonded ACM was generally in sound condition, consistent with the results of previous investigations. Based on DP observations during periodic inspections on-site, ACM impacts were pre-existing, and there were no obvious indications that ACM impacts had occurred due to demolition activities.

Where bonded ACM sheeting was encountered, the size and number of fragments observed were visually assessed to be at a concentration which would exceed the relevant WA DoH (2009) concentration guidelines (ie 0.04% w/w asbestos for bonded ACM for residential with minimal access to soil) which is equivalent to approximately one 40g fragment per 10L sample).

The results of PID screening on soil samples are shown on the borehole and test pit logs in Appendix A. PID screening generally suggested the absence of gross volatile hydrocarbon impact in the majority of samples tested (ie <10 ppm). PID readings above 10 ppm, however, below 30 ppm were detected as follows:

- Bore 201 between 0.4 m and 1.3 m depth, where a slight to moderate hydrocarbon odour was observed;
- Bore 201 at 7.9 m depth (possible groundwater interface);
- Bore 203 at 9.8 m depth (possible groundwater interface).

The results are still indicative of low volatile hydrocarbon impact.

No observations of gross contamination (ie staining or odours) were observed within groundwater during drilling or during purging and sampling of groundwater wells (refer Table 4 above).

10.4 Field Gas Monitoring

The gas monitoring was undertaken between 14 November 2019 and 7 January 2020. Readings were obtained from boreholes during drilling for the subsurface investigation, post well / casing installation and also within the existing buildings and surrounding grounds within the site. Atmospheric pressure readings were measured between 1015 mb and 1019 mb during the monitoring events.

Tables 6 to 8 provide a summary of the peak results for the monitoring conducted throughout the investigation.

Table 6: Field Gas Monitoring Results from Within Existing Buildings / Surrounding Grounds

Location	Description	Date	Methane Peak %	CO_2 Peak %	O_2 Peak %	H_2S Peak	CO Peak
1	Pit B23	18/12/2019	0	0	20.5	0	0
2	Pit B23 at vent in wall	18/12/2019	0	0	20.5	0	0
3	Book Storage B17	18/12/2019	0	0	20.5	0	0
4	Crack in concrete floor	18/12/2019	0	0	20.5	0	0
5	Back of Pit B20	18/12/2019	0	0	20.7	0	0
6	Sump in B07	18/12/2019	0	0	20.7	0	0
7	Tunnel floor drain	18/12/2019	0	0	20.7	0	0
8	Tunnel floor drain	18/12/2019	0	0	20.7	0	0
9	Domestic violence room floor pit	18/12/2019	0	0	20.7	0	0
10	Domestic violence room floor pit	18/12/2019	0	0	20.7	0	0
11	Service pit	18/12/2019	0	0	20.7	0	0
12	Drain in gym room	18/12/2019	0	0	20.7	0	0
13	Cell 1	18/12/2019	0	0	20.7	0	0
14	Stormwater pit	18/12/2019	0	0	20.7	0	0
15	Excavated pit (footing)	18/12/2019	0	0	20.7	0	0
16	Stormwater pit	18/12/2019	0	0	20.7	0	0
17	Drain in plant room	18/12/2019	0	0	20.7	0	0
18	Court 7	18/12/2019	0	0	20.7	0	0
19	SMH lid rim	18/12/2019	0	0	20.7	0	0
20	PMG pit rim	18/12/2019	0	0	20.7	0	0
21	Stormwater trench edge	18/12/2019	0	0	20.7	0	0
22	Service Pit	18/12/2019	0	0	20.7	0	0
23	SMH	18/12/2019	0	0	20.7	0	0
24	Manhole in Pit B19	18/12/2019	0	0	20.7	0	0
25	Drain in depression	18/12/2019	0	0	20.7	0	0
26	Weephole in retaining wall	18/12/2019	0	0	20.7	0	0

Notes to Table 6:

Test locations shown on Drawing 2, Appendix E

Table 7: Field Gas Monitoring Results During Drilling of Boreholes

Location	Depth of Bore (m)	Date	PID (ppm)	Flow Rate Peak (L/h)	Methane Peak %	CO_2 Peak %	O_2 Peak %	H_2S Peak (ppm)	CO Peak (ppm)
201	10.0	12/12/2019	<1	-	0.1	0.1	20.7	0	0
202	12.0	11/12/2019	<1	-	0	0	20.8	0	0
203	10.0	11/12/2019	<1	-	0	0	20.9	0	0
MS1	81.2	14/11/2019 - 20/11/19	-	-	0.1	0	20.3	0	0
MS2	88.5	22/11/2019	-	-	0.1	0	20.5	0	0
MS4	20.8	21/11/2019	-	-	0.1	0	20.8	0	0

Notes to Table 7:

Monitoring was conducted periodically during drilling at regular depth intervals

Table 8: Field Gas Monitoring Results Post Well/Casing Installation

Location	Depth of Bore (m)	Date	PID (ppm)	Flow Rate Peak [1] (L/h)	Methane Peak %	CO_2 Peak %	O_2 Peak %	H_2S Peak (ppm)	CO Peak (ppm)	GSV = flow x highest Methane or CO_2	CGS [2]
201	10.0	18/12/2019	<1	0.1	0.1	1.1	19	0	8	0.001	1
202	12.0	18/12/2019	1.1	0.2	0.1	1.9	20.5	0	12	0.004	1
203	10.0	18/12/2019	<1	0.1	0	4.9	19.7	0	0	0.005	1
MS1	81.2	18/12/2019	1.1	0.2	0	0.1	19.8	0	0	0.000	1
MS2	88.5	18/12/2019	<1	0.1	0	0	17.8	1	24	0.000	1
MS4	20.8	18/12/2019	<1	0.2	0	7.1	20	0	0	0.014	2
GEO1	14.7	18/12/2019	Not Sealed	0.1	0	0.4	20.1	0	0	0.000	1
GEO2	24.8	18/12/2019	<1	0.3	0	0	20.4	0	2	0.000	1

Notes to Table 8:

1. The flow rate used to calculate the GSV was the detection limit of the instrument for <0.1 L/h readings and negative readings were assumed as the equivalent positive reading as recommended in NSW EPA (2019)
2. Where methane >1% or CO_2 >5% CGS was increased to Situation 2 as per Table 8 of NSW EPA (2019)

As shown in Tables 6, no gas was detected inside the existing buildings. Based on these results, these areas are classified as having a very low to low risk of exposure to ground gases.

Minor concentrations of methane and CO_2 were detected during the drilling of geotechnical and environmental boreholes as part of the subsurface investigation (refer to Table 7). Peak methane values of 0.1% were observed in Bores 201, MS1, MS2 and MS4, while a CO_2 concentration of 0.1% was also detected in Bore 201.The results indicate that there was a very low to low risk of exposure to ground gas during drilling.

Table 8 shows that relatively minor concentrations of gas were detected in boreholes after well/casing installation. CO_2 was found in various concentrations within most bores, with minor detections also being observed for methane and H_2S. The peak flow was detected at 0.3 L/h in Bore Geo2. The landfill gas results indicate generally low landfill gas concentrations and flow rates, with each location being assigned a CGS value of 1 or 2 (Bore MS4 only). Referencing Table 6 in NSW EPA (2019) shows that a CGS rating of 1 to 2 corresponds to a very low to low risk of landfill gas exposure and is typical of natural soils with low to high organic content and 'typical fill' to 'recent deep fill'.

11. Data Quality Assurance and Control

11.1 Data Quality Objectives

The Supplementary DSI has been devised broadly in accordance with the seven step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of NEPC (2013). The DQO process is outlined as follows:

Step 1 - State the Problem

The proposed development involves the demolition of two buildings on the site, changing the original courthouse building to an educational establishment, and construction of two new four-storey buildings. Previous investigations have identified potential sources of soil contamination and groundwater contamination associated with the sites history. The 'problem' to be addressed is that the extent and nature of potential contamination on site is not fully understood. It is unclear whether the site is suitable for the proposed redevelopment and if contamination poses a risk to human health or the environment during and after the redevelopment works. The objective of the supplementary investigation is therefore to characterise the nature and extent of contamination at the site and make recommendations for remediation (where required) to render the site suitable for the proposed redevelopment works. Where required, options for the management or disposal of excess soils from site redevelopment will also be provided.

DP's project team includes a Principal, Project Manager (Senior Associate), field engineers / scientists and drilling subcontractor. The decision makers are the DP Principal and Project Manager (Senior Associate).

Step 2 - Identify the Decision

Based on the site history, including broad scale filling, it is considered that the contaminants of concern are various organic and inorganic compounds impacting on soil, soil vapour, and groundwater, together with possible impacts from ground gases associated with former coal mining (refer to the CSM in Section 8). As such, the analysis will focus on those contaminants relevant to the identified media.

The analytical data for soil will be compared to relevant SAC (refer to Section 14) including HIL, HSL, EIL and ESL for an educational facility with accommodation as per Tables 1A and 1B in Schedule B1, NEPC (2013). The analytical data for groundwater will be compared to GIL relevant to the particular receptors including HSL (petroleum hydrocarbons) as per Table 1C in Schedule B1, NEPC (2013). The nearest receiving water body is considered to be Newcastle Harbour / Newcastle Beach.

The analytical data for soil gas will be compared to relevant GSV, CGS and NEPC (2013) or other relevant guidance, as appropriate.

The suitability of the site for the proposed development will be based on a comparison of the analytical results for all contaminants of concern to the adopted SAC (Section 13). If necessary, results will also be compared to the 95% UCL of the mean concentrations (relevant to soil contamination under certain circumstances).

The following specific decisions will be made, as appropriate:

- What is the conceptual site model (ie sources, receptors, migration pathways, exposure)?;
- Do the existing fill materials and/or natural soils pose a potential risk to identified receptors?;
- Does the existing groundwater beneath the site pose a potential risk to identified receptors?;
- Does the existing soil gas/soil vapour beneath the site pose a potential risk (toxic, explosion or asphyxiation) to identified receptors?;
- Is the data sufficient to make a decision regarding the abovementioned risks, the compatibility of the site for the proposed development or are additional investigations required?;
- Are there any off-site migration issues that need to be considered?;

- What are the waste management requirements for excess soils associated with the development?;
- Is the data sufficient to enable the preparation of a Remediation Action Plan (RAP) and/or Environmental Management Plan (EMP) should the data suggest these are required?

Step 3 - Identify the Inputs to the Decision

Inputs into the decisions are as follows:

- Collection and review of site history information including information regarding previous and current activities undertaken on the site and the surrounding areas;
- Review of previous investigations undertaken;
- Regional geology, topography, ASS risk mapping and hydrogeology;
- Soil, soil gas and groundwater samples will be collected at a combination of targeted and grid-based sampling patterns and analysed for the relevant contaminants of concern;
- Field screening of ground gases will be conducted during drilling using a calibrated GEM 2000 Plus or GA5000 landfill gas meter, together with screening for potential volatile organic compounds (ie soil vapour and groundwater headspace using a PID);
- The lithology of the site as described in the borehole logs;
- If site conditions suggest additional contaminants of concern, eg if the condition of subsurface material encountered whilst drilling encounter particular odours, further analysis may be undertaken;
- Field and laboratory QA/QC data to assess the suitability of the environmental data for the assessment;
- All analysis undertaken at a NATA accredited laboratory; and
- The results will be compared with the SAC and GIL, GSV and CGS criteria discussed below.

Step 4 - Define the Boundary of the Assessment

The study boundary is as shown on Drawing 1, Appendix E and described in Section 2.

Step 5 - Develop a Decision Rule

The information obtained during the assessment will be used to characterise the site in terms of contamination issues and risk to human health and/or the environment. The decision rules used in characterising the site will be as follows:

- Laboratory test results for fill/soil will be assessed individually or statistically, if considered appropriate, to determine the 95% UCL of the mean concentration for each analyte or analyte group (of like materials);
- Laboratory test results for targeted locations (and identified ‘hot spots’) will be assessed individually;
- The adopted SAC and GIL, GSV and CGS will be from NSW EPA endorsed guidelines;
- Where such criteria are not available, other recognised national or international standards will be used;

- The contaminant concentrations in fill / soil should meet the following criteria, or further investigation or remedial action is required if:
  - The concentration of the contaminant is more than 2.5 times the SAC. Any location more than 2.5 times the adopted site criteria is classified as a 'hotspot', requiring further assessment / management; and
  - The calculated 95% UCL for a relevant area and discrete impacted fill/soil stratum (excluding any 'hotspot' concentrations) exceeds the adopted SAC;
  - The standard deviation of the results is greater than 50% of the SAC;
- The groundwater will not be considered significantly impacted by a particular contaminant if there is no notable or significant increase in background concentrations and/or there are no analyte concentrations in the groundwater samples significantly exceeding the adopted GIL;
- Further investigation, remediation and/or management will be recommended if the site is found to be contaminated or containing contamination 'hot spots' or significantly impacted groundwater; and
- The landfill gas data will be evaluated in the context of relevant GSV and CGS and the degree of impact will inform proposed gas mitigations (if required).

Field and laboratory test results will be considered useable for the assessment after evaluation against the following data quality indicators (DQIs):

Table 9: Data Quality Indicators

DQI	Frequency	Data Acceptance Criteria
Completeness		
Field documentation correct	All samples	All samples
Soil bore / pit logs complete and correct	All samples	All samples
Suitably qualified and experience sampler	All samples	All samples
Appropriate lab methods and limits of reporting (LORs)	All samples	All samples
Chain of custodies (COCs) completed appropriately	All samples	All samples
Sample holding times complied with	All samples	All samples
Proposed/critical locations sampled	-	Proposed/critical locations sampled
Comparability		
Consistent standard operating procedures for collection of each sample. Samples should be collected, preserved and handled in a consistent manner	All samples	All samples
Experienced sampler	All samples	All samples
Consistent analytical methods, laboratories and units	All samples	All samples
Representativeness		
Sampling appropriate for media and analytes (appropriate collection, handling and storage)	All samples	All Samples
Samples homogenous	All samples	All Samples
Samples extracted and analysed within recommended holding times	All samples	-

Table 9: Data Quality Indicators (continued)

DQI	Frequency	Data Acceptance Criteria
Precision		
Blind duplicates (intra-laboratory duplicates)	1 per 20 samples	30% RPD, then review RPDs >30% would be reviewed in relation to heterogeneity of sample and LOR
Split duplicates (inter-laboratory duplicates)	1 per 20 samples	30% RPD, then review RPDs >30% would be reviewed in relation to heterogeneity of sample and LOR
Laboratory duplicates	1 per 20 samples	<20% RPD Result > 20 × LOR <50% RPD Result 10-20 × LOR No Limit when RPD Result <10 × LOR
Accuracy		
Trip blanks	1 per sampling event (as required)	COPCs<LOR
Trip Spikes	1 per sampling event (as required)	70-130%
Surrogate spikes	All organic samples	50-150%
Matrix spikes	1 per 20 samples	70-130% (inorganics) 60-140% (organics)
Laboratory control samples	1 per 20 samples	70-130% (inorganics) 60-140% (organics)
Method blanks	1 per 20 samples	<LOR

Step 6 - Specify Acceptable Limits on Decision Errors

Considering the future site use / development, decision errors for the respective contaminants of concern for fill / soil are:

1. Deciding that the sites fill / soil exceeds the SAC when they truly do not; and
2. Deciding that the sites fill / soils are within the SAC when they are truly not.

Considering that the assessment of groundwater is intended to determine if there is impact on groundwater quality, the decision errors for the contaminants of concern are:

1. Deciding that the groundwater quality exceeds the GIL when it truly does not; and
2. Deciding that the groundwater quality is within the GIL when it truly is not.

Decision errors for the proposed assessment will be minimised and measured by the following:

- Compare new data with available previous investigations to determine the possible range of the parameters of interest;

- The sampling regime will target key strata identified to account for site variability;
- Sample collection and handling techniques will be with reference to DPs Field Procedures Manual;
- Samples will be prepared and analysed by a NATA accredited laboratory with the acceptance limits for laboratory QA/QC parameters based on the laboratory reported acceptance limits and those stated in NEPC (2013);
- The analyte selection is based on the available site history, past site activities, site features and the findings of the previous investigations. The potential for contaminants other than those proposed to be analysed is currently considered to be low;
- The SAC, GIL, GSV, and CGS will be adopted from established and EPA endorsed guidelines where available. The SAC, GIL, GSV and CGS have risk probabilities already incorporated;
- A significance level of 0.05 will be adopted for data with statistical analysis of 95% UCL of average concentrations; and
- Only NATA accredited laboratories using NATA endorsed methods will be used to perform laboratory analysis. Where NATA endorsed methods are not used, the reasons will be stated. The effect of using non-NATA methods (if relevant) on the decision making process will be explained.

Step 7 - Optimise the Design for Obtaining Data

Sampling design and procedures that will be implemented to optimise data collection for achieving the DQOs included the following:

- Only NATA accredited laboratories using NATA endorsed methods are used to perform laboratory analysis whenever possible;
- Grid based soil sampling (within access constraints) will generally be used to provide representative coverage of the site where feasible given constraints with the construction process;
- Where possible, targeted samples will be incorporated into the grid based sampling;
- To optimise the selection of soil samples for chemical analysis, samples collected will be screened using a calibrated PID allowing for site assessment and sample selection. In addition, additional soil samples will be collected but kept ‘on hold’ pending details of initial analysis and will be analysed if further delineation is required; and
- Adequately experienced environmental scientists / engineers will be chosen to conduct field work and sample analysis interpretation.

12. Quality Assurance/Quality Control

12.1 Field QA/QC

DP’s QA/QC procedures were adopted throughout the field sampling programme.

Regular collection of duplicate / replicate samples were undertaken during field sampling. Accuracy and precision were assessed through the analysis of 10% field duplicate / replicate samples. Two trip spikes and two trip blanks were also analysed.

Appropriate procedures were undertaken to minimise the potential for cross contamination. Field QA/QC procedures included the following:

- Standard operating procedures are followed;
- Site safety and environmental plans are developed prior to commencement of works;
- Duplicate or replicate field samples are collected and analysed;
- Trip spike and blank samples were used during field work and sample transport, and analysed as part of field sample analysis;
- Samples were stored under secure, temperature controlled conditions;
- Chain of custody documentation is employed for the handling, transport and delivery of samples to the selected laboratory.

12.1.1 Laboratory QA/QC

The NATA accredited chemical laboratory will undertake in-house QA/QC procedures, generally involving the routine testing of:

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

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

13. Laboratory Testing

13.1 Analytical Programme

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

Soil

A total of 27 soil samples (including three QA/QC soil samples) were selected from Bores 201 to 203, MS4, Pits 301to 310 and Stockpile B to provide an assessment of soil / fill conditions. The samples were selected to target the identified contaminants of concern (see Section 8). The fill / soil samples were analysed for a range of the following potential contaminants:

- Metals: Aluminium (Al), Antimony (Sb), Arsenic (As), Boron (B), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb); Magnesium (Mg), Manganese (Mn), Mercury (Hg), Nickel (Ni), Selenium (Se), Tim (Sn), Zinc (Zn);
- Total Recoverable Hydrocarbons (TRH);
- Benzene, Toluene, Ethyl Benzene, Xylene (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAH);

- Polychlorinated Biphenyls (PCBs);
- Organochlorine (OC) and Organophosphorous (OP) Pesticides;
- Total Phenolics;
- Volatile Organic Compounds (VOCs);
- Asbestos Identification.

QA/QC has comprised analysis of two replicate and one triplicate soil sample. The results of QA/QC testing are presented in Appendix D.

Following the receipt of total contaminant test results additional leachability testing was conducted as follows:

- Acid leachability testing (TCLP) for waste classification purposes on three selected soil samples;
- Water leachability testing (ASLP) to assess leachability characteristics on one selected soil sample.

In addition to the above soil analysis, six fibro fragments (F1, F2, 302/F1, 307/F1, 307/F2 and 310/F1) were analysed for asbestos and two asphalt samples (MS4/0.02 and 203/0-0.05) were analysed for coal tar identification.

Groundwater

A total of five groundwater samples (including tow QA/QC samples) were collected and analysed to provide an assessment of groundwater conditions.

The groundwater samples were analysed for the following potential contaminants:

- Metals: Aluminium (Al), Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Iron (Fe), Lead (Pb); Mercury (Hg), Manganese (Mn), Nickel (Ni), Selenium (Se), Zinc (Zn), ;
- Total Recoverable Hydrocarbons (TRH);
- Benzene, Toluene, Ethyl Benzene, Xylene (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAH) (Low Level);
- Volatile Organic Compounds (VOCs);
- Total Phenolics.

QA/QC testing has comprised analysis of one replicate groundwater sample, one triplicate groundwater sample, one trip spike and one trip blank. The results of QA/QC testing are presented in Appendix D.

13.2 Analytical Results

13.2.1 Contamination Testing

The results of chemical analysis undertaken on soil samples including previous soil analysis results (Prensa, 2016) are summarised in Table 10 and Table 11 with comparison to the adopted SAC (Refer to Section 14) for contamination and waste classification respectfully.

The results of leachability analysis undertaken on soil samples to assess waste classification are summarised in Table 12.

The results of chemical analysis undertaken on groundwater samples are summarised in Table 13.

Table 10: Results of Chemical Analysis of Soil (Contamination)

Analyte	Units	PQL	NSW EPA 2014 - General Solid Waste CT1 (No TCLP)	NSW EPA 2014 - Restricted Solid Waste CT2 (No TCLP)	CRC Care Direct Contact HSL-B	CRC Care Direct Contact Intrusive Maintenance Worker	CRC Care Intrusive MW Soil HSL Vapour Sand 0-2m	2-4m	>4m	NEPM 2013 Table 1A(1) HILs Res B Soil	NEPM 2013 Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m	1-2m	2-4m	>4m	NEPM 2013 ESLs Res/Open Space Aged	NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil	NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil
Field_ID																	
LocCode																	
Fill (F) / Natural (N)																	
Sample																	
Depth																	
Sample Date																	
[Coal Tar Identification	-																
Metals																	
Aluminium	mg/kg	10															
Antimony	mg/kg	7															
Arsenic	mg/kg	4	100	400						500					100		
Boron	mg/kg	3								40000							
Cadmium	mg/kg	0.4	20	80						150							
Chromium (III+VI)	mg/kg	1	100	400						500					190		
Cobalt	mg/kg	1								600							
Copper	mg/kg	1								30000					55		
Iron	mg/kg	10															
Lead	mg/kg	1	100	400						1200					1100		
Magnesium	mg/kg	10															
Manganese	mg/kg	1								14000							
Mercury	mg/kg	0.1	4	16						120							
Nickel	mg/kg	1	40	160						1200					9		
Selenium	mg/kg	2	20	80						1400							
Tin	mg/kg	1															
Zinc	mg/kg	1								60000					150		
TPH																	
C10-C16	mg/kg	50			4200	62000										1000	
C16-C34	mg/kg	100			5800	85000									300	2500	
C34-C40	mg/kg	100			8100	120000									2800	10000	
F2-NAPHTHALENE	mg/kg	50					NL	NL	NL		110	240	440	NL	130		
C6 - C9	mg/kg	25	650	2600							<25	<25	<25	<25			
C10 - C14	mg/kg	50									<50	<50	<50	<50			
C15 - C28	mg/kg	100									<100	<100	<100	<100			
C29-C36	mg/kg	100									<100	<100	<100	<100			
>C10 - C36 (Sum of total)	mg/kg	100	10000	40000							<250	<250	<250	<250			
C10 - C40 (Sum of total)	mg/kg	50									<50	<50	<50	<50			
C6-C10 less BTEX (F1)	mg/kg	25					NL	NL	NL		45	70	110	200		180	
C6 C10	mg/kg	25			5600	82000					<25	<25	<25	<25			700
BTEX																	
Benzene	mg/kg	0.2	10	40	140	1100	77	160	NL		0.5	0.5	0.5	0.5		50	
Ethylbenzene	mg/kg	1	600	2400	5900	85000	NL	NL	NL		55	NL	NL	NL		70	
Toluene	mg/kg	0.5	288	1152	23000	120000	NL	NL	NL		160	220	310	540		85	
Xylene (m & p)	mg/kg	2									<2	<2	<2	<2			
Xylene (o)	mg/kg	1									<1	<1	<1	<1			
Xylene Total	mg/kg	3	1000	4000	17000	130000	NL	NL	NL		40	60	95	170		105	
MAH																	
1,2,4-trimethylbenzene	mg/kg	1															
1,3,5-trimethylbenzene	mg/kg	1															
Isopropylbenzene	mg/kg	1															
n-butylbenzene	mg/kg	1															
n-propylbenzene	mg/kg	1															
p-isopropyltoluene	mg/kg	1															
sec-butylbenzene	mg/kg	1															
Styrene	mg/kg	1	60	240													
tert-butylbenzene	mg/kg	1															
Chlorinated Hydrocarbons																	
1,1,1,2-tetrachloroethane	mg/kg	1	200	800													
1,1,1-trichloroethane	mg/kg	1	600	2400													
1,1,2,2-tetrachloroethane	mg/kg	1	26	104													
1,1,2-trichloroethane	mg/kg	1	24	96													
1,1-dichloroethene	mg/kg	1															
1,1-dichloroethene	mg/kg	1	14	56													
1,1-dichloropropene	mg/kg	1															
1,2,3-trichloropropane	mg/kg	1															
1,2-dibromo-3-chloropropane	mg/kg	1															
1,2-dichloroethane	mg/kg	1	10	40													
1,2-dichloropropane	mg/kg	1															
1,3-dichloropropane	mg/kg	1															
2,2-dichloropropane	mg/kg	1															
Bromochloromethane	mg/kg	1															
Bromodichloromethane	mg/kg	1															
Bromoform	mg/kg	1															
Carbon tetrachloride	mg/kg	1	10	40													
Chlorodibromomethane	mg/kg	1															
Chloroethane	mg/kg	1															
Chloroform	mg/kg	1	120	480													
Chloromethane	mg/kg	1															
cis-1,2-dichloroethene	mg/kg	1															
cis-1,3-dichloropropene	mg/kg	1															
Dibromomethane	mg/kg	1															
Hexachlorobutadiene	mg/kg	1															
Trichloroethene	mg/kg	1	10	40													
Tetrachloroethene	mg/kg	1	14	56													
trans-1,2-dichloroethene	mg/kg	1															
trans-1,3-dichloropropene	mg/kg	1															
Vinyl chloride	mg/kg	1	4	16													
Halogenated Hydrocarbons																	
1,1-dibromoethane	mg/kg	1															
Bromomethane	mg/kg	1															
Dichlorodifluoromethane	mg/kg	1															
Trichlorofluoromethane	mg/kg	1															
Halogenated Benzenes																	
1,2,3-trichlorobenzene	mg/kg	1															
1,2,4-trichlorobenzene	mg/kg	1															
1,2-dichlorobenzene	mg/kg	1	86	344													
1,3-dichlorobenzene	mg/kg	1															
1,4-dichlorobenzene	mg/kg	1	150	600													
2-chlorotoluene	mg/kg	1															
4-chlorotoluene	mg/kg	1															
Bromobenzene	mg/kg	1															
Chlorobenzene	mg/kg	1	2000	8000													
Hexachlorobenzene	mg/kg	0.1								15							
Solvents																	
Cyclohexane	mg/kg	1															
PAH/Phenols																	
Total Positive PAHs	mg/kg	0.05	200	800						400							
Acenaphthene	mg/kg	0.1															
Acenaphthylene	mg/kg	0.1															
Anthracene	mg/kg	0.1															
Benz(a)anthracene	mg/kg	0.1															
Benzo(a) pyrene	mg/kg	0.05	0.8	3.2											33		
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.5								4							
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.5								4							
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.5								4							
Benzo(b, j+k)fluoranthene	mg/kg	0.2															
Benzo(g,h,i)perylene	mg/kg	0.1															
Chrysene	mg/kg	0.1															
Dibenz(a,h)anthracene	mg/kg	0.1															
Fluoranthene	mg/kg	0.1															
Fluorene	mg/kg	0.1															
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1															
Naphthalene	mg/kg	0.1			2200	29000	NL	NL	NL		3	NL	NL	NL	170		
Phenanthrene	mg/kg	0.1															
Phenolics Total	mg/kg	5	288	1152						130							
Pyrene	mg/kg	0.1															
Polychlorinated biphenyls																	
PCBs (Sum of total)	mg/kg	0.1	49.9999	49.9999						1							
Arochlor 1016	mg/kg	0.1															
Arochlor 1221	mg/kg	0.1															
Arochlor 1232	mg/kg	0.1															
Arochlor 1242	mg/kg	0.1															
Arochlor 1248	mg/kg	0.1															
Arochlor 1254	mg/kg	0.1															
Arochlor 1260	mg/kg	0.1															
Organochlorine pesticides																	
Endosulfan	mg/kg		60	240						400							
4,4-DDE	mg/kg	0.1															
a-BHC	mg/kg	0.1															
Aldrin	mg/kg	0.1															
Aldrin + Dieldrin	mg/kg									10							
b-BHC	mg/kg	0.1															
Chlordane (cis)	mg/kg	0.1															
Chlordane (trans)	mg/kg	0.1															
d-BHC	mg/kg	0.1															
DDD	mg/kg	0.1															
DDT	mg/kg	0.1													180		
DDT+DDE+DDD	mg/kg	0.1								600							
Dieldrin	mg/kg	0.1															
Endosulfan I	mg/kg	0.1															
Endosulfan II	mg/kg	0.1															
Endosulfan sulphate	mg/kg	0.1															
Endrin	mg/kg	0.1								20							
Endrin aldehyde	mg/kg	0.1															
g-BHC (Lindane)	mg/kg	0.1															
Heptachlor	mg/kg	0.1								10							
Heptachlor epoxide	mg/kg	0.1															
Methoxychlor	mg/kg	0.1								500							
Organophosphorous Pesticides																	
Azinophos-methyl	mg/kg	0.1															
Bromophos-ethyl	mg/kg	0.1															
Chlorpyrifos	mg/kg	0.1	4	16						340							
Chlorpyrifos-methyl	mg/kg	0.1															
Diazinon	mg/kg	0.1															
Dichlorvos	mg/kg	0.1															
Dimethoate	mg/kg	0.1															
Ethion	mg/kg	0.1															
Fenitrothion	mg/kg	0.1															
Malathion	mg/kg	0.1															
Parathion	mg/kg	0.1															
Ronnel	mg/kg	0.1															
Pesticides																	
Moderately Harmful Pesticides (total)	mg/kg		250	1000													
Pesticides (total, NSW Waste 2014)	mg/kg																
Scheduled chemicals (NSW Waste 2014)	mg/kg		49.999	49.999													
Asbestos																	
Asbestos Identification	g/kg	0.1								D							

Field_ID	301/0.9-1.2	201/7.9	202/4.8	202/7.0	203/0-0.05	203/0.5	03-11/12/19	M54 / 0.02	M54 / 0.2	F1	F2	301/0.05	301/0.2	301/0.4	03 - 3-3-20	T2 -3-3-20	301/0.7	302/F1	302/0.3	303/0.2	304/0.2	306/0.5	307/F1	307/F15	307/F2	307/F25	308/0.1	309/0.3	309/0.5	310/F1	310/0.2	51	52	SS499_BH1	SS499_BH4	SS499_BH5	SS499_BH6	SS499_BH7	SS499_BH8	SS499_BH9	SS499_BH10
LocCode	201	201	202	202	203	203	203	M54	M54	F1	F2	301	301	301	301	301	301	301	302	303	304	306	307	307	307	307	308	309	309	310	310	Stockpile B	Stockpile B	BH1	BH4	BH5	BH6	BH7	BH8	BH9	BH10
Fill (F) / Natural (N)	F	N	N	N	Asphalt	N	N	Asphalt	F	Material	Material	F	F	F	F	F	F	N	F	F	F	N	F	F	F	F	F	F	N	F	N	F	F	F	F	F	F	F	F	F	F
Sample	0.9-1.2	7.9	4.8	7	0-0.05	0.5	0.5	0.02	0.2	Surface	Surface	0.05	0.2	0.4	0.4	0.4	0.7	0.5	0.3	0.2	0.2	0.5					0.1	0.3	0.5	0.05	0.2			0.3	0.5	0.1	0.5	0.1	0.1	0.1	0.6	0.4
Depth																																								
Sample Date	12/12/2019	12/12/2019	11/12/2019	11/12/2019	11/12/2019	11/12/2019	11/12/2019	19/11/2019	19/11/2019	22/11/2019	22/11/2019	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	12/03/2020	12/03/2020	22/09/2016	22/09/2016	22/09/2016	22/09/2016	22/09/2016	22/09/2016	22/09/2016	22/09/2016
[Coal Tar Identification	-	-	-	-	ND	-	-	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																																									
Aluminium	5000	7000	9000	8900	-	7000	6400	-	-	-	-	5000	5400	3300	2700	3320	1400	-	3400	11000	2600	18000	-	-	-	-	5700	5800	9500	-	9400	10000	6600	-	-	-	-	-	-	-	-	-
Antimony	<7	<7	<7	<7	-	<7	<7	-	-	-	-	<7	<7	<7	<7	<5	<7	-	<7	<7	<7	<7	-	-	-	-	<7	<7	<7	-	<7	<7	<7	-	-	-	-	-	-	-	-	-
Arsenic	<4	5	10	<4	-	24	14	-	<4	-	-	<4	<4	<4	<4	<4	<5	<4	-	<4	5	<4	10	-	-	-	-	<4	7	6	-	5	8	5	5	<4	7	<4	<4	<4	4	5
Boron	<5	<3	<3	<3	-	<3	<3	-	-	-	-	5	<3	<3	<3	<50	<3	-	<3	<3	<3	<3	-	-	-	-	4	<3	4	-	<3	<3	<3	-	-	-	-	-	-	-	-	-
Cadmium	<0.4	<0.4	<0.4	<0.4	-	<0.4	2	-	<0.4	-	-	1	1	<0.4	<0.4	<1	<0.4	-	<0.4	<0.4	<0.4	<0.4	-	-	-	-	<0.4	<0.4	<0.4	-	<0.4	<0.4	<0.4	<0.4	<0.4	2	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium (III+VI)	4	9	12	11	-	7	10	-	24	-	-	21	15	7	5	7	2	-	4	12	4	23	-	-	-	-	11	9	12	-	15	11	7	9	9	27	10	17	18	9	22
Cobalt	1	4	<1	2	-	1	3	-	-	-	-	4	5	1	1	<2	<1	-	2	2	2	<1	-	-	-	-	3	11	15	-	<1	2	<1	-	-	-	-	-	-	-	-	-
Copper	7	17	27	41	-	29	46	-	23	-	-	170	140	26	16	26	8	-	15	32	15	3	-	-	-	-	30	18	360	-	<1	14	7	19	17	420	10	65	20	39	9
Iron	4900	15,000	28,000	27,000	-	11,000	11,000	-	-	-	-	8500	8700	6000	5500	6660	2700	-	8400	14000	4600	36000	-	-	-	-	7800	17000	19000	-	17000	23000	14000	-	-	-	-	-	-	-	-	-
Lead	6	16	9	12	-	100	240	-	4	-	-	770	670	190	54	163	14	-	75	68	44	10	-	-	-	-	19	50	180	-	5	44	22	58	40	1400	8	38	25	70	14
Magnesium	1500	1700	820	1700	-	510	920	-	-	-	-	1500	1200	610	490	500	270	-	310	410	260	780	-	-	-	-	1800	1700	2100	-	380	1200	600	-	-	-	-	-	-	-	-	-
Manganese	60	81	15	43	-	64	130	-	-	-	-	260	290	60	34	56	19	-	140	130	53	6	-	-	-	-	270	500	1100	-	3	580	210	-	-	-	-	-	-	-	-	-
Mercury	<0.1	<0.1	<0.1	<0.1	-	0.2	0.2	-	<0.1	-	-	0.3	0.4	1.4	0.3	0.3	<0.1	-	<0.1	<0.1	<0.1	<0.1	-	-	-	-	<0.1	<0.1	0.2	-	<0.1	0.2	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	<0.1
Nickel	3	9	1	8	-	5	8	-	18	-	-	10	9	5	3	5	1	-	4	5	3	2	-	-	-	-	6	13	11	-	<1	4	2	4	4	15	4	16	19	7	3
Selenium	<3	<2	<3	<3	-	<2	<2	-	-	-	-	<2	<2	<2	<2	<5	<2	-	<2	<2	<2	<4	-	-	-	-	<2	<2	<2	-	<2	<2	<2	-	-	-	-	-	-	-	-	-
Tin	<1	<1	<1	<1	-	6	6	-	-	-	-	3	3	1	<1	<5	<1	-	1	1	<1	<1	-	-	-	-	<1	<1	3	-	<1	3	1	-	-	-	-	-	-	-	-	-
Zinc	15	120	12	49	-	170	500	-	34	-	-	620	470	110	39	150	14	-	89	50	46	4	-	-	-	-	58	85	280	-	2	58	31	48	39	1100	35	210	75	85	13
TPH																																									
C10-C16	<50	<50	<50	<50	-	<50	<50	-	<50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34	<100	<100	<100	<100	-	<100	290	-	300	-	-	-	190	-	-	-	-	-	-	<100	<100	<100	<100	-	-	-	-	<100	<100	220	-	<100	<100	<100	120	<100	240	<100	<100	<100	340	<100
C34-C40	<100	<100	<100	<100	-	<100	<100	-	110	-	-	-	<100	-	-	-	-	-	-	<100	<100	<100	<100	-	-	-	-	<100	<100	150	-	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
F2-NAPHTHALENE	<50	<50	<50	<50	-	<50	<50	-	<50	-	-	-	<50	-	-	-	-	-	-	<50	<50	<50	<50	-	-	-	-	<50	<50	<50	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C6 - C9	<25	<25	<25	<25	-	<25	<25	-	<25	-	-	-	<25	-	-	-	-	-	-	<25	<25	<25	<25	-	-	-	-	<25	<25	<25	-	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
C10 - C14	<50	<50	<50	<50	-	<50	<50	-	<50	-	-	-	<50	-	-	-	-	-	-	<50	<50	<50	<50	-	-	-	-	<50	<50	<50	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15 - C28	<100	<100	<100	<100	-	<100	210	-	240	-	-	-	120	-	-	-	-	-	-	<100	<100	<100	<100	-	-	-	-	<100	<100	130	-	<100	<100	<100	<100	<100	160	<100	<100	<100	<100	<100
C29-C36	<100	<100	<100	<100	-	<100	110	-	130	-	-	-	100	-	-	-	-	-	-	<100	<100	<100	<100	-	-	-	-	<100	<100	130	-	<100	<100	<100	<100	<100	120	<100	<100	<100	<100	<100
>C10 - C36 (Sum of total)	<250	<250	<250	<250	-	<250	345	-	395	-	-	-	245	-	-	-	-	-	-	<250	<250	<250	<250	-	-	-	-	<250	<250	285	-	<250	<250	<250	<250	<250	305	<250	<250	<250	395	<250
C10 - C40 (Sum of total)	<50	<50	<50	<50	-	<50	290	-	410	-	-	-	190	-	-	-	-	-	-	<50	<50	<50	<50	-	-	-	-	<50	<50	360	-	<50	<50	<50	-	-	-	-	-	-	-	-
C6-C10 less BTEX (F1)	<25	<25	<25	<25	-	<25	<25	-	<25	-	-	-	<25	-	-	-	-	-	-	<25	<25	<25	<25	-	-	-	-	<25	<25	<25	-	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
C6 C10	<25	<25	<25	<25	-	<25	<25	-	<25	-	-	-	<25	-	-	-	-	-	-	<25	<25	<25	<25	-	-	-	-	<25	<25	<25	-	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
BTEX																																									
Benzene	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	-	-	-	<0.2	-	-	-	-	-	-	<0.2	<0.2	<0.2	<0.2	-	-	-	-	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	<1	<1	<1	<1	-	<1	<1	-	<1	-	-	-	<1	-	-	-	-	-	-	<1	<1	<1	<1	-	-	-	-	<1	<1	<1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	-	-	-	-	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	<2	<2	<2	<2	-	<2	<2	-	<2	-	-	-	<2	-	-	-	-	-	-	<2	<2	<2	<2	-	-	-	-	<2	<2	<2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Xylene (o)	<1	<1	<1	<1	-	<1	<1	-	<1	-	-	-	<1	-	-	-	-	-	-	<1	<1	<1	<1	-	-	-	-	<1	<1	<1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Xylene Total	<3	<3	<3	<3	-	<3	<3	-	<3	-	-	-	<3	-	-	-	-	-	-	<3	<3	<3	<3	-	-	-	-	<3	<3	<3	-	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
MAH																																									
1,2,4-trimethylbenzene	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,3,5-trimethylbenzene	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Isopropylbenzene	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
n-butylbenzene	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
n-propylbenzene	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
p-isopropyltoluene	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
sec-butylbenzene	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Styrene	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
tert-butylbenzene	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Chlorinated Hydrocarbons																																									
1,1,1,2-tetrachloroethane	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,1,1-trichloroethane	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,1,2,2-tetrachloroethane	<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,1,2-trichloroethane

Table 11: Results of Chemical Analysis of Soil (Waste Classification)

Analyte	Units	PQL	NSW EPA 2014 - General Solid Waste CT1 (No TCLP)	NSW EPA 2014 - Restricted Solid Waste CT2 (No TCLP)	ENM RRO Max Avg	ENM RRO Abs Max	Field_ID	201/0.9-1.2	202/7.9	202/4.8	202/7.0	203/0-0.05	203/0.5	D3	MS4 / 0.02	MS4 / 0.2	F1	F2	301/0.05	301/0.2	301/0.4	D3 - 3-3-20	T2 -3-3-20	301/0.7	302/F1	302/0.3	303/0.2	304/0.2	306/0.5	307/F1	307/F2	307/F25	308/0.1	309/0.3	309/0.5	310/F1	310/0.2	S1	S2	SS499_BH1	SS499_BH4	SS499_BH5	SS499_BH6	SS499_BH7	SS499_BH8	SS499_BH9	SS499_BH10
							LocCode	201	201	202	202	203	203	203	MS4	MS4	F1	F2	301	301	301	301	301	301	302	302	303	304	306	307	307	307	308	309	309	310	310	Stockpile B	Stockpile B	BH1	BH4	BH5	BH6	BH7	BH8	BH9	BH10
							Fill (F) / Natural (N)	F	N	N	N	Asphalt	N	N	Asphalt	F	Material	Material	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	N	F	N	F	F	F	F	F	F	F	F	F	F	F
							Sample Depth	0.9-1.2	7.9	4.8	7	0-0.05	0.5	0.5	0.02	0.2	Surface	Surface	0.05	0.2	0.4	0.4	0.4	0.7	0.5	0.3	0.2	0.2	0.5				0.1	0.3	0.5	0.05	0.2			0.3	0.5	0.1	0.5	0.1	0.1	0.1	0.6	0.4
							Sample Date	12/12/2019	12/12/2019	11/12/2019	11/12/2019	11/12/2019	11/12/2019	11/12/2019	19/11/2019	05/11/2019	22/11/2019	22/11/2019	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	1/03/2020	12/03/2020	12/03/2020	22/09/2016	22/09/2016	22/08/2016	22/09/2016	22/08/2016	22/09/2016	22/08/2016	22/09/2016
Coal Tar Identification	-	-	-	-	-	-	-	-	-	-	-	ND	-	-	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																																														
Aluminium	mg/kg	10						5000	7000	9000	8900	-	7000	6400	-	-	-	-	5000	5400	3300	2700	3320	1400	-	3400	11000	2600	18000	-	-	-	5700	5800	9500	-	9400	10000	6600	-	-	-	-	-	-	-	-
Antimony	mg/kg	5						<7	<7	<7	<7	-	<7	<7	-	-	-	-	<7	<7	<7	<7	<5	<7	-	<7	<7	<7	<7	-	-	-	<7	<7	<7	-	<7	<7	<7	-	-	-	-	-	-	-	-
Arsenic	mg/kg	4	100	400	20	40		<4	5	30	<4	-	24	14	-	<4	-	-	<4	<4	<4	<4	<5	<4	-	<4	5	<4	10	-	-	-	<4	7	6	-	5	8	5	5	<4	7	<4	<4	<4	4	5
Boron	mg/kg	3						<5	<3	<3	<3	-	<3	<3	-	-	-	-	5	4	<3	<3	<3	<3	-	<3	<3	<3	4	-	-	-	4	<3	4	-	<3	<3	<3	-	-	-	-	-	-	-	-
Cadmium	mg/kg	0.4	20	80	0.5	1		<0.4	<0.4	<0.4	<0.4	-	<0.4	2	-	-	-	-	1	1	<0.4	<0.4	<0.4	<0.4	-	<0.4	<0.4	<0.4	<0.4	-	-	-	<0.4	<0.4	<0.4	-	<0.4	<0.4	<0.4	2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium (trivvi)	mg/kg	1	100	400	75	150		4	9	12	11	-	7	30	-	24	-	-	21	15	7	5	7	2	-	6	12	4	23	-	-	-	11	9	12	-	15	11	7	9	8	27	10	27	18	9	22
Cobalt	mg/kg	1						1	4	<1	2	-	1	3	-	-	-	-	4	5	1	1	<2	<1	-	2	2	2	<1	-	-	-	3	11	15	-	<1	2	<1	-	-	-	-	-	-	-	-
Copper	mg/kg	1			100	200		7	17	27	41	-	39	46	-	23	-	-	170	140	26	16	26	8	-	15	30	15	3	-	-	-	30	18	360	-	<1	14	7	19	17	420	10	65	20	39	9
Iron	mg/kg	10						4900	15,000	26,000	27,000	-	11,000	11,000	-	-	-	-	8500	8700	6000	5500	6660	2700	-	8400	14000	4600	36000	-	-	-	7800	17000	13000	-	17000	23000	14000	-	-	-	-	-	-	-	-
Lead	mg/kg	1	100	400	50	100		6	16	9	9	-	24	7	-	4	-	-	170	170	130	54	310	14	-	75	38	44	10	-	-	-	33	50	180	-	5	44	22	58	40	1400	18	38	25	70	14
Magnesium	mg/kg	10						1500	1700	820	1700	-	510	920	-	-	-	-	1500	1200	610	490	500	270	-	310	410	260	780	-	-	-	1800	1700	2100	-	380	1300	650	-	-	-	-	-	-	-	-
Manganese	mg/kg	1						60	81	35	41	-	54	130	-	-	-	-	260	270	60	34	56	19	-	140	130	51	6	-	-	-	270	500	1100	-	3	580	210	-	-	-	-	-	-	-	-
Mercury	mg/kg	0.1	4	16	0.5	1		<0.1	<0.1	<0.1	<0.1	-	0.2	0.2	-	<0.1	-	-	0.3	0.4	1.4	0.3	0.3	<0.1	-	0.2	0.2	<0.1	<0.1	-	-	-	<0.1	0.2	0.1	-	<0.1	0.2	0.1	0.2	<0.1	<0.1	<0.1	0.4	<0.1
Nickel	mg/kg	1	40	160	30	60		3	9	1	8	-	5	8	-	18	-	-	10	9	5	3	5	1	-	4	5	3	7	-	-	-	6	13	11	-	<1	4	2	4	4	5	4	35	19	7	3
Selenium	mg/kg	2	20	80				<3	<2	<3	<3	-	<2	<2	-	-	-	-	<3	<2	<2	<2	<5	<2	-	<2	<2	<2	<2	-	-	-	<2	<2	<2	-	<2	<2	<2	-	-	-	-	-	-	-	-
Tin	mg/kg	1						<1	<1	<1	<1	-	6	6	-	-	-	-	3	3	1	<1	<5	<1	-	1	1	<1	<3	-	-	-	<1	<3	3	-	<1	<3	1	-	-	-	-	-	-	-	-
Zinc	mg/kg	1			150	300		15	120	12	49	-	170	900	-	34	-	-	620	470	110	39	150	14	-	89	50	46	4	-	-	-	58	85	280	-	2	58	31	48	39	1100	35	210	75	85	13
TBH																																														
C10-C16	mg/kg	50						<50	<50	<50	<50	-	<50	<50	-	<50	-	-	<50	-	-	-	-	-	-	<50	<50	<50	<50	-	-	-	<50	<50	<50	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34	mg/kg	100						<100	<100	<100	<100	-	<100	290	-	300	-	-	190	-	-	-	-	-	-	<100	<100	<100	<100	-	-	-	<100	<100	230	-	<100	<100	<100	120	<100	240	<100	<100	340	<100	
C34-C40	mg/kg	100						<100	<100	<100	<100	-	<100	<100	-	110	-	-	<100	-	-	-	-	-	-	<100	<100	<100	<100	-	-	-	<100	<100	150	-	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
F2-NAPHTHALENE	mg/kg	50						<50	<50	<50	<50	-	<50	<50	-	<50	-	-	<50	-	-	-	-	-	-	<50	<50	<50	<50	-	-	-	<50	<50	<50	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C6 - C9	mg/kg	25	650	2600				<25	<25	<25	<25	-	<25	<25	-	<25	-	-	<25	-	-	-	-	-	-	<25	<25	<25	<25	-	-	-	<25	<25	<25	-	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
C10 - C14	mg/kg	50						<50	<50	<50	<50	-	<50	<50	-	<50	-	-	<50	-	-	-	-	-	-	<50	<50	<50	<50	-	-	-	<50	<50	<50	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15 - C28	mg/kg	100						<100	<100	<100	<100	-	<100	210	-	240	-	-	120	-	-	-	-	-	-	<100	<100	<100	<100	-	-	-	<100	<100	130	-	<100	<100	<100	<100	<100	160	<100	300	<100	240	<100
C29-C36	mg/kg	100						<100	<100	<100	<100	-	<100	110	-	130	-	-	<100	-	-	-	-	-	-	<100	<100	<100	<100	-	-	-	<100	<100	130	-	<100	<100	<100	<100	<100	120	<100	<100	<100	130	<100
>C10 - C36 (Sum of total)	mg/kg		10000	40000	250	500		<250	<250	<250	<250	-	<250	341	-	395	-	-	245	-	-	-	-	-	-	<250	<250	<250	<250	-	-	-	<250	<250	285	-	<250	<250	<250	<250	<250	305	<250	<250	<250	395	<250
C30 - C40 (Sum of total)	mg/kg	50						<50	<50	<50	<50	-	<50	260	-	410	-	-	190	-	-	-	-	-	-	<50	<50	<50	<50	-	-	-	<50	<50	360	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C6-C10 less BTEX (F1)	mg/kg	25						<25	<25	<25	<25	-	<25	<25	-	<25	-	-	<25	-	-	-	-	-	-	<25	<25	<25	<25	-	-	-	<25	<25	<25	-	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
C6-C10	mg/kg	25						<25	<25	<25	<25	-	<25	<25	-	<25	-	-	<25	-	-	-	-	-	-	<25	<25	<25	<25	-	-	-	<25	<25	<25	-	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
BTEX																																														
Benzene	mg/kg	0.2	10	40		0.5		<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	-	-	<0.2	-	-	-	-	-	-	<0.2	<0.2	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene	mg/kg	1	600	2400		25		<1	<1	<1	<1	-	<1	<1	-	<1	-	-	<1	-	-	-	-	-	-	<1	<1	<1	<1	-	-	-	<1	<1	<1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	mg/kg	0.5	288	1152		65		<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	-	-	<0.5	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	-	-	-	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene (m & p)	mg/kg	2						<2	<2	<2	<2	-	<2	<2	-	<2	-	-	<2	-	-	-	-	-	-	<2	<2	<2	<2	-	-	-	<2	<2	<2	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Xylene (o)	mg/kg	1						<1	<1	<1	<1	-	<1	<1	-	<1	-	-	<1	-	-	-	-	-	-	<1	<1	<1	<1	-	-	-	<1	<1	<1	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Xylene Total	mg/kg	3	1000	4000		35		<3	<3	<3	<3	-	<3	<3	-	<3	-	-	<3	-	-	-	-	-	-	<3	<3	<3	<3	-	-	-	<3	<3	<3	-	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
VOH																																														
1,2,4-trimethylbenzene	mg/kg	1						<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,3,5-trimethylbenzene	mg/kg	1						<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Isopropylbenzene	mg/kg	1						<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
n-butylbenzene	mg/kg	1						<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
n-propylbenzene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
p-isopropyltoluene	mg/kg	1						<1	<1	<1	<1	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
sec-butylbenzene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Styrene	mg/kg	1	60	240				<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
tert-butylbenzene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Chlorinated Hydrocarbons																																													
1,1,1,2-tetrachloroethane	mg/kg	1	200	800				<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,1,1-trichloroethane	mg/kg	1	600	2400				<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,1,2,2-tetrachloroethane	mg/kg	1	26	104				<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,1,2-trichloroethane	mg/kg	1	24	96				<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,1-dichloroethane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,1-dichloroethene	mg/kg	1	14	56				<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,1-dichloropropene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,1,3-trichloropropane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,2-dibromo-3-chloropropane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,2-dichloroethane	mg/kg	1	10	40				<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,2-dichloropropane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,3-dichloropropane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
2,2-dichloropropane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Bromochloromethane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Bromoform	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Carbon tetrachloride	mg/kg	1	10	40				<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Chlorodibromomethane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Chloroethane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Chloroform	mg/kg	1	120	480				<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Chloromethane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
cis- 1,2-dichloroethene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
cis- 1,3-dichloropropene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Dibromomethane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	1	10	40				<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	1	14	56				<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
trans-1,2-dichloroethene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
trans-1,3-dichloropropene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Vinyl chloride	mg/kg	1	4	16				<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons																																													
1,2-dibromoethane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Bromomethane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Halogenated Benzenes																																													
1,2,3-trichlorobenzene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,2,4-trichlorobenzene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,2-dichlorobenzene	mg/kg	1	86	344				<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,3-dichlorobenzene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,4-dichlorobenzene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
2-chlorotoluene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
4-chlorotoluene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Bromobenzene	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	1	2000	8000				<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.1						<0.1	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Solvents																																													
Cyclohexane	mg/kg	1						<1	<1	<1	<5	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Wet/Phenols																																													
Total Positive PAHs	mg/kg	0.05	200	800	20	40		<0.05	42	<0.05	<0.05	-	30	77	-	100	-	-	23	10	12	10	21.8	0.1	-	4.4	6.4	1.8	<0.05	-	-	-	7	4.8	25	-	<0.05	8	6.9	50	1.3	62	1.7	<0.05	0.58	41	19
Acenaphthene	mg/kg	0.5						<0.5	0.3	<0.5	<0.5	-	0.1	0.5	-	5.7	-	-	<0.5	<0.5	<0.5	<0.5	0.1	<0.5	-	<0.5	<0.5	<0.5	0.3	-	-	-	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.5						<0.5	<0.5	<0.5	<0.5	-	0.1	0.8	-	0.2	-	-	<0.5	0.6	0.2	0.2	0.6	<0.5	-	<0.5	<0.5	<0.5	0.3	-	-	-	<0.5	<0.5	0.3	-	<0.5	<0.5	<0.5	0.6	<0.5	1.2	<0.5	<0.5	1.3	0.4	
Anthracene	mg/kg	0.5						<0.5	0.8	<0.5	<0.5	-	0.3	2.2	-	4.2	-	-	0.3	0.7	0.2	0.2	0.8	<0.5	-	0.1	0.2	<0.5	<0.5	-	-	-	0.1	0.1	0.5	-	<0.5	0.3	0.4	1.6	<0.5	1.4	<0.5	<0.5	2.1	0.6	
Benz[a]anthracene	mg/kg	0.5						<0.5	2.7	<0.5	<0.5	-	2	8	-	8.5	-	-	1.9	3.5	1.3	1.2	2.1	<0.5	-	0.4	0.7	0.2	<0.5	-	-	-	0.6	0.5	2.4	-	<0.5	0.6	0.6	4.3	0.1	4.5	0.2

Table 12: Results of Leachability Analysis

Sample ID	PID (ppm)	Metals			PAHs					
		Lead (Pb)			Total PAH			Benzo(a)pyrene		
		Total	TCLP	ASLP	Total	TCLP	ASLP	Total	TCLP	ASLP
		(mg/kg)	(mg/L)	(mg/L)	(mg/kg)	(mg/L)	(mg/L)	(mg/kg)	(mg/L)	(mg/L)
203/0.5	<1	100	0.03	-	20	NIL (+)VE	-	1.8	<0.001	-
D3 (203/0.5)	<1	240			77			6.4		
MS4 / 0.2		4	-	-	100	0.064	-	4.6	<0.001	-
301/0.05	<1	770	0.08	0.041	23	NIL (+)VE	<0.001 each	2.1	<0.001	<0.001
Laboratory PQL		1	0.1	0.001	0.05	0.001	0.001	0.05	0.001	0.001
NSW EPA 2014 - Waste Classification Guidelines	**General Solid Waste**	1500 (1)	5	NC	200	NC	NC	10 (1)	0.04	NC
	Restricted Solid Waste	6000 (1)	20	NC	800	NC	NC	23 (1)	0.16	NC
ANZG (2018) - MW 95%	**Marine**	NC	NC	0.0044	NC	NC	NC	NC	NC	0.0001

Notes to Table:
Total concentrations in mg/kg on a dry weight basis
TCLP and ASLP concentrations in mg/L
(1) - Waste Classification Criteria for Total Concentrations when used with TCLP Results
PQL - practical quantitation limit
NC - No Criteria
- Not Tested
TCLP - standard NSW EPA acid leaching test
ASTM - TCLP test using distilled water as extracting fluid
(L) - 95% Low Reliability Trigger Values (99% protection level applied where recommended (ie benzo(a)pyrene))
Shaded Results Exceed Criteria Shaded

Table 13: Results of Chemical Analysis of Groundwater

Analyte	Units	PQL	ANZG 2018 MW 95%	NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion, Sand			NEPM 2013 Table 1C GILs, Marine Waters	NEPM 2013 Table 1C GILs, Drinking Water	Field_ID	201	202	203	DW1	TW1
				2-4m	4-8m	>8m			Sample Date	7/01/2020	7/01/2020	7/01/2020	7/01/2020	7/01/2020
Metals														
Arsenic (Filtered)	mg/L	0.001	0.0023					**0.01**		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium (Filtered)	mg/L	0.0001	0.0007				0.0007	**0.002**		<0.0001	<0.0001	0.0001	0.0001	0.0001
Chromium (III+VI) (Filtered)	mg/L	0.001	0.0044					**0.05**		<0.001	<0.001	<0.001	<0.001	<0.001
Copper (Filtered)	mg/L	0.001	0.0013				0.0013	**2**		<0.001	<0.001	<0.001	<0.001	<0.001
Lead (Filtered)	mg/L	0.001	0.0044				0.0044	**0.01**		<0.001	<0.001	<0.001	<0.001	<0.001
Mercury (Filtered)	mg/L	0.00005	0.0001				0.0001	**0.001**		<0.00005	<0.00005	<0.00005	<0.00005	<0.0001
Nickel (Filtered)	mg/L	0.001	0.007				0.007	**0.02**		0.006	0.016	0.012	0.011	0.014
Zinc (Filtered)	mg/L	0.001	0.015				0.015			0.016	0.017	0.051	0.044	0.052
TRH														
C10-C16	mg/L	0.05								<0.05	<0.05	<0.05	<0.05	<0.1
C16-C34	mg/L	0.1								<0.1	<0.1	<0.1	<0.1	<0.1
C34-C40	mg/L	0.1								<0.1	<0.1	<0.1	<0.1	<0.1
F2-NAPHTHALENE	mg/L	0.05		1	1	1				<0.05	<0.05	<0.05	<0.05	<0.1
C6 - C9	mg/L	0.01								<0.01	<0.01	<0.01	<0.1	<0.02
C10 - C14	mg/L	0.05								<0.05	<0.05	<0.05	<0.05	<0.05
C15 - C28	mg/L	0.1								<0.1	<0.1	<0.1	<0.1	<0.1
C29-C36	mg/L	0.05								<0.1	<0.1	<0.1	<0.1	<0.05
C6-C10 less BTEX (F1)	mg/L	0.01		1	1	1				<0.01	<0.01	<0.01	<0.01	<0.02
C6-C10	mg/L	0.01								<0.01	<0.01	<0.01	<0.1	<0.02
BTEX														
Benzene	mg/L	0.001	0.5	0.8	0.8	0.9	0.5	**0.001**		<0.001	<0.001	<0.001	<0.01	<0.001
Ethylbenzene	mg/L	0.001	0.005	NL	NL	NL		**0.3**		<0.001	<0.001	<0.001	<0.01	<0.002
Toluene	mg/L	0.001	0.18	NL	NL	NL		**0.8**		<0.001	<0.001	<0.001	<0.01	<0.002
Xylene (m & p)	mg/L	0.002								<0.002	<0.002	<0.002	<0.02	<0.002
Xylene (o)	mg/L	0.001	0.35							<0.001	<0.001	<0.001	<0.01	<0.002
Xylene Total	mg/L		0.625	NL	NL	NL		**0.6**		<0.003	<0.003	<0.003	<0.003	<0.002
MAH														
1,2,4-trimethylbenzene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
1,3,5-trimethylbenzene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Isopropylbenzene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
n-butylbenzene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
n-propylbenzene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
p-isopropyltoluene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
sec-butylbenzene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Styrene	mg/L	0.001						**0.03**		<0.001	<0.001	<0.001	<0.01	<0.005
tert-butylbenzene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Chlorinated Hydrocarbons														
1,1,1,2-tetrachloroethane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
1,1,1-trichloroethane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
1,1,2,2-tetrachloroethane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
1,1,2-trichloroethane	mg/L	0.001	1.9				1.9			<0.001	<0.001	<0.001	<0.01	<0.005
1,1-dichloroethane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
1,1-dichloroethene	mg/L	0.001						**0.03**		<0.001	<0.001	<0.001	<0.01	<0.005
1,1-dichloropropene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
1,2,3-trichloropropane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
1,2-dibromo-3-chloropropane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
1,2-dichloroethane	mg/L	0.001						**0.003**		<0.001	<0.001	<0.001	<0.01	<0.005
1,2-dichloropropane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
1,3-dichloropropane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
2,2-dichloropropane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Bromochloromethane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	-
Bromodichloromethane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Bromoform	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Carbon tetrachloride	mg/L	0.001						**0.003**		<0.001	<0.001	<0.001	<0.01	<0.005
Chlorodibromomethane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Chloroethane	mg/L	0.01								<0.01	<0.01	<0.01	<0.1	<0.05
Chloroform	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Chloromethane	mg/L	0.01								<0.01	<0.01	<0.01	<0.1	<0.05
cis-1,2-dichloroethene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
cis-1,3-dichloropropene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Dibromomethane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Hexachlorobutadiene	mg/L	0.001	0.00003					**0.0007**		<0.001	<0.001	<0.001	<0.01	<0.005
Trichloroethene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Tetrachloroethene	mg/L	0.001						**0.05**		<0.001	<0.001	<0.001	<0.01	<0.005
trans-1,2-dichloroethene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
trans-1,3-dichloropropene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Vinyl chloride	mg/L	0.01						**0.0003**		<0.01	<0.01	<0.01	<0.1	<0.05
Halogenated Hydrocarbons														
1,2-dibromoethane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Bromomethane	mg/L	0.01						**0.001**		<0.01	<0.01	<0.01	<0.1	<0.05
Dichlorodifluoromethane	mg/L	0.01								<0.01	<0.01	<0.01	<0.1	<0.05
Trichlorofluoromethane	mg/L	0.01								<0.01	<0.01	<0.01	<0.1	<0.05
Halogenated Benzenes														
1,2,3-trichlorobenzene	mg/L	0.001						**0.03**		<0.001	<0.001	<0.001	<0.01	<0.005
1,2,4-trichlorobenzene	mg/L	0.001	0.02				0.02	**0.03**		<0.001	<0.001	<0.001	<0.01	<0.005
1,2-dichlorobenzene	mg/L	0.001						**1.5**		<0.001	<0.001	<0.001	<0.01	<0.005
1,3-dichlorobenzene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
1,4-dichlorobenzene	mg/L	0.001						**0.04**		<0.001	<0.001	<0.001	<0.01	<0.005
2-chlorotoluene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
4-chlorotoluene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Bromobenzene	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	<0.005
Chlorobenzene	mg/L	0.001						**0.3**		<0.001	<0.001	<0.001	<0.01	<0.005
Solvents														
Cyclohexane	mg/L	0.001								<0.001	<0.001	<0.001	<0.01	-
PAH/Phenols														
Total Positive PAHs	mg/L	0.0001								<0.0001	<0.0001	<0.0001	<0.0001	<0.00005
Acenaphthene	mg/L	0.0001								<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Acenaphthylene	mg/L	0.0001								<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Anthracene	mg/L	0.0001	0.00001							<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Benz(a)anthracene	mg/L	0.0001								<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Benzo(a) pyrene	mg/L	0.00005	0.0001					**0.00001**		<0.0001	<0.0001	<0.0001	<0.0001	<0.00005
Benzo(g,h,i)perylene	mg/L	0.0001								<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Benzo(b,j,k)fluoranthene	mg/L									<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Chrysene	mg/L	0.0001								<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dibenz(a,h)anthracene	mg/L	0.0001								<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Fluoranthene	mg/L	0.0001	0.001							<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Fluorene	mg/L	0.0001								<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Indeno(1,2,3-c,d)pyrene	mg/L	0.0001								<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Naphthalene	mg/L	0.0001	0.05	NL	NL	NL	0.05			<0.0002	<0.0002	<0.0002	<0.0002	<0.0001
Phenanthrene	mg/L	0.0001	0.0006							<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Phenolics Total	mg/L	0.05	0.4				0.4			<0.05	<0.05	<0.05	<0.05	<0.001
Pyrene	mg/L	0.0001								<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Notes to Table:
DW1 - Replicate of Sample 203
TW1 - Triplicate of Sample 203
ANZECC 2000 guidelines used in the absence of ANZG (2018) criteria where applicable

14. Site Assessment Criteria

The proposed development at 9 Church Street, Newcastle will comprise the demolition of the existing Supreme Court and Administration Building and construction of two new four-storey buildings either side of the existing courthouse to be utilised as a university campus. The new development will include a 108 bed student accommodation building (east wing) and a 20 car park basement level carpark within the proposed education building (west wing), although only localised cut / fill up to 1 m to 2 m are proposed at this stage (i.e. building levels to remain similar to current ground levels). It is further understood that the ground floors will cover the majority of the site with the exception of the perimeter of the buildings which will be landscaped or comprise sealed driveways / paths (refer to Azusa Sekkei - General Arrangement Plan in Appendix E).

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

The investigation and screening levels applied in the current investigation comprise levels adopted for a generic residential with minimal soil access (HIL-B / HSL-B) land use scenario.

14.1 Soils

14.1.1 Health Investigation and Screening Levels

The generic HIL and HSL are considered to be appropriate for the assessment of contamination at the site. The adopted soil HIL and HSL for the potential contaminants of concern are presented in Table 14.

Table 14: HIL and HSL in mg/kg Unless Otherwise Indicated

Contaminants		HIL- B	HSL- B[4]
Metals	Aluminium	NC	NC
	Antimony	NC	NC
	Arsenic	500	NC
	Boron	40000	NC
	Cadmium	150	NC
	Chromium (VI)	500	NC
	Cobalt	600	NC
	Copper	30000	NC
	Iron	NC	NC
	Lead	1200	NC
	Magnesium	NC	NC
	Manganese	14000	NC
	Mercury (inorganic)	120	NC
	Nickel	1200	NC
	Selenium	1400	NC
	Tin	NC	NC
	Zinc	60000	NC
PAH	Benzo(a)pyrene TEQ[1]	4	NC
	Naphthalene	NC	3
	Total PAH	400	NC
TRH	$C_6 – C_{10}$ (less BTEX) [F1]	NC	45
	$>C_{10}$-C_{16} (less Naphthalene) [F2]	NC	110
	$>C_{16}$-C_{34} [F3]	NC	NC
	$>C_{34}$-C_{40} [F4]	NC	NC
BTEX	Benzene	NC	0.5
	Toluene	NC	160
	Ethylbenzene	NC	55
	Xylenes	NC	40
Phenol	Pentachlorophenol (used as an initial screen)	130	NC
OCP	Aldrin + Dieldrin	10	NC
	Chlordane	90	NC
	DDT+DDE+DDD	600	NC
	Endosulfan	400	NC
	Endrin	20	NC
	Heptachlor	10	NC
	HCB	15	NC
	Methoxychlor	500	NC
OPP	Chlorpyrifos	340	NC
PCB[2]		1	NC
VOC		PQL as initial screening concentration. Reference to national or international standards above the PQL.	

Notes to Table 14:

1 Sum of carcinogenic PAH

2 Non dioxin-like PCBs only.

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

4 The HSL have been calculated for a potential vapour intrusion pathway, a sand soil based on the variable coarse filling being the predominant soil type (Section 10) and an assumed depth to contamination of 0 m to <1 m (conservative initial screen).

As shown in Table 14 the adopted HSLs are predicated on a potential vapour intrusion pathway, as identified in the CSM. Although the CSM also identifies a direct contact pathway, and construction worker receptors, the corresponding HSLs are significantly higher than those for the vapour intrusion pathway and are therefore not drivers for further assessment and/or remediation. As such the direct contact and intrusive maintenance worker HSLs have not been listed.

14.1.2 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 NEPC (2010) *Interactive (Excel) Calculation Spreadsheet* (NEPC online ASC NEPM Toolbox) are shown in the following Table 15.

Table 15: EIL in mg/kg

Analyte		EIL Residential	Comments
Metals	Arsenic	100	**Adopted parameters** pH = 6 (conservative estimate) CEC = 2 $cmol_c/kg$ (conservative estimate based on coarse filling; assumed clay and organic content of 1% (conservative) "Aged" (>2 years) source of contamination low for traffic volumes in NSW
	Copper	55	
	Nickel	9	
	Chromium III	190	
	Lead	1100	
	Zinc	150	
PAH	Naphthalene	170	
OCP	DDT	180	

14.1.3 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 16.

Table 16: ESL in mg/kg

Analyte		ESL[1]	Comments
TRH	$C_6 – C_{10}$ (less BTEX) [F1]	*180	All ESLs are low reliability apart from those marked with * which are moderate reliability
	$>C_{10}-C_{16}$ (less Naphthalene) [F2]	*120	
	$>C_{16}-C_{34}$ [F3]	300	
	$>C_{34}-C_{40}$ [F4]	2800	
BTEX	Benzene	50	
	Toluene	85	
	Ethylbenzene	70	
	Xylenes	105	
PAH	Benzo(a)pyrene	0.7	

Notes to Table 16:

1 The ESL have been calculated for a coarse soil based on coarse filling being the predominant soil type (Section 10) and Urban residential landuse

The NEPM ESL of 0.7 mg/kg is understood to be based on a single invertebrate species referenced in the 1999 Canadian Soil Quality Guidelines (since updated) and is considered conservative in the Australian context. These guidelines were updated in 2010 and now suggest a B(a)P concentration of 20 mg/kg for the protection of environmental health based on the soil contact exposure pathway.

It is also noted that the benzo(a)pyrene ESL is a low reliability value. Higher reliability screening levels have been published in CRC CARE (2017), Risk-based Management and Remediation Guidance for Benzo(a)pyrene, CRCCARE Technical Report no. 39. The high reliability value of 33 mg/kg for aged contamination recommended in CRC CARE (2017) has therefore been adopted.

14.1.4 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, eg penetration of, or damage to, in-ground services.

The adopted management limits from Schedule B1 of NEPC (2013) are shown in the following Table 17.

Table 17: Management Limits in mg/kg

Analyte		Management Limit	
TRH	$C_6 – C_{10}$ (F1) #	700	The management limits have been calculated for a coarse soil based on coarse filling being the predominant soil type (Section 10) and residential landuse
	$>C_{10}$-C_{16} (F2) #	1000	
	$>C_{16}$-C_{34} (F3)	2500	
	$>C_{34}$-C_{40} (F4)	10 000	

Notes to Table 17:

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

14.1.5 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 Asbestos Containing Materials (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.

NEPC (2013) defines the various asbestos types referred to above as follows:

Bonded ACM: Asbestos containing material which is in sound condition, bound in a matrix of cement or resin, and cannot pass a 7 mm x 7 mm sieve.

FA: Fibrous asbestos material including severely weathered cement sheet, insulation products and woven asbestos material. This material is typically unbonded or was previously bonded and is now significantly degraded and crumbling.

AF: Asbestos fines including free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve.

Health Screening Levels (HSL) for asbestos in soil, which are based on likely exposure levels for different scenarios, have been adopted in NEPC (2013) from the Western Australian Department of Health (WA DoH) publication *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia 2009* (WA DoH, 2009).

On the basis of the proposed educational land use with student accommodation, and in accordance with Table 7, Schedule B1, NEPC (2013) the following asbestos HSLs would be applicable:

Table 18: Health Screening Levels for Asbestos Contamination in Soil (% w/w)

Form of Asbestos	HSL
	Residential with Minimal Soil Access Land Use Land Use
Bonded ACM	0.04% %
FA and AF	0.001 %
All Forms of Asbestos	No visible asbestos for surface soil

A detailed asbestos assessment has not been undertaken as part of these works as the preferred remediation option (on-site capping) was selected by the client due to the presence of asbestos at numerous locations across the site. Therefore, the presence or absence of asbestos at a limit of reporting of 0.1 g/kg has been adopted as an initial screen.

While a detailed asbestos assessment was not conducted as discussed above, visual assessment and a qualitative assessment of the extent and frequency of ACM across the site was conducted with reference to these HIL concentrations.

14.1.6 Waste Classification

The results of chemical testing were also compared against NSW EPA Waste Classification Guidelines (NSW EPA, 2014a), to assess possible off-site disposal options to a licenced facility and the NSW EPA (2014b) resource recovery order (RRO) for excavated natural material (ENM) to assess possible re-use options for excess soil / fill.

14.2 Groundwater

The potential receptors of impacted groundwater from the site include:

- Current occupiers of the site (ie contractors);
- Future occupiers of the site (eg workers, students, visitors);
- Workers conducting excavations, construction or maintenance works within the site or nearby the site (impacted groundwater);
- Residents, workers and recreational users of surrounding properties (vapours associated with groundwater impacts); and
- Newcastle Harbour / Newcastle Beach (nearest surface water body recipients of groundwater flowing beneath the site / surface water runoff) which is located approximately 500 m north to 200 m east of the site.

14.2.1 Groundwater Investigation Levels

The GIL adopted in NEPC (2013) are based on:

- NHMRC (2011), National water quality management strategy, Australian drinking water guidelines 6 2011, National Health and Medical Research Council and National Resource Management Ministerial Council, Australia (updated August 2018);

- Guidelines for Managing Risk in Recreational Waters 2008 (GMRRW);
- National water quality management strategy. Australian and New Zealand guidelines for fresh and marine water quality 2000 (ANZECC & ARMCANZ).

The adopted GIL for the analytes included in the assessment (where applicable), and the corresponding source documents, are shown in Table 19.

Table 19: GIL (in µg/L unless otherwise stated)

Analyte		NEPC (2013) Marine Waters [2]	NEPC (2013) Drinking Water
Metals	Aluminium	0.5	NC
	Arsenic (V)	2.3	10
	Cadmium	0.7	2
	Chromium (VI)	4.4	50
	Copper	1.3	2000
	Iron	NC	NC
	Lead	4.4	10
	Manganese	80	500
	Mercury (total)	0.1	1
	Nickel	7	20
	Selenium	3	10
	Zinc	15	NC
PAH	Naphthalene	50	NC
	Benzo(a)pyrene	0.1	0.01
BTEX	Benzene	500	1
	Toluene	180	800
	Ethylbenzene	5	300
	Xylene (o)	350	NC
	Xylene (p)	NC	NC
	Xylenes (Total)	625	600
TRH	$C_6 - C_{10}$ (less BTEX) [F1]	NC	NC
	$>C_{10}-C_{16}$ (less Naphthalene) [F2]	NC	NC
	$>C_{16}-C_{34}$ [F3]	NC	NC
	$>C_{34}-C_{40}$ [F4]	NC	NC
Phenols	Phenol	400	NC
	Pentachlorophenol	11	10
VOC[3]	1,1,2-Trichloroethane	1900	NC
	1,2,4-Trichlorobenzene	80	30
	Styrene	NC	30

Notes to table 19:

1 In cases where no high reliability trigger values are provided, the low reliability trigger values provided in ANZECC & ARMCANZ (2000) have been used as screening levels

2 Investigation levels apply to typically slightly-moderately disturbed systems

3 Additional VOC criteria available for Drinking Water – Refer to Table 13 for details

14.2.2 Health Screening Levels

The generic HSL are considered to be appropriate for the assessment of contamination at the site. Given the proposed land use the adopted HSL is:

- **HSL- B** – residential AB (Low-high density residential).

The adopted groundwater HSL for vapour intrusion, from Table 1A (4), Schedule B1 of NEPC (2013) are shown in the following Table 20.

Table 20: HSL (µg/L)

Analyte		HSL-AB	
TRH	C_6 – C_{10} (less BTEX) [F1]	1000	The HSL have been calculated for a conservative sand soil based on the coarse filling being the predominant soil type (Section 10) and an assumed conservative depth to contamination of 2 m to <4 m as an initial screening tool.
	>C_{10}-C_{16} (less Naphthalene) [F2]	1000	
BTEX	Benzene	800	
	Toluene	NL	
	Ethylbenzene	NL	
	Xylene	NL	
PAH	Naphthalene	NL	

Note: NL -The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour which is in equilibrium with the groundwater will be at its maximum. If the derived groundwater HSL exceeds the water solubility limit, a soil-vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for a given scenario. For these scenarios no HSL is presented for these chemicals. These are denoted as not limiting 'NL'.

14.3 Hazardous Gases

According to the NSW EPA (2019), methane (CH_4) is a flammable gas that is explosive in the concentration range 5% to 15% v/v in air (somewhat different ranges may apply in atmospheres with enhanced or reduced oxygen concentrations). It is also potentially an asphyxiant if its presence displaces oxygen thereby resulting in an environment with low oxygen concentration. It is less dense than air.

Carbon dioxide (CO_2) is an asphyxiant and toxic gas that is significantly denser than air. Carbon monoxide (CO) is an acutely toxic gas that is also flammable and potentially explosive. It has neutral buoyancy in air. Hydrogen is a flammable, potentially explosive gas that is much less dense than air. Hydrogen sulphide (H_2S) is a flammable and acutely toxic gas that is denser than air. It is highly odorous, and a nuisance, at low concentrations.

Trace gases may also be present depending on the nature of the source material, particularly if landfilled wastes are involved, including volatile organic compounds.

SAC from CIRIA (2007) and as adopted by NSW EPA (2019) (originally modified from Wilson and Card (2007)) for the GSV and CGS have been used to evaluate landfill gas. The GSV and CGS are summarised in the table reproduced from NSW EPA (2019), below.

Table 21 – Modified Wilson and Card Classification (NSW EPA, 2019)

GSV threshold (L/hr)	CS	Risk classification	Additional factors	Typical sources
<0.07	1	Very low risk	Typically, methane <1% v/v and/or carbon dioxide <5% v/v; otherwise consider increase to CS 2	Natural soils with low organic content Typical fill
<0.7	2	Low risk	Borehole flow rate not to exceed 70 L/hr; otherwise consider increase to CS 3	Natural soils with high organic content Recent deep fill
<3.5	3	Moderate risk		Old inert waste landfill Flooded mine workings
<15	4	Moderate to high risk	Consider need for Level 3 risk assessment	Mine workings susceptible to flooding Closed putrescible waste landfill
<70	5	High risk	Level 3 risk assessment required	Shallow, unflooded abandoned mine workings
>70	6	Very high risk		Recently used putrescible waste landfill

1. Site characterisation should be based on monitoring of gas concentrations and borehole flow rates for the minimum periods defined in Section 3.4.
2. The CSM must identify the source of gas and its generation potential.
3. Soil gas investigations should be conducted in accordance with the guidance provided in Section 3.4.
4. Where there is no detectable flow, the lower measurement limit of the instrument should be used.
5. To determine a GSV of <0.07, instruments capable of accurately measuring concentration to 0.5% v/v and flow to 0.1 L/hr are recommended.

With regard to VOC's preliminary screening was conducted using a calibrated PID. Further assessment of risks associated with soil vapour was conducted by comparison of soil and groundwater concentrations to the vapour intrusions HSLs outlined in Tables 14 and 20 above.

14.4 Aesthetic Considerations

Neither NEPC (2013) or CRC CARE (2011) provide numeric aesthetic guidelines, however, NEPC (2013) states that site assessment requires balanced consideration of the quantity, type and distribution of foreign material or odours in relation to the specific land use and its sensitivity.

Higher expectations for soil quality would apply for standard residential properties with garden beds compared to less sensitive landuse settings such as industrial sites. The proposed educational facility while not as sensitive as a standard residential development still needs to consider aesthetics given the exposed soils (landscape areas) and on-site accommodation facilities.

NEPC (2013) notes that in arriving at a balanced assessment, the presence of small quantities of non-hazardous inert material and low odour residue (for example, weak petroleum hydrocarbon odours) that will decrease over time should not be a cause of concern or limit the use of a site in most circumstances. Similarly, sites with large quantities of well-covered known inert materials that present no health hazard such as brick fragments and cement wastes (for example, broken cement blocks) are usually of low concern for both non-sensitive and sensitive land uses.

15. Assessment of Contamination

The results of chemical analysis to date indicate the following:

Soil

The results of chemical analysis from the current and previous investigation indicated the following with respect to contamination:

- The soil samples tested were generally within the health investigation levels for high density residential land use with minimal access to soil (HIL-B), with the exception of the following:
  - Elevated lead in fill sample BH5/0.1 m;
  - Elevated Benzo(a)Pyrene TEQ (PAH) concentrations in seven natural / fill samples (201/7.9 m, D3 (replicate of 203/0.5 m), MS4/0.2 m, BH1/0.3 m, BH5/0.1 m, BH9/0.6 m, 301/0.2 m);
  - Presence of detectable bonded asbestos (Amosite and/or Chrysotile asbestos) in four (fibro fragments (F1, 302/F1, 307/F2, 310/F1)) of the six material samples collected from the ground surface or within test pits;
  - The absence of friable asbestos (AF/FA) within the soil samples analysed for asbestos identification testing.
- The soil samples tested were all within the health screening levels for high density residential land use with minimal access to soil (HSL-B) for sands between 0 m to 1 m depth (conservative approach);
- The soil samples tested were all within the NEPC (2013) Management Limits for residential land use (coarse soils);
- The soil samples tested were all within the CRC Care Direct Contact criteria for high density residential landuse (HSL-B);
- The soil samples were generally within the NEPC (2013) ecological investigation and screening levels for residential landuse with the exception of several samples which had elevated copper, lead, nickel, zinc or TRH (>C_{16}-C_{34});
- Absence of PCB and pesticides (OCP/OPP) in the samples tested;
- Absence of VOCs and volatile hydrocarbons (ie TRH C_6-C_{10} / BTEX) in the samples tested;
- Absence of coal tar within the two asphalt samples tested;
- Leachability (TCLP) testing of three soil samples for lead and PAHs generally indicate the materials tested had a low propensity to leach in acidic conditions (refer to Section 16);

- Leachability testing in water (ASLP) was conducted for one soil sample for lead (Pit 301 / 0.05 m), which was collected from a similar location to former BH5/0.1 which had lead concentrations above HIL-B. The results of testing suggest that the material has some potential to leach in water, with concentrations above ANZG (2018) criteria.

Elevated lead concentrations were previously detected by Prensa (2016) in near surface sandy silt fill in Bore 5. Additional test pitting in the vicinity of Bore 5 by DP (ie Pit 301) indicated fill materials within the garden bed at the front of the former Court House extended to a depth of 0.65 m. Lead profiling undertaken in Pit 301 identified elevated lead concentrations (albeit within the HIL criteria) within the top 200 mm of the surface, decreasing in concentration with depth. Fill materials within Pit 301 were found to include trace building materials (concrete, tiles and brick fragments). Based on the above, while lead concentrations within near surface fill materials within the garden bed were elevated (potentially due to building wastes or potentially lead based paints as indicated by Prensa (2016)), the impact appears to be localised. Consistent elevated lead concentrations above the adopted HIL criteria were not observed within fill across the site.

Based on site observations, the strata observed and the sampling method (ie solid flight auger), the B(a)P TEQ HIL B exceedance within sample 201/7.9 m is likely to be a result of cross-contamination with overlying fill materials rather than occurring in the natural siltstone at depth. It is also possible that the B(a)P TEQ HIL B exceedance within sample D3 (replicate of 203/0.5 m) is due to cross-contamination with the overlying fill layers which included asphalt and possible slag.

PAH impacted soil at the site is likely to be attributed to a number of factors including the presence of ash / slag within filling and the presence of the asphalt pavement. While PAHs can naturally occur in coal it is unlikely that the elevated concentrations detected on site would be attributed to coal based our experience in the Newcastle area.

Bonded ACM impacted fill materials were identified across all areas of the site (ie both the Administration Building, The Supreme Court Building, landscape areas and the car park). The bonded ACM impacts appeared to be associated with the fill materials across the site which contain extensive building wastes. ACM was also observed to have been utilised as formwork for existing footings/structures below ground. We understand that a licensed contractor was engaged by Built to validate the removal of hazardous building materials (HBM) from the buildings prior to demolition (refer to ADE (2020) in Appendix B). Based on the validation reports and observations during the DSI, the bonded ACM impacts identified do not appear to be a consequence of the demolition works being undertaken during the investigation.

Bonded ACM materials, where encountered in fill, were typically observed to comprise a few to numerous fibro sheeting fragments (general in good condition). Based on a qualitative assessment, the frequency of ACM would exceed the WA DoH concentration limits in the absence of a detailed asbestos assessment (ie field sieving for bonded ACM). Based on these observations and the presence of widespread building wastes within fill across the site, the presence of further bonded ACM impact is anticipated across the site as evidenced during exposure of fill materials beneath the former Administration Building. The ACM encountered was generally observed to be in sound condition. Friable asbestos (ie AF/FA) was not detected within the soil samples analysed. The identified asbestos impacts at the site were therefore associated with bonded ACM.

It is noted that the bonded ACM utilised as formwork on the external walls of the former Courthouse building and on the external walls of the tunnel extended beneath the ground surface. Given the tunnel and Courthouse are to remain in-situ, it is not considered practical to remove ACM in these areas. ACM will therefore remain and will be managed beneath the proposed site capping as instructed by the client.

Statistical analysis of lead and B(a)P TEQ concentrations was undertaken to further assess the significance of the health investigation level exceedances noted above. This included consideration of the following:

- All test results across the site;
- Results of both fill and natural soils independently;
- Soil properties at different depths and spatially across the site and consideration of the above-mentioned potential cross-contamination issues with natural samples.

The analysis was conducted using USEPA ProUCL Version 5.1 and considered non-detects. The results of statistical analysis indicated the following:

- Maximum concentrations detected for lead (1400 mg/kg) and B(a)P TEQ (9.8 mg/kg) are within 2.5 times the HIL-B criteria (1200 mg/kg and 4 mg/kg respectively) and are therefore not considered to represent a 'hot spot' with reference to NEPC (2013);
- The 95% UCL of the mean for B(a)P TEQ were within the HIL-B criteria (ie 4 mg/kg) as follows:
    - All fill samples (3.085mg/kg);
    - All fill samples including natural samples 203/0.5, D3 and 201/7.9 (likely to be associated with cross contamination from upper fill material) (3.541 mg/kg);
    - All fill and natural samples (3.068 mg/kg)
- The standard deviation (SD) for all B(a)P TEQ scenarios above ranged from 2.347 to 2.677 which is >50% of the HIL-B criteria (considered a possible exceedance of the HIL with reference to NEPC (2013) Schedule B1 Section3.2.1);
- While some scenarios show marginal exceedances of the SD values (ie above 50% of the HIL-B criteria), the results are not considered to be significant based on the following:
    - No 'hot spots' were detected;
    - The PAH impact is aged (ie which would allow a theoretically higher HIL with reference to the PAH HIL derivation outlined in Schedule B7, Appendix A2 of NEPC (2013)).
- The 95% UCL of the mean for Pb were within the HIL-B criteria of 1200 mg/kg as follows:
    - All fill and natural samples (303.3 mg/kg);
    - All fill samples (490.3 mg/kg);
    - All fill and natural samples within the upper 3 m (407.7 mg/kg);
- Given that no 'hot spots' were detected for lead and the 95% UCL values for all scenarios were below the conservatively derived HIL-B criteria, the elevated lead result at Bore 5/0.1 m does not constitute significant contamination requiring remediation.

Groundwater

The majority of groundwater analytical results were generally within the adopted guidelines (SAC) with the exception of the following:

- Nickel in wells (Bores 202 and 203) above marine water GIL. Note: concentrations in the upgradient well (Bore 203) were similar to Bore 202 concentrations;
- Zinc in all wells (Bores 201, 202 and 203) above marine water GIL. Note: concentrations in the upgradient well (Bore 203) were higher than those in Bores 201 and 202 concentrations.

No detectable concentrations of lead, TRH, BTEX, PAH, Phenols or VOCs were identified for all groundwater samples.

The results of testing along the eastern site boundary with the Police Station indicated the general absence of gross impacts to soil or groundwater downgradient of UST's fill points, bowsers / fuel lines etc associated with the adjacent Police Station site.

Hazardous Ground Gases

The preliminary assessment of hazardous ground gases (HGG) conducted at the site comprised the following:

- Desktop review of former mining activities (refer DP, 2019c); and assessment of potential volatile impacts associated with adjacent USTs, associated infrastructure and wash bay;
- Site inspection to assess probable indications of gas emissions (ie stressed vegetation);
- Consideration of the CSM (source, Pathway, Receptor);
- Consideration of geology and hydrogeology (potential sources of HGG – mine seams, adjacent USTs and infrastructure), depth to potential sources (refer to borehole logs and Figure 5.)
- Preliminary gas monitoring:
    - Using landfill gas analyser and PID;
    - During drilling of bores (including geotechnical bores drilled within underlying coal seams to depths of up to 88 m;
    - Within groundwater wells and cased geotechnical bores;
    - Within existing buildings and basements.

The results of the preliminary assessment of ground gases are summarised below:

- The desktop review identified the following potential sources of HGG:
- Abandoned coal mine workings or coal seams as follows:
    - Dudley Seam (possibly 20 m to 30 m below ground, anticipated thickness of 1.5 m to 2.5 m, possible convict workings);
    - Yard Seam (possibly 50 m below ground, anticipated thickness of 0.7 m to 0.9 m, no workings identified in nearby investigations);
    - Borehole Seam (possibly 75 m to 85 m below ground, anticipated thickness of 6.1 m to 6.5 m, AA Co workings);

- Possible volatile organic compounds associated with migration of contaminants from existing USTs, associated infrastructure and wash bay located within the adjacent Police Station site.

Hazardous ground gas monitoring was conducted by DP during the geotechnical and mine subsidence investigations for the Royal Newcastle Hospital site (Project 39699A) in December 2007. Monitoring indicated the absence of significant ground gases within the Yard Seam or Borehole Seam and confirmed that abandoned workings within the Borehole Seam are flooded beneath the former Royal Newcastle Hospital site (located approximately 150 m north-east of the subject site).

There were no obvious indications of gas emissions during the site inspection (ie no obvious stressed vegetation or odours), and inspection within the adjacent Police Station basement.

The CSM in Section 8 identified possible sources / pathway / receptors to HGG.
The general subsurface conditions within the site are summarised within Table 3 of the DP (2020b) mine subsidence report, reproduced below in Table 22.

Table 22 – Summary of Subsurface Conditions

		GEO2	MS2	MS1	MS4
Borehole Surface Level (m - AHD)		23.7	23.4	22.4	22.3
Unit - Description of Strata			Depth Range (m)		
Fill/Soil		0-11.7	0-11.0	0-9.1	0-9.0
Bar Beach Formation		11.7-22.65	11.0-21.15	9.1-19.86	9.0-19.15
Dudley Seam		22.65-24.0	21.15-22.3	19.86-21.26	See below
Void in Dudley Seam		NE	NE	NE	19.15-19.25
Coal/Rubble Dudley Seam		NE	NE	NE	19.25-20.55
Tighes Hill Formation		24.0-24.8	22.3-34.4	21.26-33.57	20.55-20.75
Yard Seam		NM	34.4-35.0	33.57-34.14	NM
Tighes Hill Formation			35.0-80.36	34.14-77.94	
Borehole Seam - Coal with siltstone layers			80.36-87.68	84.01-86.42 (Floor of Workings)	
Borehole Seam - Void (m)			NE	77.94-80.64	
Borehole Seam - Rubble (m)			NE	80.64-84.01	
Waratah Sandstone			87.68-88.46	86.42-87.21	
Summary of "Coal Seams and related Workings"					
Borehole Seam Summary	Goaf: Borehole Seam Total Void and Rubble Thickness and Basal Coal (m)	NM	NE	8.48	NE
	Total "Intact Seam" Thickness	NM	7.32	2.41	NM
RL Waratah Standstone		NM	-64.28	-64.02	NM
Dudley Seam Thickness (m)		1.35	1.15	1.4	1.4**
Basal RL of Dudley Seam (m AHD)		-0.3	1.1	1.14	1.75***
Yard Seam Thickness (m)		NM	0.6	0.57	NM
RL of Free Groundwater in Borehole on 12 December 20219		10.4	15.2	9.2	20.6

Notes to Table:
NE – Not Encountered
NM – Not Measured
() – Thickness in brackets, where stated
* – Based on CCTV Camera observations
** - includes void
***Approximate only due to drill methods

The following pertinent observations were also made in relation to subsurface conditions:

- Upper material soils generally comprised clays of relatively low permeability;
- General absence of significant drill fluid loss while rock coring suggesting the general absence of permeable strata above coal seams;

- General absence of significant highly fractured rock in the geotechnical bores;
- Preliminary gas monitoring indicated the general absence of HGG or VOCs during drilling, following well installation and within existing buildings / basements (including sumps / drains);
- Minor hydrocarbon odours were observed, however laboratory testing in soils and groundwater also indicated the absence of VOC's.

It is also noted that the proposed development does not include basements or deep excavations.

Based on a weight of evidence approach and the results of the preliminary assessment above, the risk of adverse impacts associated with HGG at the site is considered to be low.

Aesthetic Considerations

The results of the DSI generally indicate the absence of significant aesthetic issues at the site due to the following:

- General absence of gross staining or odours within soils observed at the site;
- General absence of significant HGG;
- Presence of only minor hydrocarbon odours within Bores 201 and 202 at depths which are not likely to be disturbed during site development;
- Requirement for the capping of site soils due to ACM impacts, which will also address possible aesthetic issues associated with anthropogenic inclusions within fill.

16. Preliminary Waste Classification

The results of soil chemical analysis from the current and previous investigation indicated the following with respect to waste classification:

- The soil samples tested were generally within the NSW EPA (2014a) general solid waste (CT1) criteria, with the exception of the following:
  - Elevated lead in six soil / fill samples (D3 (replicate of 203/0.5 m), BH5 / 0.1 m and 301/0.05 m, 301/0.2 m, 301/0.4 m (and its triplicate sample T2) and 309/0.5m);
  - Elevated Benzo(a)pyrene in 11 soil / fill samples (201/7.9 m, 203/0.5 m (and replicate sample D3), MS4/0.2 m, BH1/0.3 m, 301/0.05 m, 301/0.2 m, 301/0.4 m (and its duplicate D3 and triplicate sample T2) and 309/0.5m, BH5/0.1 m, BH9/0.6 m, BH10/0.4 m.
- Leachability (TCLP) testing was conducted on three selected samples to confirm the waste classification:
  - Based on the leachability testing conducted, the three samples (plus one duplicate sample) would be classified as General Solid Waste (SCC1/ TCLP1) from a chemical contaminant perspective;
  - Assuming similar leachability (TCLP) characteristics for the other soil / fill samples, the soil / fill samples tested would be suitable for classification as General Solid Waste (SCC1 / TCLP1) from a chemical contaminant perspective.

- Comparison of total contaminant concentrations against the NSW EPA (2014b) ENM RRO indicate the following:
  - Nine of the 31 samples tested (seven natural and 24 fill sample) had elevated heavy metals (namely arsenic, cadmium, copper, lead, mercury and zinc) and / or PAHs concentrations above the maximum average or absolute maximum concentration for classification as ENM;
  - Five samples also had elevated metals or TRH (C_{10}-C_{36}) concentrations above the maximum average concentration for classification as ENM;
  - The nine remaining samples comprising five natural samples and four fill samples had contaminant concentrations within the ENM RRO for the analytes tested. The natural samples may be suitable for classification as VENM, while further testing would be required to confirm possible re-use / disposal options for the fill sample.
- Presence of detectable asbestos (Chrysotile asbestos) in four of the six material samples collected from the ground surface / within filling. Asbestos or asbestos impacted soils are classified as 'Special Waste (asbestos)' in addition to the chemical classification (soils). Further ACM is likely to be present across the site within upper fill materials based on site observations and the presence of building waste;
- Absence of coal tar within the two asphalt samples tested. Asphalt is pre-classified by NSW EPA as 'General Solid Waste'. Asphalt which does not contain coal tar or asbestos can be re-used under the NSW EPA resource recovery order (RRO) for reclaimed asphalt (NSW EPA, 2014c).

17. Conclusions

17.1 Summary of DSI Findings

The results of the DSI have identified the following:

- Presence of fill within all bores / pits to depths of 0.1 m to >3.3 m;
- Presence of ash, slag and asphalt within some fill materials;
- Presence of building materials (brick, concrete, tile, metal, wood, glass) within some fill materials across the majority of the site spatially which may be an indicator of the presence of hazardous building materials (HBM) including asbestos;
- Presence of minor hydrocarbon odours in Bores 201 (0.4 m to 2.8 m) and 202 (4.75 m to 4.85 m);
- Presence of elevated lead and PAH impacts within fill / soil, however, statistical analysis indicated that 95% UCL concentrations were within the adopted site criteria;
- Bonded ACM has been confirmed within filling under both buildings and within the car park and landscape areas (ie all areas of the site proposed for development). Although a detailed asbestos assessment was not conducted, the frequency of ACM observed would exceed WA DoH (2009) concentration limits based on site observations. Site remediation is therefore required to address ACM impacts across the site. Given the widespread distribution of filling across the site containing building rubble and the observed occurrence of ACM within subsurface formwork, further ACM is likely to be present within the site. On this basis, all fill materials across the site should be

considered to be impacted with ACM in the absence of a detailed asbestos investigation and validation as a precautionary measure;

- Presence of copper, lead, nickel, zinc and TRH (>C_{16}-C_{34}) within fill / soil above the adopted ecological based SAC (ie EIL / ESL) at several locations. It is noted that the adopted EILs have been derived using conservative soil parameters in the absence of site-specific soil testing. It is noted that the ecological significance of the site is considered to be low considering the site condition and the proposed development;
- Absence of volatile hydrocarbons (TRH, BTEX, VOCs), pesticides (OCP, OPP), PCBs or Phenols within the soil samples tested which is consistent with previous testing by Prensa (2016);
- Fill materials tested generally met the criteria for classification as 'General Solid Waste' based on total and leachable concentrations. Asbestos impacted soils would be classified as 'Special Waste' (asbestos waste) in addition to the classification of the soil matrix. ACM is likely to be present in upper fill across the site;
- Previous leachability testing in water of two samples with elevated PAHs (Prensa, 2016) indicated the materials tested had a low propensity to leach PAHs. Current leachability testing in water of one soil sample with elevated lead indicated that the material had some potential to leach in water, with concentrations above ANZG (2018) criteria. It is noted, however, that the ASLP test method is an aggressive procedure which involves the tumbling of the sample in a leachant (ie distilled water) for a period of 16 to 20 hours, which is not likely to represent natural processes (ie infiltration of rainwater through the material). It is further noted that the lead impact is associated with localised near surface filling, and groundwater (the potential receptor) is located beneath low permeability residual soils at depths >6 m (ie not in contact with upper fill materials). The results of existing groundwater quality testing also indicated the absence of elevated lead concentrations (ie general absence of impacts to groundwater due to elevated lead concentration in upper fill materials);
- Groundwater testing was generally within the adopted guidelines with the exception of heavy metal concentrations (namely nickel and zinc) which were marginally above the adopted criteria (GILs for marine waters). It is noted that the groundwater concentrations in the up-gradient well (Bore 203) was typically higher or commensurate with concentrations detected in downgradient wells. It is also noted that no obvious visual or olfactory indications of impact to groundwater (ie no obvious staining, odours, slicks or free product) were detected during purging / sampling and no detectable concentrations of hydrocarbons (TRH, BTEX, PAH, VOCs) were identified within groundwater samples;
- Ground gas monitoring has indicated the general absence of mine gases or volatile hydrocarbons associated with USTs associated infrastructure and wash bay on the adjacent Police Station, within the bores and existing buildings / site grounds;
- General absence of significant aesthetic issues associated with site contamination as discussed.

As discussed, a systematic site coverage was not achieved in some areas during the DSI due to access constraints and ongoing demolition activities. Areas that were not accessible during investigations will be inspected as part of the site validation works in accordance with the unexpected finds protocols outlined in the RAP.

17.2 Updated Conceptual Site Model

The data collected for this DSI has generally confirmed that certain potential contaminant sources outlined in the CSM in Section 8 pose a potentially complete pathway to the identified receptor(s) whilst others do not. No additional sources of contamination have been identified as a result of the testing results. Groundwater data suggests that while some slightly elevated contaminants (i.e. nickel and zinc) were present in groundwater they appear to be associated with regional or upgradient sources and not on-site activities. Adverse impacts to adjacent surface water bodies are not anticipated based on the DSI findings.

Based on the above an updated Conceptual Site Model (CSM) has been prepared and described below in Table 23.

Table 23: Updated Conceptual Site Model

Known Sources	Primary Release Mechanism	Secondary Release Mechanism	Impacted Media	Identified Contaminants of Concern	Exposure Pathway	Potential Receptors		Actual Risk to Receptors based on DSI Findings
						Current	Future	
Filling imported across the site	Placement of filling on-site	Exposure / disturbance during proposed development	Soil	Asbestos	inhalation (dust), ingestion	Site workers, maintenance workers, consultants, trespassers, surface water bodies, groundwater, neighbouring properties in the case of groundwater or surface water migration	Site workers, residents, maintenance workers, consultants, trespassers, surface water bodies, groundwater, neighbouring properties in the case of groundwater or surface water migration	Low to Moderate (Bonded Asbestos impacts identified in soil)
Demolition of former structures or maintenance, renovations to existing / former buildings, underground formwork containing ACM	Demolition / maintenance of buildings / structures	Exposure / disturbance during proposed development	Soil	Asbestos	inhalation (dust), ingestion			Low to Moderate (Bonded Asbestos impacts identified in soil)

17.3 Suitability of the Site for the Proposed Development

Based on the findings of the DSI it is considered that the site can be made suitable for the proposed educational development subject to the preparation of a suitable RAP and the implementation of appropriate site remediation as per the recommendations outlined in Section 18.

18. Conclusions

Based on the DSI findings, remediation / management would be required to render the site suitable for the proposed educational facility from a contamination perspective due to the bonded ACM impacts identified in fill materials across the site.

While PAH, heavy metal and TRH impacts were identified on site exceeding the adopted Tier 1 health and ecological investigation / screening levels, remediation for these contaminants is not warranted based on statistical analysis and consideration of the ecological setting and the proposed development.

It is also considered that the contaminated fill/soil materials identified on-site are unlikely to be having a significant adverse impact on the groundwater quality and down-gradient receiving water quality given the nature of the contaminants, distribution across the site and the depth and nature of the groundwater identified on-site.

It is noted that the results of the investigations suggest that the USTs on the adjacent Police Station have not resulted in significant contamination to the subject site. In addition, the results of preliminary screening for HGG suggests a risk classification of very low to low with reference to NSW EPA (2019).

Management of the ACM impacted fill / soil materials under a suitable capping layer to prevent access/exposure from a contamination perspective could be considered at the site. Given the proposed development will comprise buildings with concrete slabs and concrete pavements across the majority of the site (ie minimal landscaping), the proposed development could be used to manage site contamination.

The results indicate that the bonded ACM impacted soils are situated broadly across the site within filling and also within formwork associated with the former Courthouse building and tunnel which will be retained on-site. Remediation via excavation, stripping and off-site disposal of impacted materials, is therefore not likely to be feasible from both a practical, cost-effective or time-effective perspective based on discussions with the client/developer.

The adopted remediation approach should be aligned with the proposed development and should be detailed in a site-specific remediation action plan (RAP) for the site. It is noted that on-site management of contamination will attract a notice on the Section 10.7 planning certificate for the site and require the preparation of a long term site management plan (SMP) to outline management procedures for maintenance of the capping layer and procedures for future disturbance (if required). On-site management of site contamination will require approval by the Site Auditor and regulatory authority.

In summary, development of the site will require remediation and management of bonded asbestos impacted soil, which should be conducted in accordance with a site-specific Remediation Action Plan (RAP).

The site is considered to be suitable for the proposed educational development, subject to appropriate remediation / management of contamination and regulatory approvals.

19. References

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20. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this project at 9 Church Street, Newcastle with reference to DP's proposal NCL190520.P.001.Rev1 dated 16 September 2019 and email variation of 12 November 2019 and acceptance received from Sita Vasanthakumar of Built Pty Limited dated 30 October 2019 and 15 November 2019 on behalf of Nihon Daigaku Australia Newcastle Pty Ltd. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Nihon Daigaku Australia Newcastle Pty Ltd and Built Pty Limited for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

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

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility. Due to time constraints, 'post-demolition' investigations were undertaken during the course of site demolition as requested by the developer/client. Parts of the site were therefore not accessible for inspection/investigation. Further inspection/investigation should be conducted during site remediation to confirm site conditions.

Asbestos has been detected by observation and 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 concrete, brick, tile, wood, glass, metal and bitumen, were located in below-ground filling, and these are considered as indicative of the possible presence of hazardous building materials (HBM), including asbestos.

Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions or to budget constraints (as discussed above), or to parts of the site being inaccessible and not available for inspection/sampling, or to vegetation preventing visual inspection and reasonable access. It is therefore considered possible that 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.

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 / groundwater) components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

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Appendix A

About This Report
Sampling Methods
Soil Descriptions
Symbols and Abbreviations
Borehole Logs (DP – Bores 201 to 203, MS1, MS2, MS4, GEO1, GEO2)
Test Pit Logs (Pits 301 to 304, 306, 308 to 310)
Borehole Logs (Presna – BH1 to BH10)

About this Report

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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.

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This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

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 Methods

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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.

Symbols & Abbreviations

Douglas Partners

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

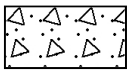
Symbols & Abbreviations

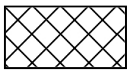
Graphic Symbols for Soil and Rock

General

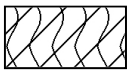
Asphalt

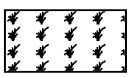
Road base

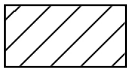

Concrete

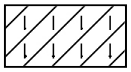

Filling

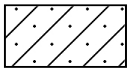
Soils


Topsoil

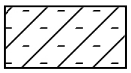

Peat

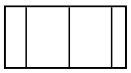

Clay

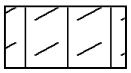

Silty clay

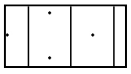

Sandy clay

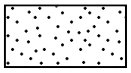
Gravelly clay

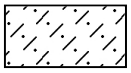

Shaly clay

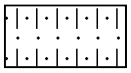

Silt


Clayey silt


Sandy silt


Sand

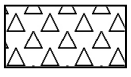

Clayey sand


Silty sand

Gravel

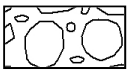
Sandy gravel

Cobbles, boulders

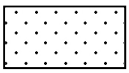

Talus

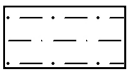
Sedimentary Rocks

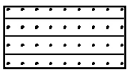
Boulder conglomerate

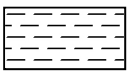

Conglomerate

Conglomeratic sandstone

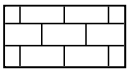

Sandstone


Siltstone

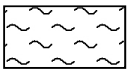

Laminite

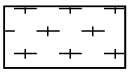

Mudstone, claystone, shale

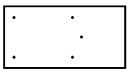
Coal


Limestone

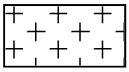
Metamorphic Rocks

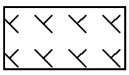

Slate, phyllite, schist

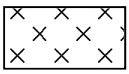

Gneiss

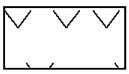

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia

Porphyry

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. 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	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

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

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with ‘Mix of Soil and Cobbles/Boulders’ with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

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
Friable	Fr	-

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	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

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;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) — Non-cohesive and free-running.
- Moist (M) — Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) — Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

BOREHOLE LOG

CLIENT: Nihon Daiguaku Australia Newcastle Pty Ltd
PROJECT: Proposed Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.6 AHD
EASTING: 386206.04
NORTHING: 6355797.97
DIP/AZIMUTH: 90°/--

BORE No: 201
PROJECT No: 91667.02
DATE: 12/12/2019
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.15	CONCRETE		D	0.15	E	PID<1		Gatic cover at surface
	0.17	FILLING - Generally comprising brown fine to medium rounded river gravel			0.19		PID<1		From 0m to 0.25m, concrete
	0.19								
	0.4	FILLING - Generally comprising asphalt (former pavement)			0.4				
22				U		E	PID=12		
	0.9	FILLING - Generally comprising, brown dark grey, gravelly sand, trace coal, asphalt, possibly ash gravel, moist			0.9				
1				U		E	PID=17		1
					1.2				
	1.3	FILLING - Pale grey mottled orange, red, black silty clay, trace iron staining, coal W>PL, slight to medium hydrocarbon odour			1.4				
				U		E	PID=8		
21		FILLING - Grey mottled orange clayey sand, trace coal, moist, slight hydrocarbon odour			1.6				
					1.9				From 0.25m to 3.4m, bentonite
2		FILLING - Grey, mottled orange, red and brown silty clay, trace to some coal, W>PL, slight hydrocarbon odour		U		E	PID=7		2 From 0m to 4.0m, 50mm diameter Class 18 PVC casing
					2.2				
		At 1.3m, clay content increasing			2.4				
				U		E	PID=2		
20					2.6				
	2.8	SILTY CLAY - (Completely weathered siltstone) pale grey, mottled orange, red W>PL			2.8				
3				U		E	PID=2		3
					3.1				
		At 3.2m, moisture content decreasing, increased silt content		U	3.2	E	PID<1		
		At 3.5m, W<PL		U	3.5	E	pp >280-330 PID<1		
19		At 3.8m, strength increasing							
				U	4.1	E	pp >400 PID<1		4
4									
				U	4.5	E	PID<1		
18									
				U	5.1	E	PID<1		5
5		At 5.2m to 5.4m, grey brown							
		At 5.4m, grey, orange, mottled red		U	5.5	E	PID<1		
17									
		From 6.0m, some iron cementing, mottled orange red		U	6.1	E	PID<1		6
6									
		At 6.5m to 6.9m, iron cementing, moisture content increasing W>PL		U	6.5	E	PID<1		From 3.4m to 10m, 5/2mm gravel
16									
7				U	7.1	E	pp = 350-380 PID<1		7 From 4.0m to 10m, 50mm diameter Class 18 PVC Screen
	7.3	SILTSTONE - Grey mottled red, highly weathered		A	7.35	E	PID=1		
				A	7.4				
15									
				A	7.9	E	PID=19		

RIG: Terratest **DRILLER:** Tucker **LOGGED:** Wilson / Falla **CASING:**

TYPE OF BORING: MC5 Push tube from 0.15m to 7.3m, 125mm diameter SFA with TC bit from 7.3m to 10m

WATER OBSERVATIONS: Free groundwater observed at approx 8m during drilling

REMARKS: Push tube refusal at 7.3m on iron cemented siltstone, surface levels determined by levelling

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: Nihon Daiguaku Australia Newcastle Pty Ltd
PROJECT: Proposed Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.6 AHD
EASTING: 386206.04
NORTHING: 6355797.97
DIP/AZIMUTH: 90°/--

BORE No: 201
PROJECT No: 91667.02
DATE: 12/12/2019
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		SILTSTONE - Grey mottled red, highly weathered *(continued)*							
		From 8.0m, wet							
	9			A	8.9	E	PID<1		9
		At 9.0m, dark grey, carbonaceous bands							
				A	9.8	E	PID<1		
	10 10.0				10.0	E	PID<1		10 End cap
		Bore discontinued at 10.0m, limit of investigation							

RIG: Terratest **DRILLER:** Tucker **LOGGED:** Wilson / Falla **CASING:**

TYPE OF BORING: MC5 Push tube from 0.15m to 7.3m, 125mm diameter SFA with TC bit from 7.3m to 10m

WATER OBSERVATIONS: Free groundwater observed at approx 8m during drilling

REMARKS: Push tube refusal at 7.3m on iron cemented siltstone, surface levels determined by levelling

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: Nihon Daiguaku Australia Newcastle Pty Ltd
PROJECT: Proposed Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.6 AHD
EASTING: 386200.53
NORTHING: 6355780.09
DIP/AZIMUTH: 90°/--

BORE No: 202
PROJECT No: 91667.02
DATE: 11 - 12/12/2019
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.13	CONCRETE							Gatic cover at surface From 0m to 0.1m, Concrete From 0.1m to 0.3m, bentonite
22	0.35	FILLING - Generally comprising grey fine to medium sandy gravel, subrounded and subangular gravel, possible trace fine to medium slag, wet (concrete coring)		U	0.3	E	PID<1		
				U	0.6	E	pp = 400-410		
	0.8	FILLING - Generally comprising mottled orange brown silty clay, trace gravel and sand, M<Wp							
1		From 0.7m, trace to some fine to medium grained sand		U	1.0	E	PID<1	1	From 0.3m to 1.9m, Backfill
	1.1	FILLING - Generally comprising brown silty sand fill, some gravel, some intermixed coal fragments, moist							
21		CLAY - Brown mottled orange silty clay with silt, low plasticity, M<Wp		U	1.5	E	pp = 440-460 PID<1		
2		From 1.9m, brown mottled red, trace medium subangular gravel		U	2.0	E	pp >450 PID<1	2	
		From 2.3m, grey mottled red		U	2.5	E	PID<1		From 0m to 4.5m, 50mm diameter Class 18 PVC casing
20		From 2.6m, becoming grey with silt			2.8	E	pp >450		
	2.9								
3		SILTY CLAY - Grey, very stiff to hard (completely weathered siltstone)		U	3.0	E	PID<1	3	From 1.9m to 4.0m, Bentonite
		At 3.25m, DT45 refusal		U	3.5	E	PID<1		
19									
4				U	4.0	E	pp = 250-300 PID<1	4	
		At 4.1m, DT32 refusal							
		From 4.1m, alternating grey and 70% iron stained		U	4.5	E	PID<1		
18				U	4.8	E	PID<1		
		From 4.75m to 4.85m, iron stained band, possible slight hydrocarbon odour		U	5.0	E	pp >600 PID<1		
5								5	
17									
6				U	6.0	E	PID<1	6	
				U	6.5	E	PID<1		
16		From 6.7m, 6.8m, wet lense in highly weathered rock							
7				U	7.0	E	PID<1	7	
				U	7.3	E	PID<1		
	7.4								
15		SILTSTONE / SANDSTONE - Grey, extremely weathered							
		From 7.8m to 8.0m, decrease in drilling resistance		A	7.8	E	PID<1		
	8.0								

RIG: Terratest **DRILLER:** Tucker **LOGGED:** Wilson **CASING:**

TYPE OF BORING: DT45 dual push tube to 3.25m, DT325 Push tube to 4.1m, MC5 push tube to 7.4m then auger with TC bit to termination

WATER OBSERVATIONS: No free groundwater observed during drilling

REMARKS: No sample recovery 5.0m to 5.9m (disturbed during drilling), surface levels determined by levelling

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: Nihon Daiguaku Australia Newcastle Pty Ltd
PROJECT: Proposed Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.6 AHD
EASTING: 386200.53
NORTHING: 6355780.09
DIP/AZIMUTH: 90°/--

BORE No: 202
PROJECT No: 91667.02
DATE: 11 - 12/12/2019
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		SILTSTONE / CLAYSTONE - Extremely weathered, grey siltstone / claystone, with trace fine grained sand							From 4.0m to 12m, 5/2mm gravel
		From 8.1m, to 8.3m, decrease in drilling resistance (possible moisture)							From 4.5m to 12m, 50mm diameter Class 18 PVC Screen
				A	8.8		PID<1		
				A	9.8		PID<1		
		From 10.8m, to 11m, very low strength		A	10.8		PID<1		
				A	11.8		PID<1		
	12.0	Bore discontinued at 12.0m, limit of investigation							End cap

RIG: Terratest **DRILLER:** Tucker **LOGGED:** Wilson **CASING:**

TYPE OF BORING: DT45 dual push tube to 3.25m, DT325 Push tube to 4.1m, MC5 push tube to 7.4m then auger with TC bit to termination

WATER OBSERVATIONS: No free groundwater observed during drilling

REMARKS: No sample recovery 5.0m to 5.9m (disturbed during drilling), surface levels determined by levelling

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Nihon Daiguaku Australia Newcastle Pty Ltd
PROJECT: Proposed Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.6 AHD
EASTING: 386179.56
NORTHING: 6355760.17
DIP/AZIMUTH: 90°/--

BORE No: 203
PROJECT No: 91667.02
DATE: 11 - 12/12/2019
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.09	ASPHALT		U	0.0	E			Gatic cover at surface
				U	0.05	E	PID<1		
	0.3	FILLING - Brown, gravely sand, fine to medium grained, humid			0.1				From 0m to 0.1m, Concrete
	0.4								
22		FILLING - Dark brown, clayey sand, fine to medium grained, trace coal, gravel, possibly slag		U	0.5	E	PID<1		
	1	SANDY CLAY - Brown, mottled orange, fine to medium grained, M<Wp							1
		At 0.4m, tree root							
		From 1.2m, yellow, mottled orange, fine to medium grained, trace black coal flecks							
				U	1.5	E	PID<1		
21	1.6	At 1.5m, tree roots			1.6				
		CLAYEY SILTY SAND - Pale grey, some orange mottling, fine to medium grained							From 0.1m to 3.5m, bentonite
	2			U	2.0	E	PID<1		2 From 0m to 4.0m, 50mm diameter Class 18 PVC casing
		At 2.2m, trace black coal flecks							
		At 2.4m, orange, mottled grey		U	2.5	E	PID<1		
20	2.6	SILTY CLAY - Grey mottled red, hard (completely weathered siltstone)							
	3			U	3.0	E	PID<1		3
19				U	3.5	E	PID<1		
	4			U	4.0	E	PID<1		4
				U	4.2	E			
18				U	4.5	E	pp >600 PID<1		
	4.8	SILTSTONE - Pale grey, mottled orange, highly weathered							
	5			U	5.0	E	PID<1		5
					5.2	E	PID<1		
17				U	5.5	E	PID<1		
				U	5.8	E	PID<1		
	6			U	6.0	E	PID<1		6
16				U	6.5	E	PID<1		
									From 3.5m to 10m, 2mm gravel screen
	7			U	7.0	E	PID<1		7 From 4.0m to 10m, 50mm diameter Class 18 PVC screen
		At 7.1m, clay layer			7.1	E	pp = 540 PID<1		
15				U	7.5	E	PID<1	▼	
				U	8.0	E	PID<1		

RIG: Terratest **DRILLER:** Tucker **LOGGED:** Wilson **CASING:**

TYPE OF BORING: MC5 push tube to 8.3m, SFA (125mm diameter, TC bit) to 10m

WATER OBSERVATIONS: No free groundwater observed during drilling. groundwater measured @ 7.65m on 12.12.19 prior to drilling recommencing

REMARKS: Surface levels determined by levelling

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: Nihon Daiguaku Australia Newcastle Pty Ltd
PROJECT: Proposed Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.6 AHD
EASTING: 386179.56
NORTHING: 6355760.17
DIP/AZIMUTH: 90°/--

BORE No: 203
PROJECT No: 91667.02
DATE: 11 - 12/12/2019
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		SILTSTONE - Pale grey, mottled orange, highly weathered *(continued)*		A	8.3	E	PID<1		
	9			A	9.0	E	PID<1		9
				A	9.8	E	PID=28		
	10 10.0	Bore discontinued at 10.0m, limit of investigation							10 End cap
	11								11
	12								12
	13								13
	14								14
	15								15

RIG: Terratest **DRILLER:** Tucker **LOGGED:** Wilson **CASING:**

TYPE OF BORING: MC5 push tube to 8.3m, SFA (125mm diameter, TC bit) to 10m

WATER OBSERVATIONS: No free groundwater observed during drilling. groundwater measured @ 7.65m on 12.12.19 prior to drilling recommencing

REMARKS: Surface levels determined by levelling

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.4 AHD
EASTING: 386167.1
NORTHING: 6355771.9
DIP/AZIMUTH: 90°/--

BORE No: MS1
PROJECT No: 91667.00
DATE: 14 - 20/11/2019
SHEET 1 OF 11

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
22		FILL / GRAVELLY SILT (ML) - Low plasticity, dark brown, fine to medium subangular gravel, trace fine to medium grained sand, M<Wp										
									S			pp >450 10,6,7 N = 13
21	1											
									S			6,8,8 N = 16 pp >450
	1.9	SILTY CLAY (CI) - Medium plasticity, brown, trace medium grained sand, M<Wp, hard										
20	2											
	3	From 3.0m, becoming grey							S			pp = 420 5,5,8 N = 13
19												
	4											
18		From 4.5m, fine to medium grained sand with iron staining							S			pp >450 9,9,12 N = 21
	5											
17												
	6								S			2,6,9 N = 15 pp >450
16												
	7	From 7.0m, extremely weathered ironstone bands, fragmented and friable										
15									S			pp >450 8,14,15 N = 29

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 10.4m

TYPE OF BORING: Auger with tc bit to 9.1m, washbore to 9.7m, HQ core to 87.21m

WATER OBSERVATIONS: Wet smear observed on SPT tube at approx 10.15m. 100% drill fluid loss at 77.9m

REMARKS: Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.4 AHD
EASTING: 386167.1
NORTHING: 6355771.9
DIP/AZIMUTH: 90°/--

BORE No: MS1
PROJECT No: 91667.00
DATE: 14 - 20/11/2019
SHEET 2 OF 11

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
		SILTY CLAY (CI) - Medium plasticity, brown, trace medium grained sand, M<Wp, hard *(continued)*										
	9.1	SILTSTONE - Extremely weathered rock, grey siltstone							S			16,8/10,bouncing refusal pp >450
									S			13,24,23 N = 47 pp >450
	10.15											
	10.25	SILTSTONE - Grey with iron staining interbedded fine grained sandstone						10.24m: Pt, sh, inf, cly	C	100	78	PL(A) = 0.48 PL(D) = 0.44
	10.6	SANDSTONE - Grey, fine to medium grained with iron staining						10.61m: Lam, sh, co, fe, pl, sm				
		SANDSTONE - Grey, medium grained with iron staining, partings 10°						10.69m: Lam, sh, co, fe, pl, sm 10.82m: Lam, sh, co, fe, pl, sm 10.84m: Lam, sh, co, fe, pl, sm 10.95m: Lam, sh, co, fe, pl, sm 11m: Lam, sh, co, fe, pl, sm	C	89	42	PL(D) = 0.6 PL(A) = 0.46 PL(D) = 0.13 PL(A) = 0.39
	11.14	CORE LOSS						11.14m: CORE LOSS: 140mm				
	11.28	SANDSTONE - Grey, medium to coarse grained 11.56m-11.63m, pebbly band						11.55m-11.68m, J, 60°, cln, pl, ro				PL(D) = 0.52
		13.82m-14.02m, carbonaceous bedding ~10°							C	100	100	PL(A) = 0.73 PL(D) = 0.51
								14.51m: Pt, sh, co, cbs, pl, sm				PL(A) = 1.32 PL(D) = 0.88
		14.85m-15.21m, carbonaceous bedding ~10°						14.85m: B, sh, ti, ir, sm 15.21m: Pt, sh, co, cbs, pl, sm				PL(A) = 1.46 PL(D) = 1.74
	15.64	SILTSTONE - Grey with iron staining interbedded fine grained sandstone 10mm in parts						15.81m: Pt, sh, co, cbs,	C	100	87	

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 10.4m

TYPE OF BORING: Auger with tc bit to 9.1m, washbore to 9.7m, HQ core to 87.21m

WATER OBSERVATIONS: Wet smear observed on SPT tube at approx 10.15m. 100% drill fluid loss at 77.9m

REMARKS: Surface level interpolated from site survey plan.

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)

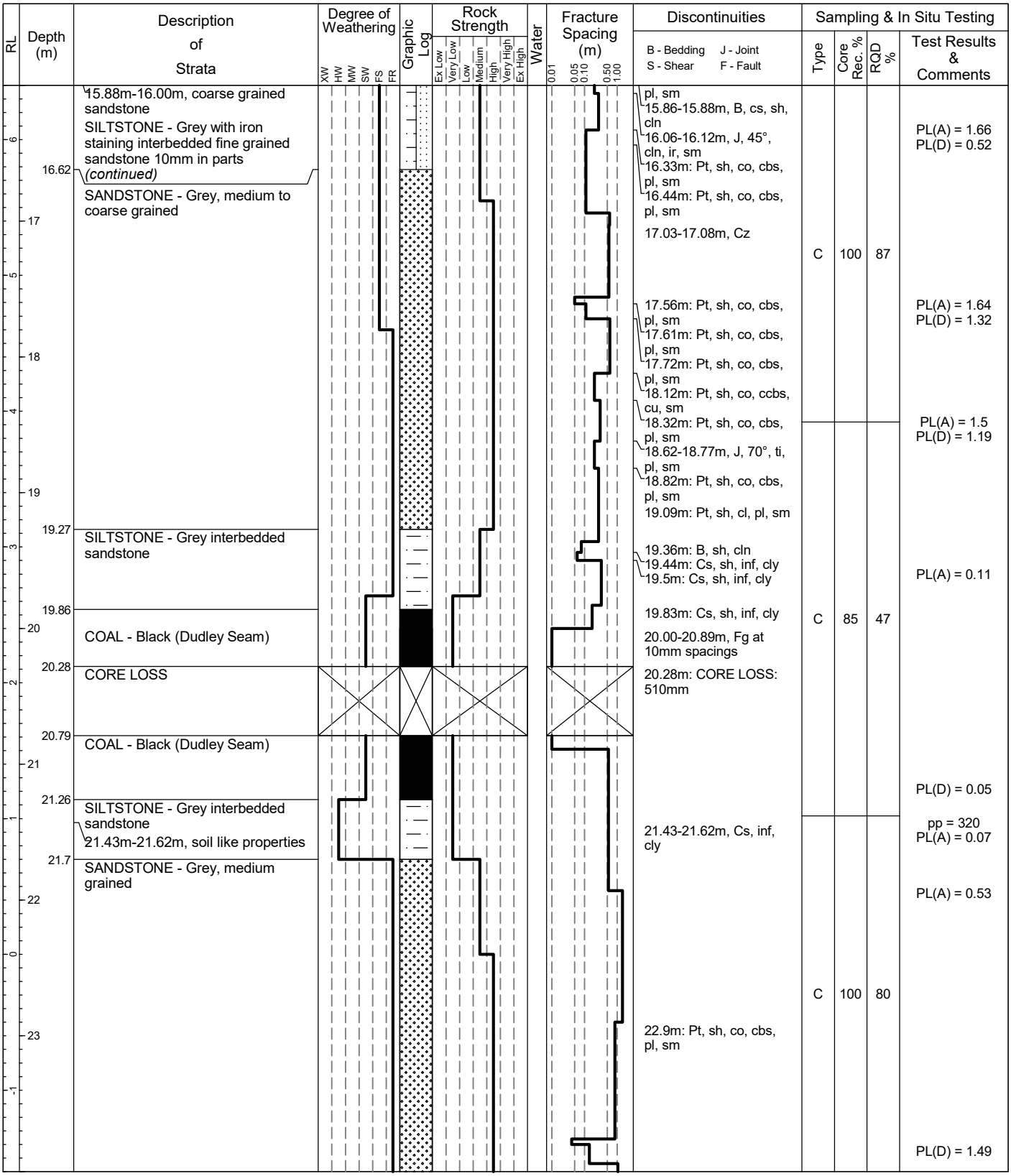
Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.4 AHD
EASTING: 386167.1
NORTHING: 6355771.9
DIP/AZIMUTH: 90°/--

BORE No: MS1
PROJECT No: 91667.00
DATE: 14 - 20/11/2019
SHEET 3 OF 11



RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 10.4m

TYPE OF BORING: Auger with tc bit to 9.1m, washbore to 9.7m, HQ core to 87.21m

WATER OBSERVATIONS: Wet smear observed on SPT tube at approx 10.15m. 100% drill fluid loss at 77.9m

REMARKS: Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.4 AHD
EASTING: 386167.1
NORTHING: 6355771.9
DIP/AZIMUTH: 90°/--

BORE No: MS1
PROJECT No: 91667.00
DATE: 14 - 20/11/2019
SHEET 4 OF 11

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-2		SANDSTONE - Grey, medium grained *(continued)*							C	100	80	
	25											
-3								25.3m: J, 45°, cln, pl, ro				
								25.61m: J, 30°, cln, pl, ro	C	100	100	
	26											
-4												
	27											
-5												
	28											
-6								28.23m: Pt, 3°, pl, ro, cbs, lam				
								28.66m: J, 30°, pl, ro				
								28.86m: J, 60°, pl, ro	C	100	100	
	29											
-7												
	30											
-8	30.43							30.33m: J, 80°, pl, sm, inf cly				
		LAMINITE - Grey, interbedded siltstone and sandstone										
	31											
								31.15m: Depositional fault, 80°, h, 2mm throw	C	100	71	
-9												PL(A) = 2.85 PL(D) = 1.79
								31.8m: Pt, sh, cbs lam, pl, sm				

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 10.4m

TYPE OF BORING: Auger with tc bit to 9.1m, washbore to 9.7m, HQ core to 87.21m

WATER OBSERVATIONS: Wet smear observed on SPT tube at approx 10.15m. 100% drill fluid loss at 77.9m

REMARKS: Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.4 AHD
EASTING: 386167.1
NORTHING: 6355771.9
DIP/AZIMUTH: 90°/--

BORE No: MS1
PROJECT No: 91667.00
DATE: 14 - 20/11/2019
SHEET 5 OF 11

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
-10		LAMINITE - Grey, interbedded siltstone and sandstone *(continued)*							C	100	71	
								32.6m: Pt, sh, un, sm 32.67m: Pt, sh, un, sm, cly 32.84m: J, 25°, un, sm, cly 32.9m: J, 45°, pl, ro 33.04m: J, 45°, fg, inf 33.1m: J, 45°, h 33.25m: J, 75°-45°, un, co, cal	C	100	54	
-11	33 32.99	SILTSTONE - Grey										
	33.57	COAL - Black, bright (Yard Seam)						33.6-33.8m, fg				
	34											
	34.14	SILTSTONE						34.01m: J, 80°, un, pl, sm 34.1m: fg 34.26m: J, 50°, ir, sm 34.35m: Pt, cbs, pl, po 34.52m: Pt, cbs, pl, po 34.57m: Pt, fg, inf 34.69m: J, 70°, un 34.85m: J, 50°, un, sm	C	100	38	
-12	35							35.1m: J, 60°, cln, pl, po 35.22m: Pt, sh, cln, un, sm 35.26m: J, sv, ir, ro				
-13								35.59m: Pt, sh, cln, un, sm				
	35.79	COAL						35.77m: Pt, sh, cln, pl, sm				
	35.85							35.85m: CORE LOSS: 50mm 35.85-35.9m, fg				
	36 35.9	CORE LOSS										
-14		SILTSTONE - Grey with sandstone laminations										
								36.73m: Pt, sh, cln, pl, sm 36.78m: Pt, sh, cln, pl, sm 36.9m: J, sv, h, calcite 36.94m: Pt, sh, ti 36.98m: Pt, sh, un, sm 37m: Pt, sh, un, sm 37.01m: Pt, sh, un, sm 37.04m: J, 30°, h 37.06m: Pt, sh, h 37.12m: Pt, sh, cbs lam (coal frags) 37.15-37.16m, fg at 0.01m 37.71m: Pt, sh, pl, sm, cly 37.83m: Pt, sh, pl, sm, cly 38m: J, sv, ti, discontinous	C	100	89	
	37											
-15		37.3m-37.7m, sandstone										
	38											
-16		38.35m-38.4m, siderite										
	39							38.5m: J, 80°, ti, calcite lined 39m: J, 80°, ti, calcite 39.3m: J, 60°, ti, cln				
-17								39.53m: Pt, sh, pl, sm 39.59m: J, 60°, pl, po	C	100	95	

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 10.4m

TYPE OF BORING: Auger with tc bit to 9.1m, washbore to 9.7m, HQ core to 87.21m

WATER OBSERVATIONS: Wet smear observed on SPT tube at approx 10.15m. 100% drill fluid loss at 77.9m

REMARKS: Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.4 AHD
EASTING: 386167.1
NORTHING: 6355771.9
DIP/AZIMUTH: 90°/--

BORE No: MS1
PROJECT No: 91667.00
DATE: 14 - 20/11/2019
SHEET 6 OF 11

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
-18		SILTSTONE - Grey with sandstone laminations *(continued)*						39.96m: Pt, sh, pl, sm				
		40.51m-40.78m, siltstone, pale grey with siderite						40.4m: J, 10°, cln, pl, sm 40.41m: Pt, sh, un, sm 40.47-40.51m, B, cln, un, sm 40.78m: B, cln, un, sm 40.82-40.88m, fg 40.9m: Pt, sh, cbs, plm sm	C	100	95	
-19	41							41.56m: Pt, sh, cln, pl, sm				PL(A) = 1.68 PL(D) = 1.07
	42	41.96m-42.1m, sandstone, grey						41.97m: Pt, sh, un, ro				
-20												
	43								C	100	99	
-21								43.8m: J, 45°, cln, pl, sm				
	44							44.09m: Pt, sh, inf, cly, pl, sm				
-22								44.51m: J, 0-45°, un, sm 44.54m: J, 70°, cln, pl, sm				
	45							45.09m: J, 60°, ti				
-23								45.48m: P, sh, cln, pl, sm 45.52m: J, sv, ti, pl 45.7m: J, 10°, un, sm				
	46											
-24								46.39m: J, sv, ti, pl, discontinuous 46.56m: J, 60°, inf, cly, pl 46.6m: J, 60°, pl, sm 46.61m: J, 70°, pl, sm 46.63m: J, 70°, ti, pl 46.65m: J, 70°, ti, pl 46.75m: Pt, sh, cln, pl, sm 46.8m: vn, calcite 47.06m: Pt, sh, cln, pl, sm 47.64m: Cs, sh, 5mm 47.79m: Pt, sh, cln, pl,	C	100	95	
	47											
-25												

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 10.4m

TYPE OF BORING: Auger with tc bit to 9.1m, washbore to 9.7m, HQ core to 87.21m

WATER OBSERVATIONS: Wet smear observed on SPT tube at approx 10.15m. 100% drill fluid loss at 77.9m

REMARKS: Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.4 AHD
EASTING: 386167.1
NORTHING: 6355771.9
DIP/AZIMUTH: 90°/--

BORE No: MS1
PROJECT No: 91667.00
DATE: 14 - 20/11/2019
SHEET 7 OF 11

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-26		SILTSTONE - Grey with sandstone laminations *(continued)*						sm	C	100	95	PL(A) = 1.55 PL(D) = 0.98
	49											
-27								49.33m: Pt, sh, cln, pl, sm	C	100	97	
	49.84											
	50	SANDSTONE - Medium grained, grey with siltstone laminations										
-28		50.2m-50.27m, siderite										
		50.67m-50.74m, siderite						50.67m: Pt, 10°, cln, ir, sm 50.69m: J, 10°, cln, pl, sm 50.7m: J, sv, cln, pl, sm 50.72m: J, 20°, ti				PL(A) = 4.83 PL(D) = 4.74
	51											
-29								51.65m: J, sv, 290mm cu, ro, open 3mm 51.78m: J, sv, 10mm pl, ro 51.84m: Pt, sh, pl, sm				
	52											
-30									C	100	77	
	53							53.2m: Pt, sln, pl, sm 53.25m: J, 50°, cu, ro 53.3-53.41m, J, sv, pl, ro				
-31												
	54											
-32		54.78m-55.05m, siltstone band						54.79m: Pt, sh, cln, pl, sm				
	55								C	100	98	
-33		55.28m-55.53m, coarse sandstone band with fine pebbles 55.28m-55.97m, siltstone band						55.82m: J, 20°, cln, pl,				

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 10.4m

TYPE OF BORING: Auger with tc bit to 9.1m, washbore to 9.7m, HQ core to 87.21m

WATER OBSERVATIONS: Wet smear observed on SPT tube at approx 10.15m. 100% drill fluid loss at 77.9m

REMARKS: Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.4 AHD
EASTING: 386167.1
NORTHING: 6355771.9
DIP/AZIMUTH: 90°/--

BORE No: MS1
PROJECT No: 91667.00
DATE: 14 - 20/11/2019
SHEET 8 OF 11

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-34		SANDSTONE - Medium grained, grey with siltstone laminations *(continued)*						sm 55.88m: Pt, sh, cln, pl, sm 56.29m: Pt, sh, cbs, pl, sm	C	100	98	
	57											
-35		57.24m-57.3m, siderite						57.24m: Pt, sh, cln, cu, cm 57.52m: vn, cbs				PL(A) = 2.86 PL(D) = 2.51
	58	58.02m-58.07m, siderite						57.83m: F, 45°, h, 2mm throw 58.15m: J, sv, h, calcite				
-36								58.4m: J, sh, cln, ir, sm				
	59							58.78m: Pt, sh, pl, sm	C	100	99	
-37								59.15m: J, sv, inf, calcite				
	60							59.91m: Pt, sh, pl, sm 60.22m: J, 45°, pl, ti				
-38		At 60.53m, pyrite crystals						60.52m: v, sh, pyrite 60.58m: Pt, pl, cln, sm				
	61							61.04m: Pt, sh, cln, pl, sm 61.09m: Pt, sh, cln, pl, sm				
-39		61.81m-61.85m, siderite							C	100	96	
	62							62.07m: Pt, sh, cln, pl, sm				
-40												
	63							63.04m: Pt, sh, cln, pl, sm				
-41								63.51m: Pt, un, clc 63.56m: J, 45°, cln, pl, sm	C	100	72	

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 10.4m

TYPE OF BORING: Auger with tc bit to 9.1m, washbore to 9.7m, HQ core to 87.21m

WATER OBSERVATIONS: Wet smear observed on SPT tube at approx 10.15m. 100% drill fluid loss at 77.9m

REMARKS: Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.4 AHD
EASTING: 386167.1
NORTHING: 6355771.9
DIP/AZIMUTH: 90°/--

BORE No: MS1
PROJECT No: 91667.00
DATE: 14 - 20/11/2019
SHEET 9 OF 11

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-42		SANDSTONE - Medium grained, grey with siltstone laminations *(continued)*						64.03m: J, 45°, cln, pl, sm 64.3m: J, 60°, ti, discontinuous 64.38m: J, 60°, pl 64.44m: J, sh-60°, ir, ro 64.6m: J, sv, inf calcite				
-43	65							64.93m: J, sv, inf, calcite 65.04m: J, 70°, pl, discontinuous 65.25m: J, 70°, ir, ro	C	100	72	
-44	66							65.7m: Pt, 10°, cln, sm 65.74m: 66.13 fr, 80°, pl, ro 66.28m: J, sv, ro 66.34m: Pt, sh, un, ro 66.56m: J, sv, h 66.72m: Pt, sh, un, ro				PL(A) = 1.59 PL(D) = 2.54
-45	67								C	100	95	
-46	68							67.83m: J, 80°, cln, pl, ro 67.88m: Pt, 50mm fragment, inf, cly 10mm	C	100	93	
-47	69							69.1m: J, sv, ti, discontinuous				
-48	70							70.03m: J, 10°, cln, cu, sm 70.45m: J, sh, cln, pl, sm	C	100	96	
-49	71							71.22m: Pt, 10°, cln, pl, sm 71.23m: Pt, 10°, cln, pl, sm 71.24m: Pt, 10°, cln, pl, sm 71.32m: Pt, 10°, inf, fg				

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 10.4m

TYPE OF BORING: Auger with tc bit to 9.1m, washbore to 9.7m, HQ core to 87.21m

WATER OBSERVATIONS: Wet smear observed on SPT tube at approx 10.15m. 100% drill fluid loss at 77.9m

REMARKS: Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.4 AHD
EASTING: 386167.1
NORTHING: 6355771.9
DIP/AZIMUTH: 90°/--

BORE No: MS1
PROJECT No: 91667.00
DATE: 14 - 20/11/2019
SHEET 10 OF 11

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-50		SANDSTONE - Medium grained, grey with siltstone laminations *(continued)*						71.67m: J, 70°, h, calcite 71.95m: J, 70°, h, calcite 72.14m: J, 70°, h, calcite	C	100	96	
-51	73							73.09m: J, 45°, ti, pl, discontinuous 73.15m: J, sh, cln, st, sm				
-52	74							73.78m: J, sv, pl, ro	C	100	95	
-53	75							74.37m: Pt, 45°, co, cbs, pl, sm 75.27m: Pt, 30°, co, cbs, pl, sm 75.44m: Pt, 10°, inf, cly (5mm), cu 75.52m: J, 70°, pl, ro 75.62m: J, 80°, pl, ro				PL(A) = 3.83 PL(D) = 2.63
-54	76							76.2m: Pt, sh, pl, ro 76.26m: J, 45°, cln, pl, ro 76.52m: P, 10°, pl, sm	C	100	85	
-55	77							76.96m: J, 80°, pl, ti				PL(A) = 3.17 PL(D) = 2.06 PL(D) = 2.94
-56	78 77.94	VOID (no drill resistance)						77.72m: Pt, sh, pl, sm 77.84m: fz, 50mm, ro				
-57	79								C	0	0	

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 10.4m

TYPE OF BORING: Auger with tc bit to 9.1m, washbore to 9.7m, HQ core to 87.21m

WATER OBSERVATIONS: Wet smear observed on SPT tube at approx 10.15m. 100% drill fluid loss at 77.9m

REMARKS: Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.4 AHD
EASTING: 386167.1
NORTHING: 6355771.9
DIP/AZIMUTH: 90°/--

BORE No: MS1
PROJECT No: 91667.00
DATE: 14 - 20/11/2019
SHEET 11 OF 11

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-58		VOID (no drill resistance) *(continued)*							C	0	0	
	80.64	RUBBLE / VOID (drill resistance)										
-59	81											
-60	82								C	21	0	
-61	83											
	83.55	RUBBLE - Drill resistance from 80.65m. Rotating drill head then lowering, rubble comprised of siltstone fragments up to 100mm										
	83.78											
-62	84											
	84.01	RUBBLE - Drill resistance from 80.65m. Rotating drill head then lowering (repeat), rubble comprised of coal and siltstone fragments up to 50mm										
		COAL - Horizontally bedded, black (Borehole Seam)						84.33m: Pt, sh, pl, ro 84.39m: Pt, fg 0.01m 84.42m: Pt, sh, pl, fg 0.01m 84.45m: Pt, sh, pl, ro 84.48m: Pt, sh, pl, ro 84.53m: Pt, sh, fg 0.01m 84.58m: Pt, sh, cu, ro 84.62m: Pt, sh, pl, sm 84.92m: J, 70°, pl, ti 85.03m: J, 70°, pl, ti 85.11m: Pt, sh, fg 85.22m: J, 60°, pl, ti 85.34m: J, sv, pl, ti, discontinuous 85.6m: J, 60° 85.67m: J, 60°, pl, ro 86m: J, sv, un, ro 86.04m: J, 10°, pl, ro 86.24m: J, 15°, pl, sm 86.25m: J, sv, un, sm 86.26m: Pt, sh, pl, sm 86.31m: Pt, sh, cbs, pl, sm 86.32m: Pt, sh, cbs, pl, sm 86.37m: J, sv, cu, sm 86.62m: Pt, sh, pl, ro 86.72m: J, 80°, pl, ti 86.74m: J, 80°, pl, ti 86.83m: Pt, sh, pl, ro 87m: J, 70°, pl, ro	C	100	41	
-63	85											
	86											
	86.2	STONEY COAL / CARBONACEOUS SILTSTONE - Black										
-64	86.42											
		SANDSTONE - Grey (Waratah Sandstone)										
	87											
	87.21	Bore discontinued at 87.21m, limit of investigation										
-65												

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 10.4m

TYPE OF BORING: Auger with tc bit to 9.1m, washbore to 9.7m, HQ core to 87.21m

WATER OBSERVATIONS: Wet smear observed on SPT tube at approx 10.15m. 100% drill fluid loss at 77.9m

REMARKS: Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 23.4 AHD
EASTING: 386147.7
NORTHING: 6355772.7
DIP/AZIMUTH: 90°/--

BORE No: MS2
PROJECT No: 91667.00
DATE: 20 - 22/11/2019
SHEET 1 OF 12

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
23	0.2	FILL / TOPSOIL / SILTY SAND (SM) - Fine to medium grained sand, dark brown, low plasticity silt, moist										
	0.6	FILL / SANDY GRAVEL (GP) - Fine to medium sized subangular gravel, dark brown, fine to medium grained sand, trace silt, moist							D			PID<1
22	1	FILL / SANDY GRAVEL (GP) - Fine to medium sized subangular gravel, pale brown, fine to medium grained sand, moist										
	1.5	FILL / SILTY SAND (SM) - Fine to medium grained sand, brown, low plasticity silt, moist										
21	1.7	FILL / SILTY SAND (SM) - Fine to medium grained, pale brown, low plasticity silt, M<Wp							D			PID<1
	2											
	3								D			PID<1
20	3.0	SILTY CLAY (CI) - Medium plasticity, brown, trace fine to medium grained sand, M<WP							D			PID<1
	4	From 4.0m, becoming grey										
19												
	5											
18												
	5.9	SANDY CLAY / CLAYEY SAND (CI/SC) - Medium plasticity / medium grained sand, grey, M<Wp / moist							D			PID<1
17	6											
	7											
16		From 7.5m, becoming wet / M>Wp							D			PID<1

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12.1m

TYPE OF BORING: Auger with tc bit to 12.1m, washbore to 74.75m, HQ coring to 88.46m

WATER OBSERVATIONS: Free groundwater obscured below 11m depth due to drill fluids

REMARKS: Practical auger refusal at 12.1m. Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 23.4 AHD
EASTING: 386147.7
NORTHING: 6355772.7
DIP/AZIMUTH: 90°/--

BORE No: MS2
PROJECT No: 91667.00
DATE: 20 - 22/11/2019
SHEET 2 OF 12

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
15		SANDY CLAY / CLAYEY SAND (CI/SC) - Medium plasticity / medium grained sand, grey, M<Wp / moist *(continued)*										
9	9.0	SILTY CLAY (CI) - Medium plasticity, grey mottled yellow, trace medium grained sand, M>Wp							D			PID<1
14												
10												
13												
11		From 11.0m, extremely weathered rock										
12												
12	12.1	SILTSTONE / SANDSTONE										
11												
13												
10												
14												
9												
15												
8												

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12.1m

TYPE OF BORING: Auger with tc bit to 12.1m, washbore to 74.75m, HQ coring to 88.46m

WATER OBSERVATIONS: Free groundwater obscured below 11m depth due to drill fluids

REMARKS: Practical auger refusal at 12.1m. Surface level interpolated from site survey plan.

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
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BOREHOLE LOG

CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 23.4 AHD
EASTING: 386147.7
NORTHING: 6355772.7
DIP/AZIMUTH: 90°/--

BORE No: MS2
PROJECT No: 91667.00
DATE: 20 - 22/11/2019
SHEET 3 OF 12

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		SILTSTONE / SANDSTONE *(continued)*										
	17											
	18											
	19											
	20											
	21											
	21.15	COAL (Dudley Seam) - Inferred from drill cuttings and drill resistance										
	22											
	22.3	INTERBEDDED SILTSTONE / SANDSTONE										
	23											

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12.1m

TYPE OF BORING: Auger with tc bit to 12.1m, washbore to 74.75m, HQ coring to 88.46m

WATER OBSERVATIONS: Free groundwater obscured below 11m depth due to drill fluids

REMARKS: Practical auger refusal at 12.1m. Surface level interpolated from site survey plan.

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 23.4 AHD
EASTING: 386147.7
NORTHING: 6355772.7
DIP/AZIMUTH: 90°/--

BORE No: MS2
PROJECT No: 91667.00
DATE: 20 - 22/11/2019
SHEET 4 OF 12

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-1	25	INTERBEDDED SILTSTONE / SANDSTONE *(continued)*										
-2	26											
-3	27											
-4	28											
-5	29											
-6	30											
-7	31											
-8												

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12.1m

TYPE OF BORING: Auger with tc bit to 12.1m, washbore to 74.75m, HQ coring to 88.46m

WATER OBSERVATIONS: Free groundwater obscured below 11m depth due to drill fluids

REMARKS: Practical auger refusal at 12.1m. Surface level interpolated from site survey plan.

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
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BOREHOLE LOG

CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 23.4 AHD
EASTING: 386147.7
NORTHING: 6355772.7
DIP/AZIMUTH: 90°/--

BORE No: MS2
PROJECT No: 91667.00
DATE: 20 - 22/11/2019
SHEET 5 OF 12

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-9		INTERBEDDED SILTSTONE / SANDSTONE *(continued)*										
	33											
-10												
	34											
-11	34.4	COAL - Yard Seam inferred from geophysical logging										
	35	35.0 INTERBEDDED SILTSTONE / SANDSTONE										
-12												
	36											
-13												
	37											
-14												
	38											
-15												
	39											
-16												

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12.1m

TYPE OF BORING: Auger with tc bit to 12.1m, washbore to 74.75m, HQ coring to 88.46m

WATER OBSERVATIONS: Free groundwater obscured below 11m depth due to drill fluids

REMARKS: Practical auger refusal at 12.1m. Surface level interpolated from site survey plan.

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 23.4 AHD
EASTING: 386147.7
NORTHING: 6355772.7
DIP/AZIMUTH: 90°/--

BORE No: MS2
PROJECT No: 91667.00
DATE: 20 - 22/11/2019
SHEET 6 OF 12

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-17		INTERBEDDED SILTSTONE / SANDSTONE *(continued)*										
	41											
-18												
	42											
-19												
	43											
-20												
	44											
-21												
	45											
-22												
	46											
-23												
	47											
-24												
	48.0											

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12.1m

TYPE OF BORING: Auger with tc bit to 12.1m, washbore to 74.75m, HQ coring to 88.46m

WATER OBSERVATIONS: Free groundwater obscured below 11m depth due to drill fluids

REMARKS: Practical auger refusal at 12.1m. Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 23.4 AHD
EASTING: 386147.7
NORTHING: 6355772.7
DIP/AZIMUTH: 90°/--

BORE No: MS2
PROJECT No: 91667.00
DATE: 20 - 22/11/2019
SHEET 7 OF 12

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-25		SANDSTONE (drill sediment contains sand grains - slow drill progress)										
	49											
-26												
	50											
-27												
	51											
-28												
	52											
-29												
	53											
-30												
	54											
-31												
	55	55.0 SILTSTONE with interbedded SANDSTONE (drill sediment primarily fines, drilling slowed)										
-32												

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12.1m

TYPE OF BORING: Auger with tc bit to 12.1m, washbore to 74.75m, HQ coring to 88.46m

WATER OBSERVATIONS: Free groundwater obscured below 11m depth due to drill fluids

REMARKS: Practical auger refusal at 12.1m. Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 23.4 AHD
EASTING: 386147.7
NORTHING: 6355772.7
DIP/AZIMUTH: 90°/--

BORE No: MS2
PROJECT No: 91667.00
DATE: 20 - 22/11/2019
SHEET 8 OF 12

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-33		SILTSTONE with interbedded SANDSTONE (drill sediment primarily fines, drilling slowed) *(continued)*										
	57											
-34												
	58											
-35												
	59											
-36												
	60											
-37												
	61											
-38												
	62											
-39												
	63											
-40												

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12.1m

TYPE OF BORING: Auger with tc bit to 12.1m, washbore to 74.75m, HQ coring to 88.46m

WATER OBSERVATIONS: Free groundwater obscured below 11m depth due to drill fluids

REMARKS: Practical auger refusal at 12.1m. Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 23.4 AHD
EASTING: 386147.7
NORTHING: 6355772.7
DIP/AZIMUTH: 90°/--

BORE No: MS2
PROJECT No: 91667.00
DATE: 20 - 22/11/2019
SHEET 9 OF 12

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-41		SILTSTONE with interbedded SANDSTONE (drill sediment primarily fines, drilling slowed) *(continued)*										
	65											
-42												
	66											
-43												
	67											
-44												
	67.5	SANDSTONE with interbedded SILTSTONE (drill sediment increasing in sand content)										
	68											
-45												
	69											
-46												
	70											
-47												
	71											
-48												

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12.1m

TYPE OF BORING: Auger with tc bit to 12.1m, washbore to 74.75m, HQ coring to 88.46m

WATER OBSERVATIONS: Free groundwater obscured below 11m depth due to drill fluids

REMARKS: Practical auger refusal at 12.1m. Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 23.4 AHD
EASTING: 386147.7
NORTHING: 6355772.7
DIP/AZIMUTH: 90°/--

BORE No: MS2
PROJECT No: 91667.00
DATE: 20 - 22/11/2019
SHEET 10 OF 12

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-49		SANDSTONE with interbedded SILTSTONE (drill sediment increasing in sand content) *(continued)*										
	73											
-50												
	74											
-51												
	74.75	SILTSTONE with interbedded SANDSTONE - Grey										
	75											
-52								75.45m: F, 70°, ti, 1mm throw (depositional fault) 75.52m: Pt, 10°, cln, pl, sm				
	75.91	SANDSTONE - Medium grained, grey						75.91m: J, sh, ir, sm				
	76							76.05m: J, 50°, cln, pl, ro 76.11m: J, 60°, cln, pl, ro	C	100	93	
-53								76.5m: J, 70°, pl, ti 76.61m: J, 45°-0°, cln, ir, ro				
	77											
	77.11	From 77.08m-77.11, siderite band 45°						77.11m: J, 20°, pl, inf, cly				
-54		SILTSTONE with interbedded SANDSTONE - Grey						77.12m: F, ti, 1mm throw 77.18m: J, 10°, pl, sm 77.33m: J, 10°, pl, sln, sm 77.45m: J, 20°, pl, cln, sm 77.46m: J, 60°, pl, ro, discontinuous 78.26m: J, 60°, pl, ro				PL(A) = 3.14 PL(D) = 1.24
	78											
		From 78.14m-78.45m, medium to coarse grained sandstone band						78.49m: J, 10°, pl, cln, pl, sm				
-55									C	100	94	
	79							79.17m: Pt, sh, cln, pl, sm				
-56								79.57m: J, 10°, cu, sm 79.61m: Pt, sh, inf fg 0.01m				

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12.1m

TYPE OF BORING: Auger with tc bit to 12.1m, washbore to 74.75m, HQ coring to 88.46m

WATER OBSERVATIONS: Free groundwater obscured below 11m depth due to drill fluids

REMARKS: Practical auger refusal at 12.1m. Surface level interpolated from site survey plan.

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 23.4 AHD
EASTING: 386147.7
NORTHING: 6355772.7
DIP/AZIMUTH: 90°/--

BORE No: MS2
PROJECT No: 91667.00
DATE: 20 - 22/11/2019
SHEET 11 OF 12

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
		SILTSTONE with interbedded SANDSTONE - Grey *(continued)*							C	100	94	
-57	80.36	COAL - Bright black coal (Borehole Seam)						80.26m: J, sv, pl, sm, discontinuous 80.3m: Pt, sh, ir, sm 80.31m: Pt, sh, ir, sm 80.36m: Pt, sh, pl, sm 80.42m: J, sv 80.5m: J, 60°, fg	C	100	13	
	81	From 80.82m-80.84m, tuffaceous seam From 80.92m-80.96m, tuffaceous seam From 81.03m-81.07m, siltstone band						80.62m: Pt, sh, pl, sm 80.67m: J, 45°, ir 80.78m: Pt, sh, pl 80.81m: Pt, sh, pl 80.87m: Pt, sh, pl 80.94m: cs, sh, tuffaceous weathered 81.05m: J, 45°, pl, sm 81.07m-81.24, fg, 0.01m 81.22m: J, 60°, pl, discontinuous 81.43m: Pt, sh, pl, inf fg 81.52m: J, 60° 81.67m: J, 70°, un	C	81	0	
-58	82											
-59	82.34	CORE LOSS						81.87m: J, 60°, pl, discontinuous				
	82.64	COAL - Bright black coal						82m: J, 60°-sv, ir, fg 82.1m: J, 60°-sv, ir, fg 82.22m-82.34m, fg 0.01m 82.34m: CORE LOSS: 300mm 82.74m-82.78m, fg 0.01m 82.96m-82.98m, fg 0.01m 83.15m: J, 60°, pl, fg 83.26m-83.31m, fg 0.01m 83.38m-83.41m, fg 0.01m 83.51m: J, 60°, ir, highly fg	C	66	8	
-60	83											
-61	83.93	CORE LOSS						83.7m: J, sv, ir, discontinuous 83.87m-83.93m, fg 83.93m: CORE LOSS: 700mm				
	84.63	COAL - Bright black coal (Borehole Seam) From 84.63m-84.92m, carbonaceous siltstone band						84.78m: J, 80°, pl, ti, discontinuous 84.8m: Pt, sh, ir, sm 84.82m: Pt, sh, ir, fg 84.84m: Pt, sh, ir, fg 84.9m: Pt, sh, ir, sm 84.92m: Pt, sh, ir, sm 84.96m-85.03m, fg 85.08m: J, 50°, ir, fg 85.1m-85.22, fg 85.4m: J, 45°, ir 85.53m: J, sv, ir 85.62m-85.64, fg 85.73m: J, sv, ir 85.89m: J, sv, ir 85.97m: J, 45°, pl, sm 86.02m: J, 45°, pl, sm 86.15m-86.27m, fg 86.27m: CORE LOSS: 1150mm	C	62	0	
-62	85											
-63	86											
	86.27	CORE LOSS										
-64	87											
	87.42	STONEY COAL / CARBONACOUS SILTSTONE - Dark grey						87.43m-87.68m, fg 0.03-0.01	C	68	67	
	87.68	SANDSTONE - Medium grained,						87.68m: Pt, 30°, un				PL(A) = 3.28 PL(D) = 2.1

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12.1m

TYPE OF BORING: Auger with tc bit to 12.1m, washbore to 74.75m, HQ coring to 88.46m

WATER OBSERVATIONS: Free groundwater obscured below 11m depth due to drill fluids

REMARKS: Practical auger refusal at 12.1m. Surface level interpolated from site survey plan.

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 23.4 AHD
EASTING: 386147.7
NORTHING: 6355772.7
DIP/AZIMUTH: 90°/--

BORE No: MS2
PROJECT No: 91667.00
DATE: 20 - 22/11/2019
SHEET 12 OF 12

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
-65	88.26	grey (Waratah Formation) SANDSTONE - Medium grained, grey (Waratah Formation) *(continued)*						88.26m: CORE LOSS: 200mm	C	68	67	
	88.46	CORE LOSS - Core down borehole										
		Bore discontinued at 88.46m, limit of investigation										
	89											
-66												
	90											
-67												
	91											
-68												
	92											
-69												
	93											
-70												
	94											
-71												
	95											
-72												

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12.1m

TYPE OF BORING: Auger with tc bit to 12.1m, washbore to 74.75m, HQ coring to 88.46m

WATER OBSERVATIONS: Free groundwater obscured below 11m depth due to drill fluids

REMARKS: Practical auger refusal at 12.1m. Surface level interpolated from site survey plan.

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.3 AHD
EASTING: 386180.9
NORTHING: 6355766.7
DIP/AZIMUTH: 90°/--

BORE No: MS4
PROJECT No: 91667.00
DATE: 19 - 20/11/2019
SHEET 1 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
22	0.03	ASPHALT WEARING COARSE							E			
		FILL / CLAYEY GRAVELLY SAND (SC) - Fine to medium grained sand, brown, low plasticity clay and fine to medium sized subangular gravel, moist							E			
									E			
									E			
21	1											
	1.5	CLAY (CH) - High plasticity, orange mottled grey, M<Wp							D			PID<1
20	2								E			
19	3											
	3.0	SILTY CLAY (CI) - Medium plasticity, pale grey mottled orange brown, M<Wp							D			PID<1
18	4											
									D			PID<1
17	5											
	5.7	SILTY CLAY (CL) - Low plasticity, pale grey, trace fine grained sand and rock fragments, M<Wp										
16	6								D			PID<1
15	7											
									D			PID<1

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12m

TYPE OF BORING: Auger with tc bit to 12m, washbore to 20.75m

WATER OBSERVATIONS: Water observed on auger at 10.5m during drilling. 100% drill water loss at 19.15m during drilling

REMARKS: HWT casing set to 12.0m, 19/11/19 17:00. Surface level interpolated from site survey plan. Drill logs based on drill resistance and are approximately only.

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.3 AHD
EASTING: 386180.9
NORTHING: 6355766.7
DIP/AZIMUTH: 90°/--

BORE No: MS4
PROJECT No: 91667.00
DATE: 19 - 20/11/2019
SHEET 2 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		SILTY CLAY (CL) - Low plasticity, pale grey, trace fine grained sand and rock fragments, M<Wp *(continued)*										
	8.5	SILTY CLAY (CL) - Low plasticity, grey, M~Wp										
	9.0	EXTREMELY WEATHERED SILTSTONE - Exhibits properties of SILTY CLAY (CH) - grey M~Wp							D			PID<1
									E			
	12.0	Top of rock at 12.0m, practical auger refusal (Sandstone)										

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12m

TYPE OF BORING: Auger with tc bit to 12m, washbore to 20.75m

WATER OBSERVATIONS: Water observed on auger at 10.5m during drilling. 100% drill water loss at 19.15m during drilling

REMARKS: HWT casing set to 12.0m, 19/11/19 17:00. Surface level interpolated from site survey plan. Drill logs based on drill resistance and are approximately only.

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: 22.3 AHD
EASTING: 386180.9
NORTHING: 6355766.7
DIP/AZIMUTH: 90°/--

BORE No: MS4
PROJECT No: 91667.00
DATE: 19 - 20/11/2019
SHEET 3 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		Top of rock at 12.0m, practical auger refusal (Sandstone) *(continued)*										
	19.15	VOID - Drill rods dropped 0.1m and 100% water loss occured during drilling										
	19.25	RUBBLE										
	19.7	COAL - (based on CCTV image)										
	20.25	Possible Coal Floor - increased drill resistance										
	20.55	Possible SANDSTONE, drilling slowed										
	20.75	Bore discontinued at 20.75m, limit of investigation										

RIG: GEO 305 Comacchio **DRILLER:** Terratest (Russel) **LOGGED:** Pankhurst **CASING:** HWT casing to 12m

TYPE OF BORING: Auger with tc bit to 12m, washbore to 20.75m

WATER OBSERVATIONS: Water observed on auger at 10.5m during drilling. 100% drill water loss at 19.15m during drilling

REMARKS: HWT casing set to 12.0m, 19/11/19 17:00. Surface level interpolated from site survey plan. Drill logs based on drill resistance and are approximately only.

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: Church Street, Newcastle

SURFACE LEVEL: 25.1 AHD
EASTING: 386105.27
NORTHING: 6355784.25
DIP/AZIMUTH: 90°/--

BORE No: GEO 1
PROJECT No: 91667.01
DATE: 21/11/2019
SHEET 1 OF 2

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
25	0.12	CONCRETE PAVEMENT										
	0.21	FILL / SAND: Brown fine to medium grained sand, with subangular to subrounded gravel up to 30mm in size, moist							A			PID<1
									A			PID<1
24	1	FILL / SILTY SAND: Dark brown, fine to medium grained silty sand, with subangular to subrounded gravel up to 70mm in size, moist							A			PID<1
									D			PID<1
									S			1,1,1 N = 2
		From 1.4m, pale grey										
23	2								D			
	2.1	From 2.0m, reduced gravel content										
		At 2.1m, fragments of brick 50mm recovery in SPT							S			11,8/110,- refusal
	2.3	LARGE BRICK / GRAVEL: >100mm possibly concrete, rooting										
	2.5	FILL / SILTY SAND: Dark brown, fine to medium grained saiilty sand, with subangular to subrounded gravel up to 70mm in size, moist										pp >100 pp = 100-200
22	3								S			3,3,5 N = 8
	3.3	FILL / SAND: Pale brown fine to medium grained sand										
		From 3.2m, to 3.3, subangular to subrounded gravel up to 10mm in size										
21	4	CLAYEY SAND: Pale brown / yellow sandy clay, low plasticity, with silt, medium dense										
		From 3.7m, grey, trace gravel							D			pp = 200
									S			7,9,15 N = 24
20	5								D			pp = 200 pp = 300
		From 5.8m to 6.3m, red brown mottled dark grey							S			16,25,25/100 refusal
19	6								D			PID<1
18	7											
	7.5	CLAYEY SAND - Medium dense, pale red brown, low plasticity, fine to coarse grained sand, wet							S			13,25/13,- refusal
									D			PID<1

RIG: XC **DRILLER:** Terratest **LOGGED:** Beh **CASING:** NQ 2.2m

TYPE OF BORING: Diatube to 0.12m, auger to 0.12m to 2.2m, washbore / rotary from 2.2m to 14.65m

WATER OBSERVATIONS: Water observations obscured due to drilling fluids added at 2.2m depth

REMARKS: Survey level inferred from site survey plan

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: Church Street, Newcastle

SURFACE LEVEL: 25.1 AHD
EASTING: 386105.27
NORTHING: 6355784.25
DIP/AZIMUTH: 90°/--

BORE No: GEO 1
PROJECT No: 91667.01
DATE: 21/11/2019
SHEET 2 OF 2

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
17		CLAYEY SAND - Medium dense, pale red brown, low plasticity, fine to coarse grained sand, wet *(continued)*										
16	9											
15	10											
14	11								S			4,10,18 N = 28
	11.7	SANDY CLAY (CL): Hard grey mottled orange, fine grained sandy clay (wet)							D			
13	12											
12	13	From 13.2m to 13.3m, with some subangular sized gravel							S			10,20,25 N = 45
									D			pp >400
11	14											
	14.65								D			
	14.7	SANDSTONE										
10	15	Bore discontinued at 14.7m, limit of investigation										

RIG: XC **DRILLER:** Terratest **LOGGED:** Beh **CASING:** NQ 2.2m

TYPE OF BORING: Diatube to 0.12m, auger to 0.12m to 2.2m, washbore / rotary from 2.2m to 14.65m

WATER OBSERVATIONS: Water observations obscured due to drilling fluids added at 2.2m depth

REMARKS: Survey level inferred from site survey plan

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: Church Street, Newcastle

SURFACE LEVEL: 23.8 AHD
EASTING: 386138
NORTHING: 6355772
DIP/AZIMUTH: 90°/--

BORE No: GEO 2
PROJECT No: 91667.01
DATE: 5 - 6/12/2019
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
23	0.1	TOPSOIL - Silty sand topsoil, dark brown, fine to medium grain, moist										
		SAND - Fine to medium grain, brown-grey sand with silt, moist										
	1											
		From 1.5m, pale brown-grey										
22	2	From 2m, dark brown with trace gravel up to 5mm (potential fill layer)										
	2.5	SANDY CLAY - Pale brown sandy clay, low to medium plasticity, M<Wp										
21	3											
20	4											
19	5	From 5m, sand content decreasing										
18	6	From 6m, medium plasticity, M>Wp										
17	7											
	7.0	SILTY CLAY - Pale grey silty clay, medium plasticity, moist, M<Wp, high silt content but material is plastic										
16												

RIG: GEO305 Commachin **DRILLER:** Terratest (Tim) **LOGGED:** Beh **CASING:** HWT 11.7m

TYPE OF BORING: Solid flight auger to rock then coring to depth, auger to 9.5m, drove casing to 11.9m, HQ core to 24.8m

WATER OBSERVATIONS: Free groundwater obscured by drill fluids below 5m depth

REMARKS: Survey level inferred from site survey plan

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: Church Street, Newcastle

SURFACE LEVEL: 23.8 AHD
EASTING: 386138
NORTHING: 6355772
DIP/AZIMUTH: 90°/--

BORE No: GEO 2
PROJECT No: 91667.01
DATE: 5 - 6/12/2019
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
15	9	SILTY CLAY - Pale grey silty clay, medium plasticity, moist, M<Wp, high silt content but material is plastic *(continued)*										
		From 9m, properties consistent with a highly weathered siltstone or claystone										
14	10											
13	11											
12	11.7	Start coring at 11.7m										
	12	SANDSTONE - Grey stained orange, fine to medium grained						11.9m: PT, sh,pl, cln, sm	C	100	60	pp = 600 PL(D) = 0.31
	12.1	SANDSTONE - Grey, fine to medium grain, fractured (medium strength), slightly weathered						12.25m: PT, sh, ir, cbs, ro 12.55m to 12.6m, PT, sh, ir, ro, spaced 50mm				PL(A) = 0.75
11	12.8	SANDSTONE - Grey, fine to medium grain, extremely weathered (friable)						12.9m: PT, sh, ir, inf slt				pp = 450
	13											
	13.3	SANDSTONE - Grey, fine to medium grain, slightly fractured						13.3m: J, 45°, ir, stn, fe 13.55m to 13.65m, J, 30°, ir, ro, spaced 100mm	C	100	90	PL(A) = 0.44
10	14							14.35m: J, 10°, ir, ro, cbs				PL(A) = 0.29 PL(D) = 0.69
9	15							15m: J, 20°, pl, ro, cbs				
8									C	100	100	PL(A) = 0.71 PL(D) = 0.56 PL(D) = 0.81

RIG: GEO305 Commachin **DRILLER:** Terratest (Tim) **LOGGED:** Beh **CASING:** HWT 11.7m

TYPE OF BORING: Solid flight auger to rock then coring to depth, auger to 9.5m, drove casing to 11.9m, HQ core to 24.8m

WATER OBSERVATIONS: Free groundwater obscured by drill fluids below 5m depth

REMARKS: Survey level inferred from site survey plan

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: Nihon Daigaku Australia Newcastle Pty Ltd
PROJECT: Nihon University
LOCATION: Church Street, Newcastle

SURFACE LEVEL: 23.8 AHD
EASTING: 386138
NORTHING: 6355772
DIP/AZIMUTH: 90°/--

BORE No: GEO 2
PROJECT No: 91667.01
DATE: 5 - 6/12/2019
SHEET 3 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
		SANDSTONE - Grey, fine to medium grain, slightly fractured *(continued)*						16.2m: J, 40°, pl, ro, cbs 16.45m: J, 40°, ir, ro, cbs				
	17							17.2m: J, 10°, pl, ro	C	100	100	PL(A) = 1.56 PL(D) = 0.25
	18							17.8m: PT, sh, pl, sm, cbs				PL(A) = 1.86 PL(D) = 1.16
								18.6m: PT, sh, ir, ro				
	19							19.05m: J, 10°, pl, sm, cbs				
	20								C	100	100	PL(A) = 2.22 PL(D) = 2.06
								20.6m: J, 20°, ir, ro, cbs				
	21							21.3m: PT, sh, pl, sm				PL(A) = 1.12 PL(D) = 0.87
	22											PL(A) = 1.07
	22.4	CARBONACEOUS SANDSTONE - Grey-black fine grained						22.3m: J, 10°, ir, ro, cbs 22.4m: PT, sh, pl, cbs	C	100	30	PL(A) = 0.05
	22.65	COAL - Black, (Dudley Seam)						22.5m to 22.65m, PT, sh, pl, cbs, spaced 50mm 22.65m to 23.5m, fg, generally 40mm diameter, probably drilling induced				
	23											
	23.5											
	23.55	CORE LOSS - 0.05m, probable coal						23.5m: CORE LOSS: 50mm 23.55m to 24m, fg, generally 40mm	C	97	30	
		COAL - Black										
	24.0											PL(A) = 0.18

RIG: GEO305 Commachin **DRILLER:** Terratest (Tim) **LOGGED:** Beh **CASING:** HWT 11.7m

TYPE OF BORING: Solid flight auger to rock then coring to depth, auger to 9.5m, drove casing to 11.9m, HQ core to 24.8m

WATER OBSERVATIONS: Free groundwater obscured by drill fluids below 5m depth

REMARKS: Survey level inferred from site survey plan

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Nihon Daiguaku Australia Newcastle Pty Ltd
PROJECT: Proposed Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: --
EASTING: 386144
NORTHING: 6355813

PIT No: 301
PROJECT No: 91667.02
DATE: 3/3/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILL / SILTY SAND (SP): Dark brown, silty fine to medium grained sand filling with trace coal, rootlets, gravels, concrete, tiles, brick, moist		D	0.05	E	PID<1		
				D	0.2	E	PID<1		
		At 0.35m, white chalky material (possibly gypsum)		D	0.35		PID<1		
				D	0.4	E	PID<1		
	0.65	SILTY SAND (SP): Grey, silty fine grained sand, moist		D	0.7	E	PID<1		
	1								1
				D	1.1	E	PID<1		
	1.2	Pit discontinued at 1.2m, limit of investigation							
	2								2

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

RIG: Hand tools
LOGGED: Lambert
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observations

REMARKS: In courtyard garden bed at front of Courthouse. Co-ordinates are approximate only.

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

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Nihon Daiguaku Australia Newcastle Pty Ltd
PROJECT: Proposed Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: --
EASTING: 386115
NORTHING: 6355804

PIT No: 302
PROJECT No: 91667.02
DATE: 3/3/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		CONCRETE							
	0.09	FILL / GRAVELLY SAND (SW): Dark brown, fine sized gravely fine to coarse grained sand, with trace coal, slag, shell, fibro fragments, fine sized cobbles, moist		B	0.1				
					0.2				
				D	0.3	E	PID<1		
				D	0.5	E	PID<1		
	0.8	SILTY SAND (SP): Brown / grey, silty fine to medium grained sand, moist							
1				D	1.0	E	PID<1		1
	1.3	Pit discontinued at 1.3m, limit of investigation							
2									2

RIG: Hand tools

LOGGED: Lambert

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observations

REMARKS: In basement carpark. Co-ordinates are approximate only.

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

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Nihon Daiguaku Australia Newcastle Pty Ltd
PROJECT: Proposed Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: --
EASTING: 386111
NORTHING: 6355787

PIT No: 303
PROJECT No: 91667.02
DATE: 3/3/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		CONCRETE							
	0.14	FILL / GRAVELLY SAND (GP): Grey, fine sized, gravely fine to coarse grained sand, with trace ash, coal, coarse size gravel, moist		D	0.2	E	PID<1		
	0.3	SILTY SAND (SP): Orange brown, silty fine to medium grained sand, moist		D	0.5	E	PID<1		
				D	0.9	E	PID<1		
	0.95	Pit discontinued at 0.95m, limit of investigation							
	1								1
	2								2

RIG: Hand tools

LOGGED: Lynch

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observations

REMARKS: In basement carpark. Co-ordinates are approximate only.

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

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Nihon Daiguaku Australia Newcastle Pty Ltd
PROJECT: Proposed Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: --
EASTING: 386131
NORTHING: 6355794

PIT No: 304
PROJECT No: 91667.02
DATE: 3/3/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		CONCRETE							
	0.12	FILL / GRAVELLY SAND: Dark grey, fine to medium sized gravelly fine to medium grained sand fill, with trace slag, glass, ash, coal, brick, moist		B	0.12				
				D	0.2	E	PID<1		
	0.25	FILL / SILTY SAND (SP): Grey, silty sand fill, with trace fine sized gravel, moist		D	0.4	E	PID<1		
	0.5	SILTY SAND (SP): Brown, silty fine grained sand, moist		D	0.6	E	PID<1		
	0.8	Pit discontinued at 0.8m, refusal of hand auger on possible bedrock							
	1								1
	2								2

RIG: Hand tools

LOGGED: Lambert

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observations

REMARKS: In basement carpark. Co-ordinates are approximate only.

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

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Nihon Daiguaku Australia Newcastle Pty Ltd
PROJECT: Proposed Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: --
EASTING: 386190
NORTHING: 6355770

PIT No: 306
PROJECT No: 91667.02
DATE: 3/3/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		CONCRETE							
	0.1								
	0.15	FILL / SAND (SP): Pale brown, fine to medium grained sand		D	0.13	E	PID<1		
				D	0.2	E	PID<1		
		FILL / SILTY CLAY (CH): High plasticity, brown mottled black, silty clay, with trace glass, metal, coal, subrounded gravel, M<Wp		B	0.3				
				D	0.5	E	PID<1		
	0.55	SILTY CLAY (CH): High plasticity, orange silty clay, M<Wp							
				D	0.8	E	PID<1		
	0.9	Pit discontinued at 0.9m, limit of investigation							
	1								1
	2								2

RIG: Hand tools

LOGGED: Lambert

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observations

REMARKS: Co-ordinates are approximate only.

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

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Nihon Daiguaku Australia Newcastle Pty Ltd
PROJECT: Proposed Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: --
EASTING: 386139
NORTHING: 6355768

PIT No: 308
PROJECT No: 91667.02
DATE: 3/3/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILL / SANDY GRAVEL (SP): Pale grey, fine grained sandy, fine sized gravel fill, with trace wood, plastic, tile, moist		D	0.1	E	PID<1		
				B	0.2				
	0.3	FILL / GRAVELLY SAND: Orange brown, gravelly sand, with trace plastic, glass, wood, slag, coal, geo fabric, cobbles, moist		D	0.5	E	PID<1		
	0.7	SILTY SAND: Orange, silty fine to medium grained sand, with trace clay, moist		D	0.9	E	PID<1		
1	1.0	Pit discontinued at 1.0m, limit of investigation							1
2									2

RIG: Hand tools

LOGGED: Lambert

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observations

REMARKS: Co-ordinates are approximate only.

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

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Nihon Daiguaku Australia Newcastle Pty Ltd
PROJECT: Proposed Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: --
EASTING: 368158
NORTHING: 6355762

PIT No: 309
PROJECT No: 91667.02
DATE: 3/3/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILL / SANDY GRAVEL (SP): Pale grey, fine grained sandy, fine sized gravel, with trace wood, plastic, tile		D	0.1	E	PID<1		
	0.2	FILL / GRAVELLY SAND: Orange brown fine sized, gravelly fine to medium grained sand, with trace plastic, glass, wood, slag, coal, asphalt, geofabric, cobbles, moist		D B	0.2 0.3	E	PID<1		
	0.4	SILTY SAND (Possibly Fill) - Dark brown silty fine grained sand, with trace clay, moist		D	0.4 0.5	E	PID<1		
		AT 0.7m, (coal gravel)		D	0.7	E	PID<1		
	1			D	1.0	E	PID<1		1
	1.2	Pit discontinued at 1.2m, slow progress hand tools							
	2								2

RIG: Hand tools

LOGGED: Lambert

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observations

REMARKS: Co-ordinates are approximate only.

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

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Nihon Daiguaku Australia Newcastle Pty Ltd
PROJECT: Proposed Nihon University
LOCATION: 9 Church Street, Newcastle

SURFACE LEVEL: --
EASTING: 368188
NORTHING: 6355756

PIT No: 310
PROJECT No: 91667.02
DATE: 3/3/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
	0.1	FILL / SILTY SAND (SP): Dark brown, silty fine grained sand, with trace rootlets, plastic, gravel, asphalt, and fibro fragments moist (topsoil)		D	0.05	E	PID<1		
		SILTY CLAY (CL): Grey, mottled orange, silty clay, M≤Wp		D	0.2	E	PID<1		
				D	0.6	E	PID		
	0.7	Pit discontinued at 0.7m, limit of investigation							
	1								1
	2								2

RIG: Hand tools
LOGGED: Lambert
SURVEY DATUM: MGA94

WATER OBSERVATIONS:

REMARKS: Co-ordinates are approximate only.

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

SAMPLING & IN SITU TESTING LEGEND

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

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Borehole Log - BH1

Sheet: 1 of 1

Client: Government Property NSW	**Date:** 22/09/2016	**Depth of Hole:** 0.65 m
Job Number: 55499	**Rig/Machine:**	**Drawn By:** STM
Site Location: 9 Church Street	**Excavation Method:** Auger	**Approved By:** RBB
Job Type: GPNSW 9 Church St, Newcastle DSI	**PID Calibration:** 99.9 ppm Isobutylene	

Comment:

Depth (m)	Method	Graphic Log	Subsurface Profile	Sample	PID
			BRICK		
0.1	HA		FILL: sand, medium to coarse grained, yellow to brown, loose, moist, fine rootlets	BH1_0.1	5.1
0.2					
0.3			FILL: gravelly sandy clay, coarse grained sand, brown to red, medium dense, slightly moist, bitumen present, semi-angular to angular gravels	BH1_0.3	0
0.4					
0.5				BH1_0.5	2.6
0.6					
0.7			End of hole at 0.65 m Refusal		
0.8					
0.9					
1.0					
1.1					
1.2					
1.3					
1.4					
1.5					
1.6					
1.7					
1.8					
1.9					
2.0					
2.1					
2.2					
2.3					
2.4					
2.5					
2.6					
2.7					
2.8					
2.9					
3.0					
3.1					
3.2					
3.3					
3.4					

PRENSA LIB 1.01.GLB Log PRENSA BH-TP-HA LOG 55499 GPNSW 9 CHURCH ST DSI.GPJ <<DrawingFile>> 07/10/2016 14:38 8.30.002 Datgel Lab and In Situ Tool

Environmental log only. Not to be relied on for any other purpose.

Borehole Log - BH10

Sheet: 1 of 1

prensa

Client: Government Property NSW	**Date:** 22/09/2016	**Depth of Hole:** 3.30 m
Job Number: 55499	**Rig/Machine:**	**Drawn By:** STM
Site Location: 9 Church Street	**Excavation Method:** Auger	**Approved By:** RBB
Job Type: GPNSW 9 Church St, Newcastle DSI	**PID Calibration:** 99.9 ppm Isobutylene	

Comment:

Depth (m)	Method	Graphic Log	Subsurface Profile	Sample	PID
0.1	HA		FILL: sandy silt, fine grained sand, dark brown, medium dense, moist	BH10_0.1	0
0.2					
0.3			FILL: sandy clay, fine grained sand, yellow to brown, loose moist		
0.4				BH10_0.4	0
0.5					
0.6					
0.7					
0.8					
0.9					
1.0				BH10_1.1	0
1.1					
1.2			FILL: sand, fine to medium grained, grey, loose, moist		
1.3				BH10_1.3	0
1.4					
1.5					
1.6					
1.7					
1.8					
1.9					
2.0					
2.1					
2.2				BH10_2.2	0
2.3					
2.4					
2.5					
2.6					
2.7					
2.8					
2.9					
3.0				BH10_3.0	0
3.1					
3.2					
3.3			End of hole at 3.30 m Refusal		
3.4					

PRENSA LIB 1.01.GLB Log PRENSA BH-TP-HA LOG 55499 GPNSW 9 CHURCH ST DSI.GPJ <<DrawingFile>> 07/10/2016 14:38 8.30.002 Datgel Lab and In Situ Tool

Environmental log only. Not to be relied on for any other purpose.

Borehole Log - BH2

Sheet: 1 of 1

prensa

Client: Government Property NSW	**Date:** 22/09/2016	**Depth of Hole:** 0.60 m
Job Number: 55499	**Rig/Machine:**	**Drawn By:** STM
Site Location: 9 Church Street	**Excavation Method:** Auger	**Approved By:** RBB
Job Type: GPNSW 9 Church St, Newcastle DSI	**PID Calibration:** 99.9 ppm Isobutylene	

Comment:

Depth (m)	Method	Graphic Log	Subsurface Profile	Sample	PID
0.1	HA		FILL: sandy silt, very coarse grained sand, dark brown to black, medium dense, moist, fine rootlets	BH2_0.1	0
0.2					
0.3					
0.4					
0.5				BH2_0.5	0
0.6			End of hole at 0.60 m Refusal		
0.7					
0.8					
0.9					
1.0					
1.1					
1.2					
1.3					
1.4					
1.5					
1.6					
1.7					
1.8					
1.9					
2.0					
2.1					
2.2					
2.3					
2.4					
2.5					
2.6					
2.7					
2.8					
2.9					
3.0					
3.1					
3.2					
3.3					
3.4					

PRENSA LIB 1.01.GLB Log PRENSA BH-TP-HA LOG 55499 GPNSW 9 CHURCH ST DSI.GPJ <<DrawingFile>> 07/10/2016 14:38 8.30.002 Datgel Lab and In Situ Tool

Environmental log only. Not to be relied on for any other purpose.

Borehole Log - BH3

Sheet: 1 of 1

prensa

Client: Government Property NSW	**Date:** 22/09/2016	**Depth of Hole:** 1.20 m
Job Number: 55499	**Rig/Machine:**	**Drawn By:** STM
Site Location: 9 Church Street	**Excavation Method:** Auger	**Approved By:** RBB
Job Type: GPNSW 9 Church St, Newcastle DSI	**PID Calibration:** 99.9 ppm Isobutylene	

Comment:

Depth (m)	Method	Graphic Log	Subsurface Profile	Sample	PID
0.1	HA		FILL: sandy silt, fine grained sand, dark brown to black, loose, dry, rootlets	BH3_0.1	0
0.2					
0.3					
0.4					
0.5					
0.6					
0.7				BH3_0.7	0
0.8					
0.9				BH3_1.0	0
1.0					
1.1				BH3_1.2	0
1.2			End of hole at 1.20 m Borehole collapse		
1.3					
1.4					
1.5					
1.6					
1.7					
1.8					
1.9					
2.0					
2.1					
2.2					
2.3					
2.4					
2.5					
2.6					
2.7					
2.8					
2.9					
3.0					
3.1					
3.2					
3.3					
3.4					

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Borehole Log - BH4

Sheet: 1 of 1

prensa

Client: Government Property NSW	**Date:** 22/09/2016	**Depth of Hole:** 0.92 m
Job Number: 55499	**Rig/Machine:**	**Drawn By:** STM
Site Location: 9 Church Street	**Excavation Method:** Auger	**Approved By:** RBB
Job Type: GPNSW 9 Church St, Newcastle DSI	**PID Calibration:** 99.9 ppm Isobutylene	

Comment:

Depth (m)	Method	Graphic Log	Subsurface Profile	Sample	PID
0.1	HA		CONCRETE		
0.2			FILL: gravelly sand, medium to coarse grained sand, grey, medium dense, slightly moist, angular to semi-angular gravels, bitumen fragments	BH4_0.1	0
0.3					
0.4					
0.5				BH4_0.5	0
0.6					
0.7					
0.8				BH4_0.8	0
0.9					
1.0			End of hole at 0.92 m Refusal		
1.1					
1.2					
1.3					
1.4					
1.5					
1.6					
1.7					
1.8					
1.9					
2.0					
2.1					
2.2					
2.3					
2.4					
2.5					
2.6					
2.7					
2.8					
2.9					
3.0					
3.1					
3.2					
3.3					
3.4					

PRENSA LIB 1.01.GLB Log PRENSA BH-TP-HA LOG 55499 GPNSW 9 CHURCH ST DSI.GPJ <<DrawingFile>> 07/10/2016 14:38 8.30.002 Datgel Lab and In Situ Tool

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Borehole Log - BH5

Sheet: 1 of 1

prensa

Client: Government Property NSW	**Date:** 22/09/2016	**Depth of Hole:** 0.80 m
Job Number: 55499	**Rig/Machine:**	**Drawn By:** STM
Site Location: 9 Church Street	**Excavation Method:** Auger	**Approved By:** RBB
Job Type: GPNSW 9 Church St, Newcastle DSI	**PID Calibration:** 99.9 ppm Isobutylene	

Comment:

Depth (m)	Method	Graphic Log	Subsurface Profile	Sample	PID
0.1	HA		FILL: sandy silt, fine to medium grained sand, dark brown to black, loose, moist, high organic content	BH5_0.1	0
0.2					
0.3					
0.4					
0.5					
0.6			FILL: sand, fine to medium grained sand, grey, loose, slightly moist	BH5_0.6	0
0.7			SAND: grey, very dense, slightly moist, pulverised, weathered sandstone	BH5_0.8	0
0.8			End of hole at 0.80 m Refusal		
0.9					
1.0					
1.1					
1.2					
1.3					
1.4					
1.5					
1.6					
1.7					
1.8					
1.9					
2.0					
2.1					
2.2					
2.3					
2.4					
2.5					
2.6					
2.7					
2.8					
2.9					
3.0					
3.1					
3.2					
3.3					
3.4					

PRENSA LIB 1.01.GLB Log PRENSA BH-TP-HA LOG 55499 GPNSW 9 CHURCH ST DSI.GPJ <<DrawingFile>> 07/10/2016 14:38 8.30.002 Datgel Lab and In Situ Tool

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Borehole Log - BH6

Sheet: 1 of 1

Client: Government Property NSW	**Date:** 22/09/2016	**Depth of Hole:** 1.10 m
Job Number: 55499	**Rig/Machine:**	**Drawn By:** STM
Site Location: 9 Church Street	**Excavation Method:** Auger	**Approved By:** RBB
Job Type: GPNSW 9 Church St, Newcastle DSI	**PID Calibration:** 99.9 ppm Isobutylene	

Comment:

Depth (m)	Method	Graphic Log	Subsurface Profile	Sample	PID
0.0	HA		BITUMEN		
0.1			FILL: sand, medium to coarse grained, yellow, loose, slightly moist	BH6_0.15	0
0.2					
0.3					
0.4				BH6_0.5	0
0.5					
0.6			CLAY: zero plasticity, red to brown, hard and dense, slightly moist		
0.7				BH6_0.7	0
0.8					
0.9				BH6_1.0	0
1.0					
1.1			End of hole at 1.10 m Target depth		
1.2					
1.3					
1.4					
1.5					
1.6					
1.7					
1.8					
1.9					
2.0					
2.1					
2.2					
2.3					
2.4					
2.5					
2.6					
2.7					
2.8					
2.9					
3.0					
3.1					
3.2					
3.3					
3.4					

PRENSA LIB 1.01.GLB Log PRENSA BH-TP-HA LOG 55499 GPNSW 9 CHURCH ST DSI.GPJ <<DrawingFile>> 07/10/2016 14:38 8.30.002 Dalgel Lab and In Situ Tool

Environmental log only. Not to be relied on for any other purpose.

Borehole Log - BH7

Sheet: 1 of 1

prensa

Client: Government Property NSW	**Date:** 22/09/2016	**Depth of Hole:** 0.85 m
Job Number: 55499	**Rig/Machine:**	**Drawn By:** STM
Site Location: 9 Church Street	**Excavation Method:** Auger	**Approved By:** RBB
Job Type: GPNSW 9 Church St, Newcastle DSI	**PID Calibration:** 99.9 ppm Isobutylene	

Comment:
QC1 & QC2 taken at 55499_BH7_0.1
Stepped out 4 times, refusal at same depth

Depth (m)	Method	Graphic Log	Subsurface Profile	Sample	PID
0.1	HA		FILL: sandy silt, fine grained sand, dark brown to black, loose, dry, roots and rootlets	BH7_0.1	0
0.2					
0.3					
0.4					
0.5			FILL: sandy clay, zero plasticity, red to brown, medium dense, slightly moist	BH7_0.5	0
0.6			CLAY: zero plasticity, red to brown, dense, slightly moist	BH7_0.6	0
0.7					
0.8					
0.9			End of hole at 0.85 m Refusal		
1.0					
1.1					
1.2					
1.3					
1.4					
1.5					
1.6					
1.7					
1.8					
1.9					
2.0					
2.1					
2.2					
2.3					
2.4					
2.5					
2.6					
2.7					
2.8					
2.9					
3.0					
3.1					
3.2					
3.3					
3.4					

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Environmental log only. Not to be relied on for any other purpose.

Borehole Log - BH8

Sheet: 1 of 1

Client: Government Property NSW	**Date:** 22/09/2016	**Depth of Hole:** 0.30 m
Job Number: 55499	**Rig/Machine:**	**Drawn By:** STM
Site Location: 9 Church Street	**Excavation Method:** Auger	**Approved By:** RBB
Job Type: GPNSW 9 Church St, Newcastle DSI	**PID Calibration:** 99.9 ppm Isobutylene	

Comment:
Refusal on 2nd slab, stepped out 4 times, refusal at same depth for all locations

Depth (m)	Method	Graphic Log	Subsurface Profile	Sample	PID
0.1	HA		FILL: sandy silt, fine grained sand, dark brown, loose, dry, rootlets	BH8_0.1	0
0.2					
0.3			End of hole at 0.30 m Refusal		
0.4					
0.5					
0.6					
0.7					
0.8					
0.9					
1.0					
1.1					
1.2					
1.3					
1.4					
1.5					
1.6					
1.7					
1.8					
1.9					
2.0					
2.1					
2.2					
2.3					
2.4					
2.5					
2.6					
2.7					
2.8					
2.9					
3.0					
3.1					
3.2					
3.3					
3.4					

PRENSA LIB 1.01.GLB Log PRENSA BH-TP-HA LOG 55499 GPNSW 9 CHURCH ST DSI.GPJ <<DrawingFile>> 07/10/2016 14:38 8.30.002 Datgel Lab and In Situ Tool

Environmental log only. Not to be relied on for any other purpose.

Borehole Log - BH9

Sheet: 1 of 1

prensa

Client: Government Property NSW	**Date:** 22/09/2016	**Depth of Hole:** 1.30 m
Job Number: 55499	**Rig/Machine:**	**Drawn By:** STM
Site Location: 9 Church Street	**Excavation Method:** Auger	**Approved By:** RBB
Job Type: GPNSW 9 Church St, Newcastle DSI	**PID Calibration:** 99.9 ppm Isobutylene	

Comment:

Depth (m)	Method	Graphic Log	Subsurface Profile	Sample	PID
0.1	HA		FILL: sandy silt, dark brown, loose, slightly moist, rootlets	BH9_0.1	0
0.2					
0.3					
0.4			FILL: gravelly sand, medium to coarse grained sand, grey to brown, dense, moist, semi-angular to angular gravels		
0.5				BH9_0.5	0
0.6			FILL: sand, medium to coarse grained sand, yellow to brown, loose, moist, minor gravels, tile, brick, crushed sandstone		
0.7				BH9_0.6	0
0.8			Silty CLAY: medium plasticity, grey to brown, very soft, very moist, higher clay content with depth		
0.9					
1.0				BH9_1.0	0
1.1					
1.2					
1.3			End of hole at 1.30 m Target depth		
1.4					
1.5					
1.6					
1.7					
1.8					
1.9					
2.0					
2.1					
2.2					
2.3					
2.4					
2.5					
2.6					
2.7					
2.8					
2.9					
3.0					
3.1					
3.2					
3.3					
3.4					

PRENSA LIB 1.01.GLB Log PRENSA BH-TP-HA LOG 55499 GPNSW 9 CHURCH ST DSI.GPJ <<DrawingFile>> 07/10/2016 14:38 8.30.002 Datgel Lab and In Situ Tool

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Appendix B

Worksafe NSW – Dangerous Goods Search (Lot 1 DP 1199904)
Table 1 - Summary of site information from previous investigations and cRAP (GHD, 2019)
Petrolink (2017) – Decommissioning and Abandonment of Underground Petroleum Storage Tanks
WSP (2017) – Vapour Risk Assessment, Decommissioning of Underground Storage Tank at Newcastle Police Station, 1 Church Street, Newcastle NSW
ADE (2020) – Waste Analysis & Classification Report, 9 Church Street, Newcastle West

NSW GOVERNMENT | SafeWork NSW

RECEIVED
14 NOV 2019
BY:.....

Locked Bag 2906, Lisarow NSW 2252
Customer Experience 13 10 50
ABN 81 913 830 179 | www.safework.nsw.gov.au

Our Ref: D19/217146

7 November 2019

Mr Matthew Blackert
Douglas Partners Pty Ltd
PO Box 324
HUNTER REGION MAIL CENTRE NSW 2310

Dear Mr Blackert

RE SITE: 9 Church St, Newcastle NSW 2300

I refer to your site search request received by SafeWork NSW on 4 November 2019 requesting information on Storage of Hazardous Chemicals for the above site.

A search of the records held by SafeWork NSW has not located any records pertaining to the above-mentioned premises.

For further information or if you have any questions, please call us on 13 10 50 or email licensing@safework.nsw.gov.auw

Yours sincerely

Customer Service Officer
Customer Experience - Operations
SafeWork NSW

6 Attachment A – Summary of site information

Table 1 Summary of site information from previous investigations and cRAP

Aspect	Coffey 2012 Phase 1 ESA	Prensa 2016 DSI	Cardno 2019 cRAP
Objectives and Scope of Work	Stated objectives were to: • Identify current and past potentially contaminated activities on the site • Assess Areas of Environmental Concern (AECs) and Chemicals of Concern (COCs) for the site • Provide recommendations for further assessment, if required The scope of work comprised a desktop study and historical review of past activities at the site with the potential to cause contamination, including: • Review of historical ownership (title search) • Aerial photograph review for 1959, 1965, 1974, 1983, 1993 and 2004 • S.149 Planning Certificate review • Review of OEH notices for the site and nearby properties • Assessment of site topography, geology and hydrogeology including site drainage and regional groundwater usage • Site walkover and visual assessment of activities, potential contaminant sources, property boundaries, surrounding land uses, topography, drainage and nearby sensitive environments.	The stated objective was to assess the contamination status of soil associated with previously identified AEC [as per Coffey 2012]. The scope of work comprised the following: • Excavation of ten boreholes (BH1 – BH10) using a hand auger, in accessible areas of the site • Logging of ground conditions at each borehole • Field screening of soil samples using a photo-ionisation detector (PID) • Analysis of selected samples for contaminants of potential concern (COPC)	Stated objectives are to define potential remediation and validation requirements, provide a sampling plan for DSI to fill data gaps following demolition, evaluate remedial options, recommend the most appropriate remedial strategy, establish validation criteria, outline the remedial process and remediation management requirements. To meet the objectives, Cardno undertook the following scope of work: • Defined site features, history, areas of environmental concern (AEC) and developed a CSM • Defined need and scope of further investigations to address data gaps • Identified suitable remediation options for identified COPCs • Evaluated options and identified the preferred strategy • Outlined implementation of the preferred strategy • Developed a construction environmental management plan (CEMP) outlining environmental controls, and unexpected finds protocol and contingency plan • Identified WHS and community consultation requirements.
Comments from review: Objectives and scope were considered appropriate for each stage of work, given constraints applying at the time. Cardno notes the cRAP was prepared due to a requirement for lodgement with the DA prior to completion of a detailed site assessment, and hence detailed the sampling and investigation requirements of the DSI in addition to potential remedial options and procedures to be implemented based on the findings of the DSI when available. Remediation objectives, remediation options review and remediation implementation sections from Cardno 2019 are discussed in **Attachment B** below.			

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Aspect	Coffey 2012 Phase 1 ESA	Prensa 2016 DSI	Cardno 2019 cRAP
Site identification and description	Site identified as 9 Church Street, identified as a portion of Lot 7002 DP 1077042. Site area 4,750 m^2 Site plans show the locality and site boundaries, with site features including original court house building (1890), building extension to the west (1982) and building extension to the east (1949). Adjoining land uses identified as: • Mixed commercial and residential to north • James Fletcher Hospital to south • Police Station to the east • Newcastle Grammar to the west	Site identified as Part of Lot 1 in DP 1199904 [current lot identifier, confirmed by the Auditor with reference to SIX Maps NSW] Site area 5,241 m^2 , Zoning B4 Mixed Use The western portion of Lot 1 in DP 1199904 was noted as part of the adjacent property, with a Figure showing the property and investigation site boundaries. Surrounding land use included the police station to east, a hotel/pub across Church Street, and high density residential properties on the southern and western borders and on the northern side of Church Street.	Site identified as 9 Church Street, Lot 1 DP 1199904, site area approximately 0.52 ha (5,194 m^2). Site plans show current layout, buildings to be demolished. Summary of proposed development provided. Immediately adjoining development includes the Grand Hotel and residential apartments and townhouses to the north, the Newcastle Police Station to the east, and James Fletcher Hospital to the south and west.
Comments from review: The Auditor understands a small portion of Lot 1 DP 1199904 comprises an easement within the adjoining James Fletcher Hospital to the east, and is not part of the subject site. The exact site area and boundaries should be confirmed by survey plan. During site inspection, the contractor (Built) advised the James Fletcher Hospital borders the site both to the south and to the west, consistent with Cardno 2019. The Auditor considers it unlikely that adjoining land uses would affect site contamination conditions, except potentially from the police station to the east.			
Site history	Historical titles were searched dating back to 1883. Indicated the site was Crown Land until 1985, and the State of NSW is current owner. Historical aerial photos from 1959 and 1965 show the central Court House building, a building to the east (apparently different in 1965) and vacant to the west where a building now stands. Buildings to the north east of the site appeared similar to current configuration, buildings to the east and south appeared different, and land to the west was vacant. In 1974 the eastern wing had changed configuration. The property to the east changed configuration by 1974, with the police station developed by 1983.	A summary of Coffey 2012 was provided. Prensa noted the s.149 certificate revealed engine works and fuel / oil storage may have been carried out on the site. An email from Newcastle Council in Appendix H indicates a review of historical information revealed the use of 1 Church Street for engine works and fuel / oil storage, and therefore the property at 9 Church Street is not subject to any known contamination issue by Council.	Cardno identified Coffey 2012 and Prensa 2016 as available previous environmental reports, and provided brief summaries. Site history summary limited, stating the site has been in use as a court house since 1890, with little change in landform except the addition of the eastern and western wings in the 1940s and 1960s. Cardno noted that Prensa and Coffey identified several sources of surface and subsurface impact, indicating a low to moderate contamination potential associated with fill materials and degradation of hazardous building materials which will require further assessment, remediation or management under the proposed land use.

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Aspect	Coffey 2012 Phase 1 ESA	Prensa 2016 DSI	Cardno 2019 cRAP
	By 1993 large buildings had been added along the neighbouring southern boundary. The S.149 certificate indicated the site is within a proclaimed mine subsidence district and may be affected by land contamination. The s.149(2) certificate stated Council records indicate engine works and fuel/oil storage may have been carried out on the land. No sites with notices listed on OEH records were in proximity to the site. OEH heritage records list an extension to the court house to the east for office and court rooms around 1949, with two trial courts later added to the west. Extensive alternations and additions were carried out in 1982, with repairs following the 1989 earthquake undertaken in 1991. Data gaps identified as follows: • Refurbishment and maintenance may have contaminated the land with hazardous building material such as lead paint and asbestos • Type and amounts of fill are unknown • Makeup and condition of underground services was unknown • Not known if pesticides or insecticides were used to maintain gardens		
Comments from review: Pesticide treatment to buildings may also have occurred, as well as in maintenance of gardens (as indicated by Coffey). Coffey did not comment on the s.149(2) information regarding engine works and fuel/oil storage on the land. Subsequent enquiries by Prensa indicated this was a mistake in the records, and applied to the adjacent site to the east (1 Church Street – the police station). No reports have considered this as a potential source of contamination that may affect the site. Historical records have not been obtained from Council. No Dangerous Goods search appears to have been undertaken (either for the site or adjacent police station). The Auditor recommends available records be obtained as part of additional investigations.			
Site condition	Site inspection in 2012 observed the central court house constructed of timer and sandstone, in good condition with the rear of the courthouse unpaved and overgrown with	The northern half of the site was taken up by 3 conjoined buildings, vacant during site works. The southeast portion was a driveway and car park predominantly covered in bitumen. A thin	States the site is currently unused, and currently accommodates the 1892-constructed former Newcastle Courthouse and two non-original 3-storey buildings, comprising the

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Aspect	Coffey 2012 Phase 1 ESA	Prensa 2016 DSI	Cardno 2019 cRAP
	grass and several large trees. The eastern wing was a brick building in good condition, founded approx. 0.5 m below the Church Street footpath. The western wing was cut into the slope up to 1.8 m and constructed of concrete. The rear of the site may contain fill.	nature strip paralleled the southern boundary, widening into a garden area with soft cover landscaping including bare soil and grass. The western third of the southern side of the building had a concrete walkway which wrapped around the western side of the building. The north side of the site was mainly bitumen hardstand and brick paving with some garden beds. A driveway entrance located in the northwest corner of the site provided access to the buildings underground parking via Church Street.	former Administration Building constructed in 1949 (the eastern building) and the former Supreme Court building constructed in 1966 (the western building). Site features consist of the main central court building, and the eastern and western wings abutting joined by atria. The remainder of the site is either planted, grassed or hardstand covered. Vegetation described. Refers to Napier and Blakeley Asbestos Materials Report indicating asbestos containing materials (ACM) are present within the buildings onsite. Notes a potential breather point observed in the northeast portion of the site in driveway pavement.
Comments from review: Cardno 2018 Geotechnical report provided a more detailed description of site features, including fill structures acting as buttresses to retaining walls on the south western corner of the site, and also noted the possible underground storage tank refill point or breather noted in the northeast portion of the site in the driveway. While this is also mentioned in Cardno 2019, it has not been further investigated nor identified in the CSM as a potential contaminant source.			
Topography and hydrology	Located on a spur on the lower slopes of 'The Hill'. Relatively level site, modified by historical development. Surface water collected into onsite stormwater pits and drained to municipal underground drainage system,	The site was predominantly flat but sloped gradually from west to east in the western portion. The surrounding area sloped south to north and east to west indicating cut and fill activities likely occurred in the past.	The site is situated within elevated, undulating hilly terrain, on generally east to north east facing slopes. Site surfaces ranged from flat to slightly north east and east sloping, a result of cutting into the natural slopes predominantly in the western (uphill) portion during development. The floor level of the western building was in the order of up to 2 m below the adjacent footpath and Church Street road formation level.
Comments from review: Topography and hydrology have been adequately considered, although there is no mention of the stormwater easement through the site.			
Geology and hydrogeology	Newcastle 1:50,000 Geological Sheet indicates the site is underlain by the Newcastle Coal Measures – sandstone, siltstone, claystone, coal and tuff. Search of registered bores in 2009 indicated two registered bores within 1 km radius.	No further assessment of geology or hydrogeology was included (except by way of site observations – noted in the Results section below).	Geology as per Coffey 2012. CSM summarised site geology as Fill material consisting of Gravelly, Clayey and Silty SAND, underlain by Silty Clayey and Sandy CLAY and Silty CLAY followed by sandstone bedrock.

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Aspect	Coffey 2012 Phase 1 ESA	Prensa 2016 DSI	Cardno 2019 cRAP
	Registered for "Irrigation" purposes, more than 700 m to north of the site, most likely in Hunter River alluvial deposits. Water bearing zones 1.2 – 4.1 m in sand. Based on observations of surrounding topography, groundwater at the site is expected to be located within the underlying bedrock at a depth between about 10 m to 15 m, expected to flow to north and east discharging to the Hunter River of Newcastle Beach.		Based on acid sulfate soils mapping, there are no known occurrences of acid sulfate soils in the immediate area of the proposed development. No details of hydrogeology except in CSM, which states groundwater is present as a shallow rock aquifer approximately 8 to 12 m bgl.
Comments from review: No groundwater information relevant to the site was sourced, and there is no apparent basis for the expected depth of groundwater stated in Coffey, Prensa and Cardno cRAP. Shallow (perched) groundwater may be present on the fill (or soil) / bedrock interface. Coffey 2018 Geotechnical report encountered groundwater inflow during drilling of BH01 (southeast corner of site) at a depth of 8 m bgl, and seepage during drilling at BH3 (to the north of north-western corner of the site) at about 12 m bgl, both in extremely weathered bedrock (silty CLAY).			
Potential contaminants	Potential chemicals of concern (COCs) identified as TPH, PAH, BTEX, OCPs, OPPs, Metals and Asbestos	Potential areas and contaminants targeted comprised asbestos, BTEX, OCP/OPP, PCB, TRH, PAH and heavy metals, particularly lead.	COPCs identified above adopted Tier 1 screening criteria comprised TRH C_{16}-C_{34}, benzo(a)pyrene, BaP TEQ and lead.
Comments from review: Potential contaminants associated with fuel storage have not been considered. The cRAP did not include asbestos in the identified COPCs, although remediation works do cover asbestos contamination. Further consideration should be given to the potential for contamination associated with the existing buildings, including potential sub-slab pesticide treatment, and contamination by hazardous building materials as a result of the proposed demolition works. The Auditor notes that the Napier & Blakely Asbestos Materials Report identified a range of asbestos building products within structures on the site. This included visible asbestos cement debris (small scattered fragments) to the rear of buildings B and C, and asbestos cement water piping and electrical conduit should be presumed present in underground locations across the site. There is a high potential for asbestos contamination to soils to occur from demolition activities, and assessment following demolition should specifically consider this. While unlikely to be present, the Auditor notes that the EPA 2017 *Guidelines for the NSW Auditor Scheme* impose a requirement to specifically consider whether PFAS are a potential contamination issue.			
Conceptual site model (CSM)	CSMs not required at the time of this report. Potential contaminating activities identified as: • Weathering and/or maintenance / demolition of hazardous building materials • Infiltration of potential contaminants through poorly maintained pavements • Potential use of fill on site	No CSM per se was included. Potential sources of contamination targeted during the DSI were limited to uncontrolled historical fill, potential historical use of pesticides and insecticides, and degradation / demolition of hazardous building materials. Potential receptors and exposure pathways were considered to comprise:	Provisional CSM presented, including sources of contamination, COPCs (as above), distribution of COPCs, site specific lithological information (as above) and actual and potential receptors. The provisional CSM is to be updated pending the results of further testing. Potential contaminant sources include: • Uncontrolled placement of fill material

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Aspect	Coffey 2012 Phase 1 ESA	Prensa 2016 DSI	Cardno 2019 cRAP
	• Potential use of pesticides and insecticides Noted that the site has been developed over time, and the only accessible soil on site is limited to an approximately 10 m x 30 m area at the rear of the site.	• Future site occupants, from direct contact and inhalation (dermal contact and ingestion) with contaminated soil, dust and fibres; and vapour intrusion and inhalation from volatile contaminants. • Shallow and intrusive maintenance and excavation workers (including construction) with pathways as above. • Groundwater.	• Uncontrolled demolition, weathering and maintenance of buildings containing hazardous building materials • Potential pesticide and insecticide use and storage Given the depth to groundwater and COPCs identified for soil, site sourced groundwater impacts are not expected. Should additional investigation reveal a risk to groundwater, these will be incorporated into the CSM. Receptors include current and future site users and construction and maintenance workers, with complete pathways including direct contact and ingestion pathways to contaminated soil. Ecological receptors identified by considered to be low significance. Further investigation required to assess statistical significant of findings.
Comments from review: Prensa did not expand potential contaminant sources from those identified by Coffey. Vapour intrusion was considered as a potential exposure pathway by Prensa, but not in Cardno's CSM. As noted above, the potential on-site UST and fuel/oil storage on the adjacent police station have not been included as potential contamination sources. Potential contaminant impacts from proposed demolition works should also be given further consideration/			
Sampling plan and methodology	No sampling undertaken.	A DQO process was included in Appendix A. The "Problem" was based on contamination sources identified by Coffey. Decisions related to identifying CoPC associated with potential soil contamination, what risks the CoPC present, and whether remediation or management was required prior to divestment. Methodology was described, noting boreholes were progressive using a hand auger in accessible areas, with sampling density in general accordance with the minimum described in AS4482.2 for a site of this size. The hand auger was decontaminated between boreholes. Soil samples were collected directly from the hand auger, and a PID was used to screen the soil profile for potential volatile	DQOs for further investigations provided. The "Problem" was identified as COPCs exceeding Tier 1 criteria, however complete assessment of the site is yet to be undertaken. Decisions align with cRAP objectives summarised above. Inputs include previous investigations and those to be undertaken. The vertical extent of excavations was defined as the depth of fill or depth of proposed excavations. Decision rules, DQIs and an outline sampling plan provided. Specific investigation locations not defined, but number of sampling points to be based on NEPM guidance and NSW EPA Waste Classification guidelines. s.8.1.1

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Aspect	Coffey 2012 Phase 1 ESA	Prensa 2016 DSI	Cardno 2019 cRAP
		organic compounds (VOC) and evidence of hydrocarbon contamination. Subsurface conditions were logged and borehole logs provided in Appendix D.	indicates a minimum of 10 samples for a site of 0.32 ha, but will be further assessed prior to investigations. Detailed methodology not provided, but reference to guidelines.
Comments from review: Previous investigations have been limited by site accessibility. A detailed sampling and analytical quality plan should be prepared for the further investigations, taking into account the potential contamination sources and exposure pathways (notably potential hydrocarbons storage and use on site or on adjacent land; potential groundwater impact and vapour intrusion, and impacts from proposed demolition works). The preliminary CSM should be updated, incorporating these factors, as a basis for planning investigations.			
QA/QC	Not discussed (no investigations undertaken)	Data quality indicators (DQIs) were established as part of the DQO process. Samples were analysed by NATA accredited labs, Envirolab and Eurofins MGT for the COPC listed above. Two samples were also analysed for leachable benzo(a)pyrene using ASLP. Prensa reviewed QA/QC in Appendix F. Sampling procedures and sample handling documented and considered acceptable. A blind and split duplicate sample were analysed for the CoPC (excluding asbestos). RPDs were acceptable in accordance with DQI thresholds except for benzo(a)pyrene TEQ calculation (PQL) in one sample, with results close to the laboratory PQL and attributed to soil heterogeneity. Rinsate and trip blanks were analysed with acceptable results (one spike attributed to plastic containers). Laboratory QA/QC was reviewed and considered acceptable. Prensa considered the data could be relied upon for the purposes of the assessment.	Relatively comprehensive DQIs outlined as part of DQO process.
Comments from review: QA/QC has been adequate in the investigations undertaken to date, and appropriate QA/QC procedures are outlined for the proposed future investigations.			

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Aspect	Coffey 2012 Phase 1 ESA	Prensa 2016 DSI	Cardno 2019 cRAP
Basis of assessment criteria	Not discussed (no investigations undertaken)	Criteria adopted from NEPC 2013 Schedule B1, for current commercial / industrial and potential future high density residential land use. Appendix C discussed HILs, HSLs (including CRC CARE 2011 HSLs). Sandy soil type selected as a conservative approach. Petroleum hydrocarbon management limits were included, with EILs and ESLs. An asbestos criterion of 0.1 g/kg for asbestos identification in soil and non-detection for trace analysis was adopted. Criteria were shown in results tables.	HILs, HSLs, EILs and ESLs for residential sites without accessible soils adopted for additional investigation stage and as validation Remediation Goals (RGs) for any remedial works. As the Site will operate as an educational facility, the NEPM 1999 HILs for Residential B (HIL B), HSLs for Residential B (HSL B), and the EILs and ESLs for Urban Residential areas and Public Open Space have been adopted. HSLs for Sand textures have been applied. Aesthetic criteria will also apply. Criteria presented in Table 5-1.
Comments from review: Assessment criteria are generally considered appropriate.			
Results of investigations	None undertaken.	Fill material was encountered across the site to depths generally ranging from surface to 1.2 m bgl, except for BH10 where fill was encountered to 3.3 m bgl. Fill was underlain by weathered sandstone and clay encountered at depths between 0.55 m and 0.8 m bgl in BH5-BH7 and BH9. Groundwater was not encountered, and no visual or olfactory evidence of soil contamination, including suspected asbestos-containing materials (ACM) was noted during sampling. The highest PID reading was 5.1 ppm, indicating VOCs were unlikely to be present. Asbestos was not detected, and COPC were less than adopted assessment criteria for commercial / industrial or high-density residential land use except the following: • Benzo(a)pyrene (BaP) in 3 samples greater than commercial / industrial and high density residential ecological screening level (ESL) [3.6 mg/kg to 5	CSM summary and risk assessment section noted the following: • Identified lead and BaP TEQ in fill indicate potential health risk via ingestion and direct contact. Further investigation, remediation, management or risk assessment required to determine or mitigate the risk and render the site suitable for the proposed land use. Remediation prior to completion of development, potential impact considered to be the depth of fill, pending further investigations. • BaP and TRH $C1_6$-C_{34} require further assessment to determine whether concentrations are statistically significant and to compare against current guidelines. As the majority of the site is likely to remain as hardstand, potential risks to ecological receptors are considered to be low. [Cardno noted the ESL for BaP used by Prensa was the NEPM low reliability ISL, and CRC CARE

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Aspect	Coffey 2012 Phase 1 ESA	Prensa 2016 DSI	Cardno 2019 cRAP
		mg/kg vs ESLs of 1.4 mg/kg and 0.7 mg/kg respectively] • BaP Toxicity Equivalent Quotient (TEQ) in 3 samples greater than the high density residential health investigation level (HIL) [5.2 mg/kg to 7.3 mg/kg vs HIL of 4 mg/kg] • TRH (C_{16}-C_{34}) in one sample greater than the high density residential ESL [340 mg/kg vs ESL of 300 mg/kg] • Lead in one sample greater than the high density residential HIL and EIL [1,400 mg/kg vs EIL of 1129 mg/kg and HIL of 1200 mg/kg] Leachable concentrations of benzo(a)pyrene were less than the laboratory PQL.	has since published a high reliability ecological guideline of 33 mg/kg]. • Data gaps exist due to the inability to conduct complete investigations beneath the building and hardstand footprints. • There is likely to be variability in the quality and type of fill at the site. Should unidentified areas of soil impacts be discovered in further phases of site work, additional investigations and addition to the cRAP will be required. • An Unexpected Finds Protocol is to be developed dictating actions and responses.
Comments from review: Contamination identified to date is relatively minor, and if contamination found by further investigations is consistent with this, it may not be statistically significant. If that is the case, remediation per se may not be required, and contamination issues would be limited to appropriate classification and disposal of waste.			
Site characterisation / discussion		Included discussion of results as above. Discussion noted selected soil samples collected from fill across the site (excluding the garden beds) were analysed for COPC. Based on the analytical results and field observations Prensa considered the presence of benzo(a)pyrene was likely associated with the presence of bitumen fragments in the fill, with the potential for leaching being low. Ecological criteria were exceeded for TRH and lead, but based on the urban setting of the site and soil conditions encountered, Prensa considered it unlikely that soil processes or biota would be materially affected, given the current zoning of the site, and as such the potential risk to significant ecological receptors was considered low. The lead exceeding the HIL for high density residential use was considered a statistical	Discussion mentioned in other points above.

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Aspect	Coffey 2012 Phase 1 ESA	Prensa 2016 DSI	Cardno 2019 cRAP
		outlier. The sample was collected at shallow depth in proximity to the northern façade of the old court house, and could be attributed to lead based paint in surface soils rather than being representative of fill across the site.	
Comments from review: Site characterisation discussions adequately addressed in at least some sections of the respective reports.			
Conclusions	The site was assessed as having a low to medium likelihood of soil contamination. Potential contamination relates to: • Weathering and or maintenance / demolition of hazardous building materials • Potential use of fill • Potential use of pesticides and insecticides Given buildings and pavements cover the majority of the site, exposure to and/or offsite migration of potential soil contamination is limited. If the buildings and pavements remain in their current configuration then further investigation is not required at this time.	The concentrations of TRH, benzo(a)pyrene and lead would not preclude an ongoing commercial use of the site. Based on the fieldwork undertaken and analytical results, Prensa concludes that the potential risk to human health and the environment, in light of the proposed divestment of the site under current land zoning, is low-moderate given the potential for future high density residential land use at the site.	No conclusions presented.
Comments from review: Coffey and Prensa conclusions considered appropriate for the respective stages of assessment. Absence of conclusions in cRAP is contrary to reporting guidelines, but doesn't affect overall content of the cRAP or the Auditor's opinions regarding it's appropriateness.			
Recommend-ations	Should redevelopment be proposed, including demolition of non-heritage listed buildings and pavements, Coffey recommends a Phase 2 ESA be carried out targeting the identified AECs that are likely to impact on the proposed development. The assessment should include, but not necessarily be limited to, the collection of surface soil samples from fill, around the buildings and gardens and laboratory analysis of samples for the identified COCs.	Should the site be redeveloped for a more sensitive land use such as high density residential, further assessment, management and/or remediation of fill across the site is recommended in open areas and beneath slabs following any proposed demolition.	No summary of recommendations. Various recommendations contained throughout the cRAP as discussed above.
Comments from review: Coffey and Prensa recommendations are considered appropriate, and the cRAP is consistent with following these recommendations.			

DRAFT

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Petro-Chemical Engineers - Fuel and Chemical Systems Design, Fabrication and Installation, Decommissioning and Site Environmental Remediation, Dangerous Goods Consultants

CONTRACTORS CERTIFICATE

Decommissioning and Abandonment of Underground Petroleum Storage Tanks

Work Health & Safety Regulation 2011 under the WHS Act 2011
Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008

I hereby certify that the tank(s) indicated below have been decommissioned by the removal of all flammable and combustible liquids and abandoned by using the method of inert fill (hard cell foam or cement slurry) in accordance with the requirements of AS 4976 – 2008, Chemical Safety Unit and the POEO UPSS regulation 2008.

Company:	Newcastle Police Station	
Address of Premises:	1 Church Street (Cnr Watt), Newcastle NSW 2300	
Dangerous Goods License No:	Nil	Expiry Date: Nil
Tank(s) Abandoned:	1x 5,500 Litre UST (Steel)	
Date of Abandonment:	25/8/17	
Method Used:	All residual Diesel fuel was removed and legally disposed of. Tank abandoned by way of injecting with inert fill (hard cell foam).	
Copies sent to:	Dangerous Goods Licensing Work Cover NSW Lodged online- 29/8/17	
Site Plan attached:	YES	

Signed:

Date: _____28/8/17_____

Craig Boné

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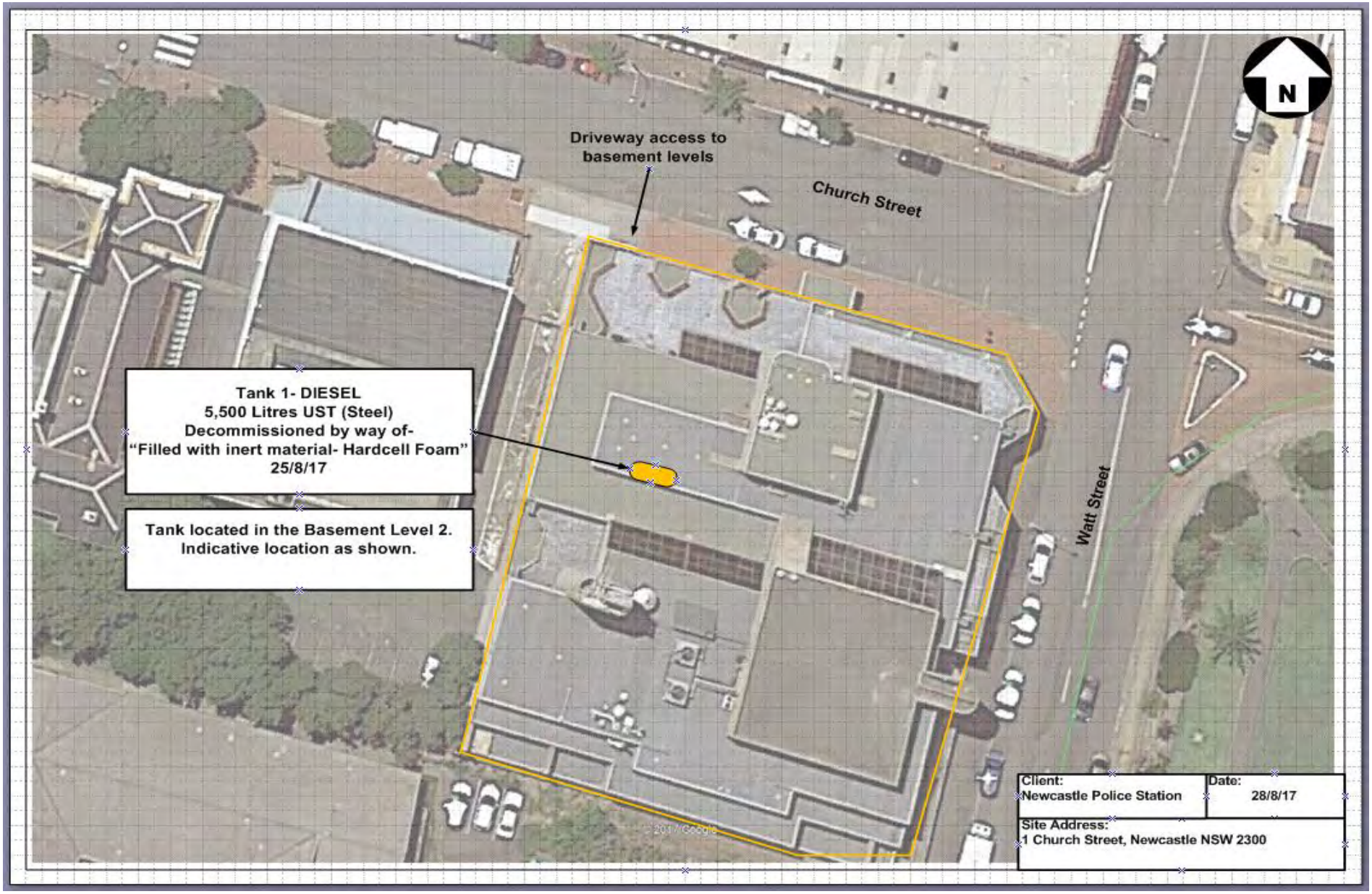

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Our ref: 2189330B-CLM-LTR-001 RevA

Your ref: 2198330B

By email
Neil.bowden@apac.bgis.com

8 September 2017

Neil Bowden
Regional Facilities Manager
BGIS NSW Police Properties - Northern Region

Dear Neil

Vapour risk assessment, decommissioning of underground storage tank at Newcastle Police Station, 1 Church Street, Newcastle NSW

1. INTRODUCTION

Brookfield Global Integrated Solutions Pty Ltd (BGIS) commissioned WSP Australia Pty Ltd (WSP) to undertake a soil vapour risk assessment in the basement of the Newcastle Police Station located at 1 Church Street, Newcastle, NSW ('the site').

The site is an operational police station. A 5.5 kL underground storage tank (UST), previously containing diesel, was decommissioned in situ in August 2017 by Petrolink Engineering Pty Ltd. The UST was filled with inert foam. Contaminated soil may be present around the UST as a result of diesel handling and storage operations. On that basis, a potentially unacceptable vapour inhalation risk to current and future occupiers of the building may arise from soil vapours intruding through the floor into the indoor air of the basement.

2. OBJECTIVE

The objective of this investigation was to assess the vapour inhalation risk resulting from the migration of vapours from potentially contaminated soil surrounding the UST into the basement air.

3. SCOPE

The scope of work completed for the site comprised:

- preliminaries: project management tasks, preparation of a health, environment and safety plan (HESP) for the site works, site inspection
- soil sampling via hand auguring at four locations around the perimeter of the UST

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- four sub-slab, active soil vapour samplers were installed, and four primary vapour samples were collected
- laboratory analyses of one primary soil sample and four primary soil vapour samples.

4. TECHNICAL FRAMEWORK

The investigation was prepared in accordance with the *National Environment Protection (Assessment of Site Contamination) Measures 1999* (NEPM; as amended 2013).

5. CONTAMINANTS OF CONCERN FOR VAPOUR INTRUSION

The contaminants of potential concern were total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN). For the assessment of soil contamination, polycyclic aromatic hydrocarbons (PAHs) were added to the above mentioned analytical suite.

6. METHODS

6.1 SAMPLING RATIONAL

The overall objective of the investigation was to ensure that there was no unacceptable health risk to users of the basement due to possible intrusion of soil vapours from the potentially contaminated soil surrounding the UST, through the floor of the basement and into the indoor air. It reasonable to assume that, if the UST has leaked, the most contaminated soil is located around and below the UST. Because of this, soil samples and sub-slab vapour samples were collected on the perimeter of the UST.

6.2 SOIL SAMPLING

A desktop search for underground services using the Dial Before You Dig (DBYD) service was undertaken prior to intrusive works by WSP and Petrolink Pty Ltd. All utilities plans were referenced on-site when selecting final locations for intrusive works. Four sampling locations were cleared for the presence of underground services by a licensed and experienced service locator subcontracted by Petrolink Pty Ltd (Figure 1 in Appendix A).

WSP staff conducted the intrusive investigation on 21 August 2017. First, the concrete slab was cut by a subcontractor engaged by Petrolink Pty Ltd. An experienced WSP scientist advanced four bore holes using a hand auger. Bore holes were advanced until refusal, which ranged from depths of 0.4 m below ground level (mBGL) to 0.85 mBGL. Seven soil samples were collected at a variety of depths during this operation.

Because bore holes could not be advanced to a depth equal to or greater than the UST depth due to refusal, sub-slab soil vapour sampling and analysis were preferred. Nonetheless, the deepest soil sample was submitted for laboratory analyses based on PID readings and visual observations.

6.2.1 SUB-SLAB VAPOUR SAMPLING

Sub-slab soil vapour sampling was carried out on 21 August 2017. The samples were collected from four locations on the perimeter of the UST and above of the tank pit (Figure 1 in Appendix A).

Sub-slab sampling involved the collection of soil vapour immediately below the concrete slab. A 16-mm diameter hole was drilled in the slab using a masonry hammer drill. The slab was penetrated and a brass VaporPin™ and silicon sleeve assembly was placed into the hole, and hammered down to the correct depth, with the silicon sleeve expending to create an effective seal.

Soil vapours were sampled using USEPA TO-15 *Compendium Methods for the Determination of Toxic Organic Compounds in Ambient Air – Compendium Method TO-15*. The soil vapour was sampled by

collecting the sub-slab atmosphere into a 1.4 L stainless steel canister which was evacuated to sub-atmospheric pressure. The differential pressure between the atmosphere to be sampled and the canister causes the sample to flow into the canister. A critical orifice flow resistor was connected between the sampling tube and the canister to maintain a constant flow rate over the desired sampling period.

The four sub-slab soil vapour locations were sampled for approximately thirty minutes and sampling flow rates were set at 50 mL/min. The canisters were returned to the laboratory and were thermally desorbed and analysed using a method based on US EPA TO-15 *Determination Of Volatile Organic Compounds (VOCs) In Air Collected In Specially – Prepared Canisters And Analyzed By Gas Chromatography/Mass Spectrometry (GC/MS)*.

Location SV1 was sampled in duplicate and at two different times – approximately 30 minutes elapsed between the collection of the primary samples, SV1, and its duplicate sample, SV1 dup. The four primary samples and the duplicate sample were analysed at the supplier primary laboratory – SGS Environmental Services in Melbourne, VIC. A secondary laboratory was not used for these analyses. Samples were analysed for volatile TRH fractions (C_6-C_{12}), BTEXN and VOC compounds.

Verification that ambient atmospheric air was not drawn down the bore and sampled was undertaken by creating an isopropanol shroud at the head of the hole and testing for isopropanol in the soil vapour samples. Moreover, the air in the shroud was sampled using a carbon tube (IPA Shroud 4745211852) and analysed for isopropanol concentration.

6.3 QUALITY ASSURANCE AND QUALITY CONTROL

The quality assurance/quality control (QA/QC) procedures followed during the investigation are summarised in Table 6.1.

Table 6.1 Data quality indicators

ITEM	DESCRIPTION
Procedures	All approvals and licences required were obtained prior to work commencing. All field work was carried out in accordance with relevant guidelines and standard operation procedures.
Storage and transport	Soil samples were placed directly into laboratory prepared containers and stored in a secure chilled container. Soil vapour samples were collected in canisters provided by the laboratory. They were stored and shipped as required by the supplier laboratory SGS. Chain of custody documentation was used to ensure the integrity of the samples from collection to receipt by the analytical laboratory.
Laboratory	All laboratories used should complied AS/NZS ISO 9001:2001 quality assurance programs, are NATA registered and perform their own internal QA/QC programs.
QA/QC field	The field QA/QC comprised: — collection and analysis of duplicate samples — collection and analysis of sample blanks — vapour shroud testing. **Field duplicates** One soil duplicate and one vapour duplicate were sent to the primary laboratory (SGS). The NEPM (2013) indicated that for soil samples if the relative percentage difference (RPD) for the primary and duplicate is greater than 30%, a review should be conducted of the cause (e.g.

	instrument calibration, extraction efficiency, appropriateness of the method used, etc.). The RPD variation can be expected to be higher for organic analysis than for inorganics, and for low concentrations analytes (AS4482.1, 2005). For soil vapour samples, acceptability of an RPD value is dependent on measured mass of each compound, relative to the detection limit. Generally, where the measured mass is more than one order of magnitude greater than the detection limit, RPDs within 100% are acceptable. **Sample blanks** Sample blanks were collected to verify that cross-contamination had not occurred during sampling or during transportation of the samples. Equipment rinsate samples were collected for each sampling day and analysed for the contaminant of potential concern. A trip blank (prepared by the laboratory) was analysed for each batch of samples submitted to the laboratory. The trip blank was analysed for volatile contaminants. **Shroud test** To demonstrate that soil vapour samples were not diluted by drawing in ambient air from the atmosphere, a shroud containing isopropanol was placed over the borehole top. Isopropanol was analysed as one of the sample analytes. A carbon tube was used to sample the air in the shroud and analysed for isopropanol concentration. Up to 20% leakage is acceptable as this is in line with acceptable sample recovery rates for sample extraction of many analytes.
QA/QC – Laboratory	Laboratory QA/QC procedures vary between analytes and between laboratories. If duplicate results are not satisfactory, non-compliance is to be documented in laboratory reports. Primary laboratory QA/QC acceptance limits are as follows: — Surrogates: 70-130% recovery — Matrix spikes: 70–140% recovery (organics) to 80-120% recovery (inorganics) — Control samples: 70–139% recovery (soil) to 80-120% (water) — Duplicate samples: RPDs less than 30% — Method blanks: 0 or less than practical quantitation limit (PQL) — Laboratory duplicate for vapour samples: <100%.

7. ASSESSMENT CRITERIA

7.1 SOIL CONCENTRATIONS

The NEPM provides a framework for assessing the human health risk from petroleum compounds via the inhalation pathway through the development and implementation of health screening levels (HSLs). The adopted carbon fraction ranges for the HSLs are based on TRH analysis after subtraction of BTEX compounds and naphthalene.

The HSLs are divided into four generic land use settings from low density residential (HSL A) to commercial/industrial sites (HSL D). The HSL methodology also further specifies subsurface profile, with criteria presented for sand, silt and clay soils at several depth intervals. Where there is reasonable

doubt as to the appropriate soil texture to select, either a conservative selection should be made (i.e. sand) or laboratory analysis carried out to determine particle size and hence soil texture sub-class.

The potential human receptors at the site are the users (commercial workers) of the basement of the Newcastle Police Station. The exposure pathway identified was vapour intrusion into the basement. Therefore, the HSLs for vapour intrusion are considered relevant for assessing the site. The HSLs for commercial users are provided in the NEPM (2013).

In this case, values for sand have been adopted and are consistent with the shallow geology encountered at the site during head augering. Excavation depth did not exceed 0.85 mBGL.

The HSLs for commercial/industrial site users are summarized in Table 7.1 below.

Table 7.1 Soil HSLs for commercial/industrial workers

ANALYTE	HSL-D (SAND) [1] (mg/kg)
	0 to <1 m
TRH F1 (C_6-C_{10} less BTEX)	260
TRH F2 (>C_{10}-C_{16} less naphthalene)	NL
Benzene	3
Toluene	NL
Ethylbenzene	NL
Total xylene	NL
Naphthalene	NL

1. NEPM (2013) Schedule B1 - Investigation levels for soil and groundwater

7.2 SUB-SLAB VAPOUR CONCENTRATIONS

Schedule B1 of the NEPM (2013) also presents HSLs describing acceptable soil vapour concentrations that would not present an unacceptable risk to building occupants through the pathway of vapour intrusion (from sub-floor soil vapour concentrations – to indoor air concentrations). The NEPM 2013 criteria listed in Table 7.2 are relevant to sub-slab vapour measurements – assuming a sandy soil profile and commercial/industrial land use, such as the basement of the Newcastle Police Station.

Table 7.2 Soil vapour HSLs for commercial/industrial workers

CHEMICAL	HSL-D (SAND) [1] (µg/m³)
	0 to <1 m
TRH F1	680,000
TRH F2	500,000
Benzene	4,000
Toluene	4,800,000
Ethylbenzene	1,300,000
Total xylene	840,000
Naphthalene	3,000

1. NEPM (2013) Schedule B1 - Investigation levels for soil and groundwater

8. RESULTS AND DISCUSSION

8.1 SOIL SAMPLES

The soil samples collected underneath the concrete slab in the basement of the Newcastle Police Station comprised brown, medium-grained, sandy backfill material. Photoionization detector (PID) readings ranged between 0 ppm and 3.2 ppm. One sample, namely BH2_0.8, showed hydrocarbon odours and the highest PID reading. This sample and a duplicate, QA01, were submitted to the laboratory and analysed for the contaminants of potential concern. Soil analytical results and RPDs are provided in Table B1 to B3 in Appendix B.

Soil sample BH2_0.8 showed concentrations of the TRH F2 and F3 fractions, as well as naphthalene, above the laboratory limit of reporting (LOR), but below the adopted assessment criteria. These detections are indicative of a diesel hydrocarbon source. The remaining analytes concentrations were lower than the laboratory LOR. Overall, the hydrocarbons detected in the soil sample were not indicative of unacceptable risks to the commercial workers at the site or intrusive maintenance workers.

All calculated RPDs were within the acceptable levels (i.e. less than 30%). Rinsate blank and trip blank showed concentrations below the laboratory LOR, indicating that cross contamination was unlikely to have occurred during sampling or transportation of the samples.

8.2 SUB-SLAB SOIL VAPOUR RESULTS

Sub-slab soil vapour concentrations for a suite of VOCs, the majority related to fuel, were measured at four locations beneath the site concrete slab (SV1, SV2, SV3 and SV4). Results are shown in Table C1, Appendix C. Several hydrocarbons were detected at all locations. All samples showed measurable concentrations of the TRH $C_6 – C_{10}$ fraction, benzene and toluene, and some had detectable levels of xylene. All concentrations were below the adopted assessment criteria.

Some detections were noted for TRH C_{10}-C_{12} fraction. Due to poor recovery of heavier hydrocarbons from vapour canisters TRH cannot be accurately reported below C_{12} in these types of samples. The C_{10}-C_{12} result cannot be directly compared to the HSL for TRH F2 (C_{10}-C_{16} less naphthalene). However, as the C_{10}-C_{12} results were three orders of magnitude below the F2 HSL there is a negligible potential for vapour risk to exist.

Relatively low concentrations of volatile hydrocarbon (e.g. below the assessment criteria) in soil vapour may be indicative of a diesel source. This corresponds with the historical use of the UST, which was diesel storage and handling.

The shroud test indicated that leakages, comprised between 0.1% and 7%, occurred during sub-slab soil vapour sampling. These values were within the acceptable level of 20%. In the majority of cases, RPDs were unable to be calculated as contaminant concentrations were below the laboratory LORs. In the other cases RPDs were generally lower than 100% indicating good analytical reproducibility (note that isopropanol was not considered as a contaminant of potential concern). Four RPDs were above 100%:

- 185% for TRH C_6-C_{10} fraction
- 119% for TRH C_{10}-C_{12} fraction
- 194% for 2-butadone
- 119% for ortho-xylene.

The duplicate sample had higher concentrations than the primary sample for the majority of detected analytes, and also had isopropanol two orders of magnitude higher. This indicates significantly more

leakage during the duplicate sample than the primary sample, and therefore the duplicate is not considered to be as accurate a representative of the conditions. However, for the primary samples the leak testing indicates minimal leakage and the laboratory duplicate indicated good precision in the analytical results. Based on this, the QA/QC is considered appropriate for the purpose of this investigation.

The absence of hydrocarbon concentrations exceeding HSLs beneath the slab in close proximity of the UST indicates that there was no unacceptable risk to the commercial workers at the site.

9. CONCLUSIONS

Investigations of potential vapour intrusion risks in the basement of the Newcastle Police Station were undertaken in August 2017, following the decommission of a diesel UST. Subsequent measurement of sub-slab soil vapours and analysis of one soil sample showed concentrations lower than assessment criteria.

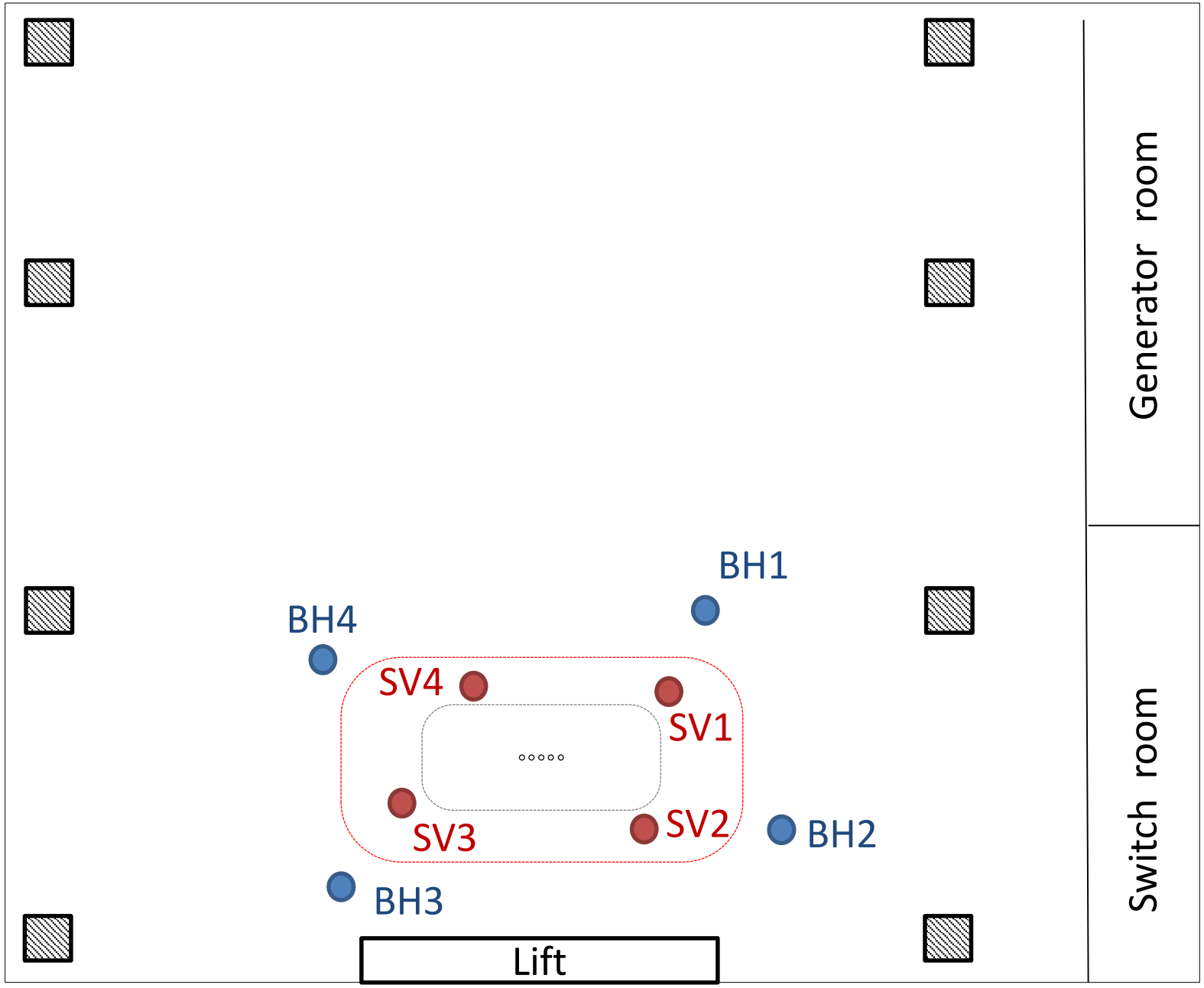
The results of the vapour and soil sampling undertaken indicated that the risk to workers at the site, through vapour intrusion and inhalation, was low and acceptable.

Yours sincerely

David Menozzi
Graduate Environmental Scientist

ATTACHMENT A
SITE PLAN

PROJECT: VAPOUR RISK ASSESSMENT
SITE: NEWCASTKE POLICE STATION
ADDRESS: 1 CHURCH STREET, NEWCASTLE, NSW



LEGEND

- Underground storage tank
- Approximate location of tank pit
- Fill point
- Soil sampling point
- Sub-slab, soil vapour sampling location
- Pillar

Figure 1
SCHEMATIC REPRESENTATION OF THE SITE PLAN

ATTACHMENT B
SOIL ANALYTICAL RESULTS

Table B1

Soil: Total Petroleum Hydrocarbons (TPH) and BTEX compounds (mg/kg) and RPDs

Newcastle Police Station, 1 Watt Street, Newcastle NSW.

August 2017

Sample location	Sample depth (m)	Sample Date	Laboratory report no.	Field PID screening	Total recoverable hydrocarbons (TRH)					BTEXN						
					C_6 - C_{10} less BTEX (F1)	>C_{10} - C_{16}	>C_{10} - C_{16} less napthalene (F2)	>C_{16} - C_{34}	>C_{34} - C_{40}	Benzene	Toluene	Ethylbenzene	m- & p- Xylene	o-Xylene	Total xylene	Naphthalene
BH2_0.8	0.8	21/08/2017	SE169457	3.2	<250	4,300	4,300	3,800	<120	<1	<1	<1	<2	<1	<3	1.5
QA01	0.8	21/08/2017	SE169457	-	<250	4,400	4,400	3,900	<120	<1	<1	<1	<2	<1	<3	1.4
Limit of reporting					250	25	25	25	120	0.1	0.1	0.1	0.2	0.1	0.3	0.3
RPDs %					**-**	**2.3**	**2.3**	**2.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**6.9**
Soil investigation levels for commercial workers[1]																
Health screening levels[1] (HSL-D)	0 to <1 m (sand)				260	-	NL	-	-	3	NL	NL	-	-	230	NL
Soil investigation levels for intrusive maintenance workers[2]																
HSL for vapour intrusion	0 to <2 m				NL	NL	-	-	-	77	NL	NL	-	-	NL	NL
Direct contact	-				82,000	62,000	-	85,000	120,000	1,100	120,000	85,000	-	-	130,000	29,000
Soil health investigation levels for maintenance workers[1]																
HIL - D	-				-	-	-	-	-	-	-	-	-	-	-	-

Notes:

Concentrations expressed as mg/kg

[1] NEPM (2013) *Schedule B1 - Investigation levels for soil and groundwater - Table 1A(3) - Health screening levels for vapour intrusion*

[2] Friebel & Nadebaum (2011) *Health screening levels for petroleum hydrocarbons in soil and groundwater. Part 1: Technical development document. CRC CARE Technical Report no. 10, Tables B3 and B4*

- Guidance values are not available

Bold Sample concentration exceeds the HSL guidance values

Table B2
Soil: Polyaromatic Hydrocarbons (PAHs; mg/kg) and RPDs
Newcastle Police Station, 1 Watt Street, Newcastle NSW.
August 2017

Sample location	Sample depth (m)	Sample Date	Laboratory report no.	Naphthalene	Acenaphtylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b&j)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Ideno(1,2,3-cd)pyrene	Dibenzo(a&h)anthracene	Benzo(ghi)perylene	BaP TEQ <LOR=0	Total PAH
BH2_0.8	0.8	21/08/2017	SE169457	<2.4	<0.6	<1.7	<2.5	<3.9	<0.7	<0.3	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.8
QA01	0.8	21/08/2017	SE169457	<1.8	<0.7	<2	<2.9	<4	<0.8	<0.5	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.8
Practical Quantitation Limit				0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.8
RPDs %				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Soil investigation levels for commercial workers[1]																					
Health screening levels[1] (HSL-D)	0 to <1 m (sand)			NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Direct contact[2]	-			11,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Soil investigation levels for intrusive maintenance workers[2]																					
HSL for vapour intrusion	0 to <2 m			NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Direct contact	-			29,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Soil health investigation levels for maintenance workers[1]																					
HIL - D				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	4,000

Notes:
Concentrations expressed as mg/kg

[1] NEPM (2013) *Schedule B1 - Investigation levels for soil and groundwater - Table 1A(3) - Health screening levels for vapour intrusion*

[2] Friebel & Nadebaum (2011) *Health screening levels for petroleum hydrocarbons in soil and groundwater. Part 1: Technical development document. CRC CARE Technical Report no. 10, Tables B3 and B4*

- Guidance values were not available

Bold Sample concentration exceeds the HSL guidance values

Table B3
Soil: QA/QC
Newcastle Police Station, 1 Watt Street, Newcastle NSW.
August 2017

Sample ID	RB_210817	TB_210817
Sample type	**Rinsate Blank**	**Trip Blank**
Date sampled	21/08/17	21/08/17
Laboratory report no.	SE169457	SE169457
Total recoverable hydrocarbons		
F1: C6-C10 less BTEX	<50	<50
F2: >C10-C16 less naphthalene	<60	-
F3: >C16-C34	<500	-
F4: >C34-C40	<500	-
Total >C10 - C40	<650	-
Aromatic hydrocarbons		
Benzene	<0.5	-
Toluene	<0.5	-
Ethylbenzene	<0.5	-
m- & p-Xylene	<1	-
o-Xylene	<0.5	-
Total Xylenes	<1.5	-
Naphthalene	<0.5	-
PAHs		
Total PAHs	<1	-

Note:
Concentrations expressed in µg/L

ATTACHMENT C
SUB-SLAB, SOIL VAPOUR
ANALYTICAL RESULTS

Table C1

Sub-slab vapour concentrations of volatile organic compounds (µg/m^3)
Newcastle Police Station, 1 Watt Street, Newcastle NSW.
August 2017

Compound Lab report # Date sampled	Units	HSL D 0 m to <1 m Sand	SV1 M170830 21/08/2017	SV2 M170830 21/08/2017	SV3 M170830 21/08/2017	SV4 M170830 21/08/2017	SV1 dup M170830 21/08/2017	SV1 Laboratory Duplicate M170830 21/08/2017
Benzene	µg/m^3	4,000	5	17	8	52	4	5
2-butanone(MEK)	µg/m^3	-	<2.3	<2.4	<2.1	<2.1	160	<2.3
n-Butylbenzene	µg/m^3	-	<3.7	<3.8	<3.4	<3.3	<3.5	<3.7
Carbon tetrachloride	µg/m^3	-	<4.6	<4.7	<4.3	<4.1	<4.4	<4.6
Chloroethane	µg/m^3	-	<2.8	<2.8	<2.6	<2.5	<2.6	<2.8
Chloromethane	µg/m^3	-	<3.2	<3.3	<3	<2.9	<3.1	<3.2
Cyclohexane	µg/m^3	-	<1.8	<1.9	<1.7	15	<1.7	<1.8
n-Decane	µg/m^3	-	<9.7	<9.9	34	11	<9.2	<9.7
Dibromochloromethane	µg/m^3	-	<5.5	<5.6	<5.1	<4.9	<5.2	<5.5
1,2-Dibromoethane	µg/m^3	-	<5.5	<5.6	<5.1	<4.9	<5.2	<5.5
Dichlorodifluoromethane	µg/m^3	-	6	5	5	5	6	6
1,1-Dichloroethane	µg/m^3	-	<3.2	<3.3	<3	<2.9	<3.1	<3.2
1,2-Dichloroethane	µg/m^3	-	<4.6	<4.7	<4.3	<4.1	<4.4	<4.6
1,1-Dichloroethene	µg/m^3	-	<2.8	<2.8	<2.6	<2.5	<2.6	<2.8
cis-1,2-Dichloroethene	µg/m3	-	<3.7	<3.8	<3.4	<3.3	<3.5	<3.7
trans-1,2-Dichloroethene	µg/m^3	-	<2.8	<2.8	<2.6	<2.5	<2.6	<2.8
2,4-dimethylpentane	µg/m^3	-	<4.6	<4.7	42	<4.1	<4.4	<4.6
n-Dodecane	µg/m^3	-	<9.7	<9.9	<8.9	<8.6	<9.2	<9.7
Ethylbenzene	µg/m^3	1,300,000	<2.8	<2.8	<2.6	7	<2.6	<2.8
Ethylcyclohexane	µg/m^3	-	<4.6	<4.7	<4.3	<4.1	<4.4	<4.6
n-Heptane	µg/m^3	-	<3.2	5	1,200	110	<3.1	<3.2
n-Hexane	µg/m^3	-	<2.8	6	1,200	54	<2.6	<2.8
Isopropanol	µg/m^3	-	190	570	660	1,200	19,000	180
Isopropylbenzene	µg/m^3	-	<3.7	<3.8	<3.4	<3.3	<3.5	<3.7
4-Isopropyltoluene	µg/m^3	-	<3.7	<3.8	<3.4	<3.3	<3.5	<3.7
2-Methyl butane	µg/m^3	-	8	19	1,500	36	9	<4.6
Methyl tert-butyl ether	µg/m^3	-	<2.8	<2.8	<2.6	<2.5	<2.6	<2.8
Methylcyclohexane	µg/m^3	-	<4.6	<4.7	<4.3	27	<4.4	<4.6
2-Methylhexane	µg/m^3	-	<4.6	<4.7	450	27	<4.4	<4.6
3-Methylhexane	µg/m^3	-	<4.6	<4.7	<4.3	<4.1	<4.4	<4.6
2-Methylpentane	µg/m^3	-	<4.6	<4.7	1,100	52	<4.4	<4.6
3-Methylpentane	µg/m^3	-	<4.6	<4.7	750	30	<4.4	<4.6
Naphthalene	µg/m^3	3,000	<9.7	<9.9	<8.9	<8.6	<9.2	<9.7

n-Nonane	µg/m^3	-	<5.5	<5.6	190	41	<5.2	<5.5
n-Octane	µg/m^3	-	<5.5	<5.6	600	81	<5.2	<5.5
n-Pentane	µg/m^3	-	<4.6	21	3,600	75	<4.4	<4.6
propylbenzene	µg/m^3	-	<3.2	<3.3	<3	<2.9	<3.1	<3.2
Tetrachloroethene	µg/m^3	-	<5.1	<5.2	<4.7	<4.5	<4.8	<5.1
Toluene	µg/m^3	4,800,000	33	66	22	100	47	25
1,1,1-trichloroethane	µg/m^3	-	<3.7	<3.8	<3.4	<3.3	<3.5	<3.7
1,1,2-trichloroethane	µg/m^3	-	<3.7	<3.8	<3.4	<3.3	<3.5	<3.7
Trichloroethene	µg/m^3	-	<4.1	<4.2	<3.8	<3.7	<3.9	<4.1
Trichloromethane	µg/m^3	-	110	<4.2	<3.8	<3.7	130	120
1,2,4-Trimethylbenzene	µg/m^3	-	<3.7	<3.8	<3.4	6	8	<3.7
1,3,5-Trimethylbenzene	µg/m^3	-	<2.8	<2.8	<2.6	5	<2.6	<2.8
n-Undecane	µg/m^3	-	<9.7	<9.9	18	<8.6	<9.2	<9.7
Vinyl Chloride	µg/m^3	-	<1.8	<1.9	<1.7	<1.6	<1.7	<1.8
o-Xylene	µg/m^3	840,000	<2.8	<2.8	<2.6	18	11	<2.8
m&p-Xylenes	µg/m^3		<6	<6.1	<5.5	40	13	<6
TRH C_6-C_{10}	µg/m^3	-	130	140	11,000	2,100	3,400	120
TRH C_{10}-C_{12}	µg/m^3	-	<92	<94	480	250	360	<92
Total BTEX	µg/m^3	-	49	95	41	217	77	42
F1: TRH >C_6-C_{10} minus BTEX	µg/m^3	680,000	81	45	10,959	1,883	3,323	79

Notes:
Total BTEX were calculated as the sum of single BTEX compound concentrations. Where concentrations were below LOR, the LOR value was used in the calculation.
F1: TRH >C10-C16 minus BTEX was calculated by the author of this report
<LOR: Concentration below the laboratory LOR

Table C2

Field duplicate: sub-slab vapour concentrations of volatile organic compounds (µg/m^3)
Newcastle Police Station, 1 Watt Street, Newcastle NSW.
August 2017

Compound Lab report # Date sampled	Units	SV1 M170830 21/08/2017	SV1 dup M170830 21/08/2017	RPD %
Benzene	µg/m^3	4.7	3.6	27%
2-butanone(MEK)	µg/m^3	<2.3	160	194%
n-Butylbenzene	µg/m^3	<3.7	<3.5	-
Carbon tetrachloride	µg/m^3	<4.6	<4.4	-
Chloroethane	µg/m^3	<2.8	<2.6	-
Chloromethane	µg/m^3	<3.2	<3.1	-
Cyclohexane	µg/m^3	<1.8	<1.7	-
n-Decane	µg/m^3	<9.7	<9.2	-
Dibromochloromethane	µg/m^3	<5.5	<5.2	-
1,2-Dibromoethane	µg/m^3	<5.5	<5.2	-
Dichlorodifluoromethane	µg/m^3	5.7	5.8	2%
1,1-Dichloroethane	µg/m^3	<3.2	<3.1	-
1,2-Dichloroethane	µg/m^3	<4.6	<4.4	-
1,1-Dichloroethene	µg/m^3	<2.8	<2.6	-
cis-1,2-Dichloroethene	µg/m3	<3.7	<3.5	-
trans-1,2-Dichloroethene	µg/m^3	<2.8	<2.6	-
2,4-dimethylpentane	µg/m^3	<4.6	<4.4	-
n-Dodecane	µg/m^3	<9.7	<9.2	-
Ethylbenzene	µg/m^3	<2.8	<2.6	-
Ethylcyclohexane	µg/m^3	<4.6	<4.4	-
n-Heptane	µg/m^3	<3.2	<3.1	-
n-Hexane	µg/m^3	<2.8	<2.6	-
Isopropanol	µg/m^3	190	19000	196%
Isopropylbenzene	µg/m^3	<3.7	<3.5	-
4-Isopropyltoluene	µg/m^3	<3.7	<3.5	-
2-Methyl butane	µg/m^3	8.4	8.7	4%
Methyl tert-butyl ether	µg/m^3	<2.8	<2.6	-
Methylcyclohexane	µg/m^3	<4.6	<4.4	-
2-Methylhexane	µg/m^3	<4.6	<4.4	-
3-Methylhexane	µg/m^3	<4.6	<4.4	-
2-Methylpentane	µg/m^3	<4.6	<4.4	-
3-Methylpentane	µg/m^3	<4.6	<4.4	-
Naphthalene	µg/m^3	<9.7	<9.2	-
n-Nonane	µg/m^3	<5.5	<5.2	-
n-Octane	µg/m^3	<5.5	<5.2	-
n-Pentane	µg/m^3	<4.6	<4.4	-
propylbenzene	µg/m^3	<3.2	<3.1	-
Tetrachloroethene	µg/m^3	<5.1	<4.8	-
Toluene	µg/m^3	33	47	35%
1,1,1-trichloroethane	µg/m^3	<3.7	<3.5	-
1,1,2-trichloroethane	µg/m^3	<3.7	<3.5	-
Trichloroethene	µg/m^3	<4.1	<3.9	-
Trichloromethane	µg/m^3	110	130	17%
1,2,4-Trimethylbenzene	µg/m^3	<3.7	8.2	76%
1,3,5-Trimethylbenzene	µg/m^3	<2.8	<2.6	-

n-Undecane	µg/m^3	<9.7	<9.2	-
Vinyl Chloride	µg/m3	<1.8	<1.7	-
o-Xylene	µg/m^3	<2.8	11	119%
m&p-Xylenes	µg/m^3	<6	13	74%
C6-C10	µg/m^3	130	3400	185%
C10-C12	µg/m^3	<92	360	119%

Table C3

Laboratory duplicate: sub-slab vapour concentrations of volatile organic compounds (µg/m^3)
Newcastle Police Station, 1 Watt Street, Newcastle NSW.
August 2017

Compound Lab report # Date sampled	Units	SV1 M170830 21/08/2017	SV1 Laboratory Duplicate M170830 21/08/2017	RPD %
Benzene	µg/m^3	4.7	4.9	4%
2-butanone(MEK)	µg/m^3	<2.3	<2.3	-
n-Butylbenzene	µg/m^3	<3.7	<3.7	-
Carbon tetrachloride	µg/m^3	<4.6	<4.6	-
Chloroethane	µg/m^3	<2.8	<2.8	-
Chloromethane	µg/m^3	<3.2	<3.2	-
Cyclohexane	µg/m^3	<1.8	<1.8	-
n-Decane	µg/m^3	<9.7	<9.7	-
Dibromochloromethane	µg/m^3	<5.5	<5.5	-
1,2-Dibromoethane	µg/m^3	<5.5	<5.5	-
Dichlorodifluoromethane	µg/m^3	5.7	5.7	0%
1,1-Dichloroethane	µg/m^3	<3.2	<3.2	-
1,2-Dichloroethane	µg/m^3	<4.6	<4.6	-
1,1-Dichloroethene	µg/m^3	<2.8	<2.8	-
cis-1,2-Dichloroethene	µg/m3	<3.7	<3.7	-
trans-1,2-Dichloroethene	µg/m^3	<2.8	<2.8	-
2,4-dimethylpentane	µg/m^3	<4.6	<4.6	-
n-Dodecane	µg/m^3	<9.7	<9.7	-
Ethylbenzene	µg/m^3	<2.8	<2.8	-
Ethylcyclohexane	µg/m^3	<4.6	<4.6	-
n-Heptane	µg/m^3	<3.2	<3.2	-
n-Hexane	µg/m^3	<2.8	<2.8	-
Isopropanol	µg/m^3	190	180	5%
Isopropylbenzene	µg/m^3	<3.7	<3.7	-
4-Isopropyltoluene	µg/m^3	<3.7	<3.7	-
2-Methyl butane	µg/m^3	8.4	<4.6	-
Methyl tert-butyl ether	µg/m^3	<2.8	<2.8	-
Methylcyclohexane	µg/m^3	<4.6	<4.6	-
2-Methylhexane	µg/m^3	<4.6	<4.6	-
3-Methylhexane	µg/m^3	<4.6	<4.6	-
2-Methylpentane	µg/m^3	<4.6	<4.6	-
3-Methylpentane	µg/m^3	<4.6	<4.6	-
Naphthalene	µg/m^3	<9.7	<9.7	-
n-Nonane	µg/m^3	<5.5	<5.5	-
n-Octane	µg/m^3	<5.5	<5.5	-
n-Pentane	µg/m^3	<4.6	<4.6	-
propylbenzene	µg/m^3	<3.2	<3.2	-
Tetrachloroethene	µg/m^3	<5.1	<5.1	-
Toluene	µg/m^3	33	25	28%
1,1,1-trichloroethane	µg/m^3	<3.7	<3.7	-
1,1,2-trichloroethane	µg/m^3	<3.7	<3.7	-
Trichloroethene	µg/m^3	<4.1	<4.1	-
Trichloromethane	µg/m^3	110	120	9%

1,2,4-Trimethylbenzene	µg/m^3	<3.7	<3.7	-
1,3,5-Trimethylbenzene	µg/m^3	<2.8	<2.8	-
n-Undecane	µg/m^3	<9.7	<9.7	-
Vinyl Chloride	µg/m3	<1.8	<1.8	-
o-Xylene	µg/m^3	<2.8	<2.8	-
m&p-Xylenes	µg/m^3	<6	<6	-
C_6-C_{10}	µg/m^3	130	120	8%

Tables C4

Isopropanol shroud results (mg/m^3)
Newcastle Police Station, 1 Watt Street, Newcastle NSW.
August 2017

Table B2

Sample ID	Date sampled	Laboratory report #	Isopropanol (mg/m^3)
IPA Shroud 4745211852	21/08/2017	M170830	270

ATTACHMENT D
SITE PHOTOGRAPHS

Photo 1. Overview of the UST area. The pink marks on the ground identify services, whereas the white dots represent soil sampling locations.

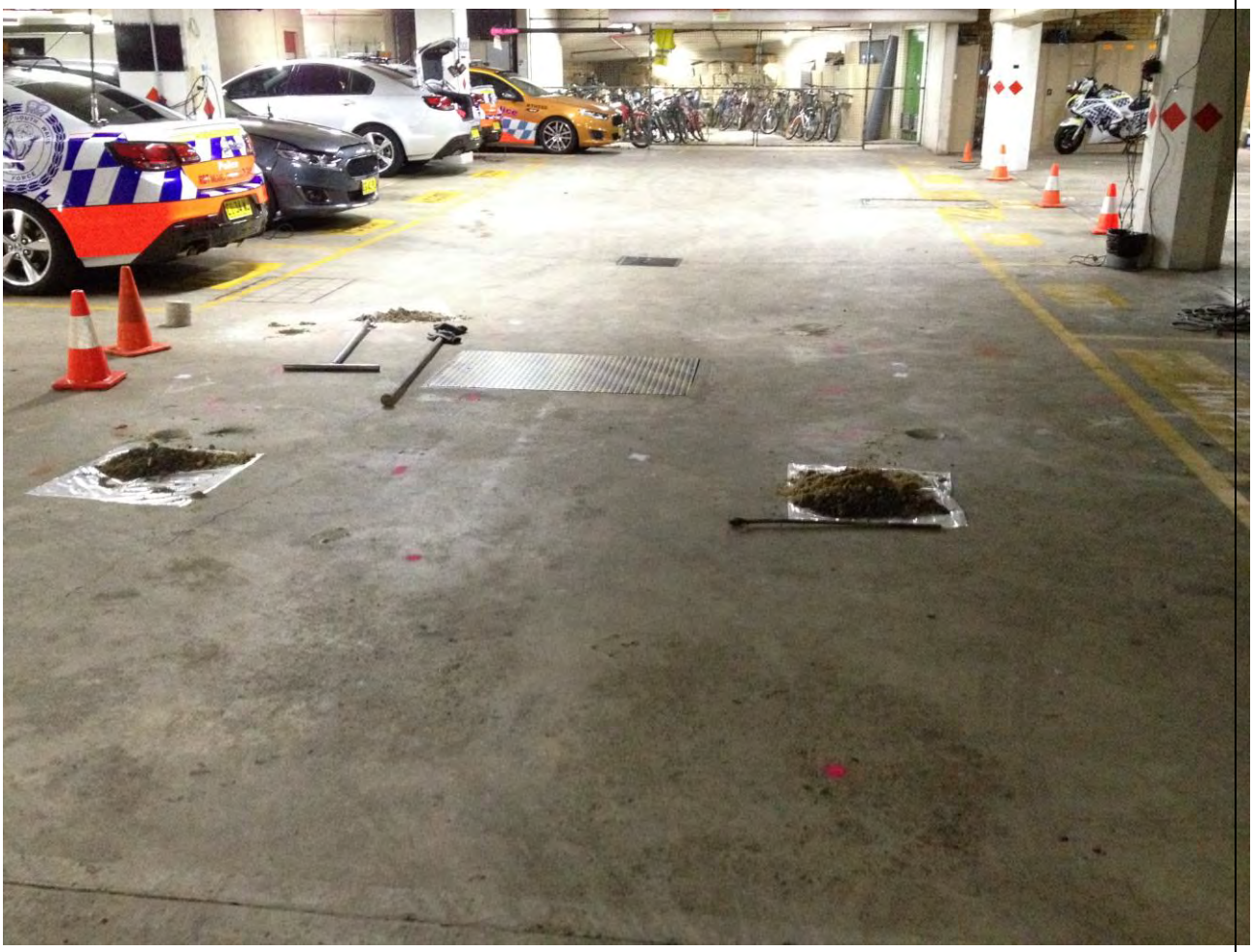


Photo 2. Collection of soil samples using a hand auger.

Photo 3. Detail of a borehole and the backfill sand extracted during sampling.

Photo 4. Detail of an installed sub-slab, soil vapour pin.

Photo 5. Sampling of sub-slab soil vapour.

ATTACHMENT E
CALIBRATION CERTIFICATES

Gas Calibration Certificate

Instrument MX6
Serial No. 1203HBW-023
Sensors O2, LEL, PID, CO, H2S

airmet
Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments			
Battery	Charge Condition	✓				
	Fuses	✓				
	Capacity	✓				
	Recharge OK?	✓				
Switch/keypad	Operation	✓				
Display	Intensity	✓				
	Operation (segments)	✓				
Grill Filter	Condition	✓				
	Seal	✓				
Pump	Operation					
	Filter					
	Flow					
	Valves, Diaphragm					
PCB	Condition	✓				
Connectors	Condition	✓				
			Low	**High**	**TWA**	**STEL**
Sensor	O2	✓	19.5%	23.5%	N/A	N/A
	LEL	✓	5%	10%	N/A	N/A
	PID	✓	50ppm	100ppm	10ppm	25ppm
	CO	✓	30ppm	60ppm	30ppm	200ppm
	H2S	✓	10ppm	15ppm	10ppm	15ppm
Alarms	Beeper	✓				
	Settings	✓				
Software	Version					
Datalogger	Operation					
Download	Operation					
Other tests:						

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No	Instrument Reading
O2		20.9% Vol O2		Fresh Air	20.8% O2
LEL		50% LEL Methane	NATA	SY131	49% LEL (Methane)
PID		98ppm Isobutylene	NATA	SY137	97ppm Isobutylene
CO		99ppm CO	NATA	SY131	99ppm CO
H2S		23.3ppm H2S	NATA	SY131	23.3ppmH2S

Calibrated by: Sarah Lian

Calibration date: 17-Aug-17

Next calibration due: 13-Feb-18

ATTACHMENT F
LABORATORY REPORTS

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Davide Manozzi
Client	WSP AUSTRALIA PTY LIMITED
Address	Level 27, 680 George St NSW 2000
Telephone	02 9272 5100
Facsimile	02 9272 5101
Email	David.Menozzi@wsp.com
Project	**2189330D - Newcastle Police Station**
Order Number	**E66QBU**
Samples	4

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE169457 R0**
Date Received	23/8/2017
Date Reported	30/8/2017

COMMENTS

Accredited for compliance with ISO/IEC 17025- Testing. NATA accredited laboratory 2562(4354).

VOC/VPH-The Limit of Reporting (LOR) has been raised due to interferences from the sample matrix.
PAH - The Limit of Reporting (LOR) has been raised due to interferences from the sample matrix.

SIGNATORIES

Akheeqar Beniameen
Chemist

Ly Kim Ha
Organic Section Head

Teresa Nguyen
Organic Chemist

VOC's in Soil [AN433] Tested: 25/8/2017

PARAMETER	UOM	LOR	BH2_0.8 SOIL - 21/8/2017 SE169457.001	QA01 SOIL - 21/8/2017 SE169457.004
Benzene	mg/kg	0.1	<1.0↑	<1.0↑
Toluene	mg/kg	0.1	<1.0↑	<1.0↑
Ethylbenzene	mg/kg	0.1	<1.0↑	<1.0↑
m/p-xylene	mg/kg	0.2	<2.0↑	<2.0↑
o-xylene	mg/kg	0.1	<1.0↑	<1.0↑
Total Xylenes	mg/kg	0.3	<3.0↑	<3.0↑
Total BTEX	mg/kg	0.6	<6.0↑	<6.0↑
Naphthalene	mg/kg	0.1	**1.5**	**1.4**

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 25/8/2017

PARAMETER	UOM	LOR	BH2_0.8 SOIL - 21/8/2017 SE169457.001	QA01 SOIL - 21/8/2017 SE169457.004
Benzene (F0)	mg/kg	0.1	<1.0↑	<1.0↑
TRH C6-C9	mg/kg	20	<200↑	<200↑
TRH C6-C10	mg/kg	25	<250↑	<250↑
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<250↑	<250↑

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 28/8/2017

PARAMETER	UOM	LOR	BH2_0.8 SOIL - 21/8/2017 SE169457.001	QA01 SOIL - 21/8/2017 SE169457.004
TRH C10-C14	mg/kg	20	**2400**	**2600**
TRH C15-C28	mg/kg	45	**5600**	**5800**
TRH C29-C36	mg/kg	45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	**4300**	**4400**
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	**4300**	**4400**
TRH >C16-C34 (F3)	mg/kg	90	**3800**	**3900**
TRH >C34-C40 (F4)	mg/kg	120	<120	<120
TRH C10-C36 Total	mg/kg	110	**8000**	**8400**
TRH C10-C40 Total	mg/kg	210	**8000**	**8400**

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 28/8/2017

PARAMETER	UOM	LOR	BH2_0.8 SOIL - 21/8/2017 SE169457.001	QA01 SOIL - 21/8/2017 SE169457.004
Naphthalene	mg/kg	0.1	<2.4↑	<1.8↑
2-methylnaphthalene	mg/kg	0.1	**18**	**17**
1-methylnaphthalene	mg/kg	0.1	**15**	**14**
Acenaphthylene	mg/kg	0.1	<0.6↑	<0.7↑
Acenaphthene	mg/kg	0.1	<1.7↑	<2.0↑
Fluorene	mg/kg	0.1	<2.5↑	<2.9↑
Phenanthrene	mg/kg	0.1	<3.9↑	<4.0↑
Anthracene	mg/kg	0.1	<0.7↑	<0.8↑
Fluoranthene	mg/kg	0.1	<0.3↑	<0.5↑
Pyrene	mg/kg	0.1	<1.0↑	<1.0↑
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.8	**32**	**31**
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	<0.8

Moisture Content [AN002] Tested: 29/8/2017

PARAMETER	UOM	LOR	BH2_0.8 SOIL - 21/8/2017 SE169457.001	QA01 SOIL - 21/8/2017 SE169457.004
% Moisture	%w/w	0.5	**5.6**	**5.9**

VOCs in Water [AN433] Tested: 28/8/2017

PARAMETER	UOM	LOR	RB_210817 WATER - 21/8/2017 SE169457.002
Benzene	µg/L	0.5	<0.5
Toluene	µg/L	0.5	<0.5
Ethylbenzene	µg/L	0.5	<0.5
m/p-xylene	µg/L	1	<1
o-xylene	µg/L	0.5	<0.5
Total Xylenes	µg/L	1.5	<1.5
Total BTEX	µg/L	3	<3
Naphthalene	µg/L	0.5	<0.5

Volatile Petroleum Hydrocarbons in Water [AN433] Tested: 28/8/2017

PARAMETER	UOM	LOR	RB_210817 WATER - 21/8/2017 SE169457.002	TB_210817 WATER - 21/8/2017 SE169457.003
TRH C6-C9	µg/L	40	<40	<40
Benzene (F0)	µg/L	0.5	<0.5	<0.5
TRH C6-C10	µg/L	50	<50	<50
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50

TRH (Total Recoverable Hydrocarbons) in Water [AN403] Tested: 27/8/2017

PARAMETER	UOM	LOR	RB_210817 WATER - 21/8/2017 SE169457.002
TRH C10-C14	µg/L	50	<50
TRH C15-C28	µg/L	200	<200
TRH C29-C36	µg/L	200	<200
TRH C37-C40	µg/L	200	<200
TRH >C10-C16 (F2)	µg/L	60	<60
TRH >C16-C34 (F3)	µg/L	500	<500
TRH >C34-C40 (F4)	µg/L	500	<500
TRH C10-C36	µg/L	450	<450
TRH C10-C40	µg/L	650	<650

PAH (Polynuclear Aromatic Hydrocarbons) in Water [AN420] Tested: 27/8/2017

PARAMETER	UOM	LOR	RB_210817 WATER - 21/8/2017 SE169457.002
Naphthalene	µg/L	0.1	<0.1
2-methylnaphthalene	µg/L	0.1	<0.1
1-methylnaphthalene	µg/L	0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1
Fluorene	µg/L	0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1
Anthracene	µg/L	0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1
Pyrene	µg/L	0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1
Chrysene	µg/L	0.1	<0.1
Benzo(b&j)fluoranthene	µg/L	0.1	<0.1
Benzo(k)fluoranthene	µg/L	0.1	<0.1
Benzo(a)pyrene	µg/L	0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1
Dibenzo(ah)anthracene	µg/L	0.1	<0.1
Benzo(ghi)perylene	µg/L	0.1	<0.1
Total PAH (18)	µg/L	1	<1

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents .
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	Carcinogenic PAHs may be expressed as Benzo(a)pyrene equivalents by applying the BaP toxicity equivalence factor (NEPM 1999, June 2013, B7). These can be reported as the individual PAHs and as a sum of carcinogenic PAHs. The sum is reported three ways, the first assuming all <LOR results are zero, the second assuming all < LOR results are half the LOR and the third assuming all <LOR results are the LOR.
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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STATEMENT OF QA/QC PERFORMANCE

SE169457 R0

CLIENT DETAILS

Contact	Davide Manozzi
Client	WSP AUSTRALIA PTY LIMITED
Address	Level 27, 680 George St NSW 2000
Telephone	02 9272 5100
Facsimile	02 9272 5101
Email	David.Menozzi@wsp.com
Project	**2189330D - Newcastle Police Station**
Order Number	**E66QBU**
Samples	4

LABORATORY DETAILS

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Laboratory	SGS Alexandria Environmental
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Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE169457 R0**
Date Received	23 Aug 2017
Date Reported	30 Aug 2017

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met (within the SGS Alexandria Environmental laboratory).

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice
Samples received in correct containers	Yes	Sample counts by matrix	2 Soil, 2 Water
Date documentation received	23/8/2017	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	4.6°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

HOLDING TIME SUMMARY

SE169457 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Moisture Content

Method: ME-(AU)-[ENV]AN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH2_0.8	SE169457.001	LB131018	21 Aug 2017	23 Aug 2017	04 Sep 2017	29 Aug 2017	03 Sep 2017	30 Aug 2017
QA01	SE169457.004	LB131018	21 Aug 2017	23 Aug 2017	04 Sep 2017	29 Aug 2017	03 Sep 2017	30 Aug 2017

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH2_0.8	SE169457.001	LB130903	21 Aug 2017	23 Aug 2017	04 Sep 2017	28 Aug 2017	07 Oct 2017	30 Aug 2017
QA01	SE169457.004	LB130903	21 Aug 2017	23 Aug 2017	04 Sep 2017	28 Aug 2017	07 Oct 2017	30 Aug 2017

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RB_210817	SE169457.002	LB130886	21 Aug 2017	23 Aug 2017	28 Aug 2017	27 Aug 2017	06 Oct 2017	29 Aug 2017

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH2_0.8	SE169457.001	LB130903	21 Aug 2017	23 Aug 2017	04 Sep 2017	28 Aug 2017	07 Oct 2017	30 Aug 2017
QA01	SE169457.004	LB130903	21 Aug 2017	23 Aug 2017	04 Sep 2017	28 Aug 2017	07 Oct 2017	30 Aug 2017

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RB_210817	SE169457.002	LB130886	21 Aug 2017	23 Aug 2017	28 Aug 2017	27 Aug 2017	06 Oct 2017	29 Aug 2017

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH2_0.8	SE169457.001	LB130876	21 Aug 2017	23 Aug 2017	04 Sep 2017	25 Aug 2017	04 Oct 2017	30 Aug 2017
QA01	SE169457.004	LB130876	21 Aug 2017	23 Aug 2017	04 Sep 2017	25 Aug 2017	04 Oct 2017	30 Aug 2017

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RB_210817	SE169457.002	LB130935	21 Aug 2017	23 Aug 2017	28 Aug 2017	28 Aug 2017	07 Oct 2017	30 Aug 2017
TB_210817	SE169457.003	LB130935	21 Aug 2017	23 Aug 2017	28 Aug 2017	28 Aug 2017	07 Oct 2017	30 Aug 2017

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH2_0.8	SE169457.001	LB130876	21 Aug 2017	23 Aug 2017	04 Sep 2017	25 Aug 2017	04 Oct 2017	30 Aug 2017
QA01	SE169457.004	LB130876	21 Aug 2017	23 Aug 2017	04 Sep 2017	25 Aug 2017	04 Oct 2017	30 Aug 2017

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RB_210817	SE169457.002	LB130935	21 Aug 2017	23 Aug 2017	28 Aug 2017	28 Aug 2017	07 Oct 2017	30 Aug 2017
TB_210817	SE169457.003	LB130935	21 Aug 2017	23 Aug 2017	28 Aug 2017	28 Aug 2017	07 Oct 2017	30 Aug 2017

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	BH2_0.8	SE169457.001	%	70 - 130%	112
	QA01	SE169457.004	%	70 - 130%	110
d14-p-terphenyl (Surrogate)	BH2_0.8	SE169457.001	%	70 - 130%	106
	QA01	SE169457.004	%	70 - 130%	112
d5-nitrobenzene (Surrogate)	BH2_0.8	SE169457.001	%	70 - 130%	100
	QA01	SE169457.004	%	70 - 130%	122

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	RB_210817	SE169457.002	%	40 - 130%	62
d14-p-terphenyl (Surrogate)	RB_210817	SE169457.002	%	40 - 130%	68
d5-nitrobenzene (Surrogate)	RB_210817	SE169457.002	%	40 - 130%	72

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH2_0.8	SE169457.001	%	60 - 130%	74
	QA01	SE169457.004	%	60 - 130%	74
d4-1,2-dichloroethane (Surrogate)	BH2_0.8	SE169457.001	%	60 - 130%	96
	QA01	SE169457.004	%	60 - 130%	78
d8-toluene (Surrogate)	BH2_0.8	SE169457.001	%	60 - 130%	82
	QA01	SE169457.004	%	60 - 130%	74
Dibromofluoromethane (Surrogate)	BH2_0.8	SE169457.001	%	60 - 130%	86
	QA01	SE169457.004	%	60 - 130%	78

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	RB_210817	SE169457.002	%	40 - 130%	97
d4-1,2-dichloroethane (Surrogate)	RB_210817	SE169457.002	%	40 - 130%	116
d8-toluene (Surrogate)	RB_210817	SE169457.002	%	40 - 130%	114
Dibromofluoromethane (Surrogate)	RB_210817	SE169457.002	%	40 - 130%	124

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH2_0.8	SE169457.001	%	60 - 130%	74
	QA01	SE169457.004	%	60 - 130%	74
d4-1,2-dichloroethane (Surrogate)	BH2_0.8	SE169457.001	%	60 - 130%	96
	QA01	SE169457.004	%	60 - 130%	78
d8-toluene (Surrogate)	BH2_0.8	SE169457.001	%	60 - 130%	82
	QA01	SE169457.004	%	60 - 130%	74
Dibromofluoromethane (Surrogate)	BH2_0.8	SE169457.001	%	60 - 130%	86
	QA01	SE169457.004	%	60 - 130%	78

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	RB_210817	SE169457.002	%	40 - 130%	97
	TB_210817	SE169457.003	%	40 - 130%	106
d4-1,2-dichloroethane (Surrogate)	RB_210817	SE169457.002	%	60 - 130%	116
	TB_210817	SE169457.003	%	60 - 130%	121
d8-toluene (Surrogate)	RB_210817	SE169457.002	%	40 - 130%	114
	TB_210817	SE169457.003	%	40 - 130%	118
Dibromofluoromethane (Surrogate)	RB_210817	SE169457.002	%	40 - 130%	124
	TB_210817	SE169457.003	%	40 - 130%	126

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB130903.001		Naphthalene	mg/kg	0.1	<0.1
		2-methylnaphthalene	mg/kg	0.1	<0.1
		1-methylnaphthalene	mg/kg	0.1	<0.1
		Acenaphthylene	mg/kg	0.1	<0.1
		Acenaphthene	mg/kg	0.1	<0.1
		Fluorene	mg/kg	0.1	<0.1
		Phenanthrene	mg/kg	0.1	<0.1
		Anthracene	mg/kg	0.1	<0.1
		Fluoranthene	mg/kg	0.1	<0.1
		Pyrene	mg/kg	0.1	<0.1
		Benzo(a)anthracene	mg/kg	0.1	<0.1
		Chrysene	mg/kg	0.1	<0.1
		Benzo(a)pyrene	mg/kg	0.1	<0.1
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
		Benzo(ghi)perylene	mg/kg	0.1	<0.1
		Total PAH (18)	mg/kg	0.8	<0.8
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	102
		2-fluorobiphenyl (Surrogate)	%	-	118
		d14-p-terphenyl (Surrogate)	%	-	108

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB130886.001		Naphthalene	µg/L	0.1	<0.1
		2-methylnaphthalene	µg/L	0.1	<0.1
		1-methylnaphthalene	µg/L	0.1	<0.1
		Acenaphthylene	µg/L	0.1	<0.1
		Acenaphthene	µg/L	0.1	<0.1
		Fluorene	µg/L	0.1	<0.1
		Phenanthrene	µg/L	0.1	<0.1
		Anthracene	µg/L	0.1	<0.1
		Fluoranthene	µg/L	0.1	<0.1
		Pyrene	µg/L	0.1	<0.1
		Benzo(a)anthracene	µg/L	0.1	<0.1
		Chrysene	µg/L	0.1	<0.1
		Benzo(a)pyrene	µg/L	0.1	<0.1
		Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1
		Dibenzo(ah)anthracene	µg/L	0.1	<0.1
		Benzo(ghi)perylene	µg/L	0.1	<0.1
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	74
		2-fluorobiphenyl (Surrogate)	%	-	64
		d14-p-terphenyl (Surrogate)	%	-	100

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB130903.001	TRH C10-C14	mg/kg	20	<20
	TRH C15-C28	mg/kg	45	<45
	TRH C29-C36	mg/kg	45	<45
	TRH C37-C40	mg/kg	100	<100
	TRH C10-C36 Total	mg/kg	110	<110

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB130886.001	TRH C10-C14	µg/L	50	<50
	TRH C15-C28	µg/L	200	<200
	TRH C29-C36	µg/L	200	<200
	TRH C37-C40	µg/L	200	<200

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB130876.001	Monocyclic Aromatic Hydrocarbons	Benzene	mg/kg	0.1	<0.1
		Toluene	mg/kg	0.1	<0.1
		Ethylbenzene	mg/kg	0.1	<0.1

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB130876.001	Monocyclic Aromatic Hydrocarbons	m/p-xylene	mg/kg	0.2	<0.2
		o-xylene	mg/kg	0.1	<0.1
	Polycyclic VOCs	Naphthalene	mg/kg	0.1	<0.1
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	79
		d4-1,2-dichloroethane (Surrogate)	%	-	82
		d8-toluene (Surrogate)	%	-	74
		Bromofluorobenzene (Surrogate)	%	-	100
	Totals	Total BTEX	mg/kg	0.6	<0.3

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB130935.001	Monocyclic Aromatic Hydrocarbons	Benzene	µg/L	0.5	<0.5
		Toluene	µg/L	0.5	<0.5
		Ethylbenzene	µg/L	0.5	<0.5
		m/p-xylene	µg/L	1	<1
		o-xylene	µg/L	0.5	<0.5
	Polycyclic VOCs	Naphthalene	µg/L	0.5	<0.5
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	128
		d4-1,2-dichloroethane (Surrogate)	%	-	119
		d8-toluene (Surrogate)	%	-	120
		Bromofluorobenzene (Surrogate)	%	-	118

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB130876.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	79
		d4-1,2-dichloroethane (Surrogate)	%	-	82
		d8-toluene (Surrogate)	%	-	74

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB130935.001		TRH C6-C9	µg/L	40	<40
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	128
		d4-1,2-dichloroethane (Surrogate)	%	-	119
		d8-toluene (Surrogate)	%	-	120
		Bromofluorobenzene (Surrogate)	%	-	118

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Moisture Content

Method: ME-(AU)-[ENV]AN002

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE169469.003	LB131018.011	% Moisture	%w/w	0.5	21.647058823	21.568627450	35	0
SE169506.001	LB131018.021	% Moisture	%w/w	0.5	27.001356852	26.879271070	34	0

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE169481.002	LB130903.020		Naphthalene	mg/kg	0.1	0.03	0.02	200	0
			2-methylnaphthalene	mg/kg	0.1	0.05	0.05	200	0
			1-methylnaphthalene	mg/kg	0.1	0.05	0.05	200	0
			Acenaphthylene	mg/kg	0.1	0	0.02	200	0
			Acenaphthene	mg/kg	0.1	0	0.01	200	0
			Fluorene	mg/kg	0.1	0	0	200	0
			Phenanthrene	mg/kg	0.1	0.09	0.08	148	0
			Anthracene	mg/kg	0.1	0.02	0.02	200	0
			Fluoranthene	mg/kg	0.1	0.11	0.18	99	48
			Pyrene	mg/kg	0.1	0.12	0.17	99	34
			Benzo(a)anthracene	mg/kg	0.1	0.09	0.05	173	0
			Chrysene	mg/kg	0.1	0.05	0.08	184	0
			Benzo(b&j)fluoranthene	mg/kg	0.1	0.08	0.07	163	0
			Benzo(k)fluoranthene	mg/kg	0.1	0.05	0.08	184	0
			Benzo(a)pyrene	mg/kg	0.1	0.05	0.09	173	0
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.04	0.05	200	0
			Dibenzo(ah)anthracene	mg/kg	0.1	0	0	200	0
			Benzo(ghi)perylene	mg/kg	0.1	0.04	0.06	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	0	0	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	0.242	0.242	134	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	0.121	0.121	175	0
			Total PAH (18)	mg/kg	0.8	0.23	0.35	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.51	0.51	30	0
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.57	0.59	30	3
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.55	0.53	30	4

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE169457.004	LB130903.021		TRH C10-C14	mg/kg	20	2600	2861	31	11
			TRH C15-C28	mg/kg	45	5800	6615	31	13
			TRH C29-C36	mg/kg	45	<45	0	200	0
			TRH C37-C40	mg/kg	100	<100	0	200	0
			TRH C10-C36 Total	mg/kg	110	8400	9476	31	13
			TRH C10-C40 Total	mg/kg	210	8400	9492	32	13
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	4400	5002	31	12
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	4400	5002	31	12
			TRH >C16-C34 (F3)	mg/kg	90	3900	4490	32	13
			TRH >C34-C40 (F4)	mg/kg	120	<120	0	200	0
SE169481.002	LB130903.022		TRH C10-C14	mg/kg	20	0	0	200	0
			TRH C15-C28	mg/kg	45	77	78	88	1
			TRH C29-C36	mg/kg	45	0	0	200	0
			TRH C37-C40	mg/kg	100	0	0	200	0
			TRH C10-C36 Total	mg/kg	110	77	78	172	0
			TRH C10-C40 Total	mg/kg	210	111	112	200	0
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	0	0	200	0
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	-0.02	0	200	0
			TRH >C16-C34 (F3)	mg/kg	90	111	112	111	1
			TRH >C34-C40 (F4)	mg/kg	120	0	0	200	0

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE169548.002	LB130876.014	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
		Aromatic	Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE169548.002	LB130876.014	Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.8	4.6	50	5
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.8	5.0	50	4
			d8-toluene (Surrogate)	mg/kg	-	4.2	4.1	50	4
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.2	5.1	50	2
		Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	200	0
SE169556.002	LB130876.020	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
		Aromatic	Toluene	mg/kg	0.1	0.1	0.2	93	38
			Ethylbenzene	mg/kg	0.1	0.3	0.4	59	29
			m/p-xylene	mg/kg	0.2	0.7	0.9	54	27
			o-xylene	mg/kg	0.1	0.2	0.3	73	26
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	173	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.1	4.4	50	7
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.3	4.9	50	13
			d8-toluene (Surrogate)	mg/kg	-	3.9	4.1	50	6
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.7	4.9	50	4
		Totals	Total Xylenes	mg/kg	0.3	0.9	1.2	58	26
			Total BTEX	mg/kg	0.6	1.4	1.8	49	28

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE169414.019	LB130935.021	Monocyclic	Benzene	µg/L	0.5	<0.5	0	200	0
		Aromatic	Toluene	µg/L	0.5	<0.5	0	200	0
			Ethylbenzene	µg/L	0.5	<0.5	0	200	0
			m/p-xylene	µg/L	1	<1	0	200	0
			o-xylene	µg/L	0.5	<0.5	0	200	0
		Polycyclic	Naphthalene	µg/L	0.5	<0.5	0	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.9	5.69	30	4
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.7	5.49	30	3
			d8-toluene (Surrogate)	µg/L	-	5.5	4.86	30	11
			Bromofluorobenzene (Surrogate)	µg/L	-	5.6	5.92	30	5

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE169548.002	LB130876.014		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.8	4.6	30	5
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.8	5.0	30	4
			d8-toluene (Surrogate)	mg/kg	-	4.2	4.1	30	4
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.2	5.1	30	2
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0
SE169556.002	LB130876.020		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.1	4.4	30	7
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.3	4.9	30	13
			d8-toluene (Surrogate)	mg/kg	-	3.9	4.1	30	6
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.7	4.9	30	4
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE169354.001	LB130935.022		TRH C6-C10	µg/L	50	<50	<50	200	0
			TRH C6-C9	µg/L	40	<50	<50	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	0.0	0.0	30	2
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	0.0	0.0	30	4
			d8-toluene (Surrogate)	µg/L	-	0.0	0.0	30	6
			Bromofluorobenzene (Surrogate)	µg/L	-	0.0	0.0	30	3
		VPH F Bands	Benzene (F0)	µg/L	0.5	<0.5	<0.5	200	0
			TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Volatile Petroleum Hydrocarbons in Water (continued) — **Method: ME-(AU)-[ENV]AN433**

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE169414.019	LB130935.021		TRH C6-C10	µg/L	50	<50	0	200	0
			TRH C6-C9	µg/L	40	<40	0	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.9	5.69	30	4
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.7	5.49	30	3
			d8-toluene (Surrogate)	µg/L	-	5.5	4.86	30	11
			Bromofluorobenzene (Surrogate)	µg/L	-	5.6	5.92	30	5
		VPH F Bands	Benzene (F0)	µg/L	0.5	<0.5	0	200	0
			TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	0	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB130903.002		Naphthalene	mg/kg	0.1	4.2	4	60 - 140	105
		Acenaphthylene	mg/kg	0.1	3.4	4	60 - 140	86
		Acenaphthene	mg/kg	0.1	4.0	4	60 - 140	101
		Phenanthrene	mg/kg	0.1	3.4	4	60 - 140	84
		Anthracene	mg/kg	0.1	4.6	4	60 - 140	114
		Fluoranthene	mg/kg	0.1	5.1	4	60 - 140	126
		Pyrene	mg/kg	0.1	4.5	4	60 - 140	114
		Benzo(a)pyrene	mg/kg	0.1	4.4	4	60 - 140	111
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	94
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	108
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	108

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB130886.002		Naphthalene	µg/L	0.1	29	40	60 - 140	72
		Acenaphthylene	µg/L	0.1	28	40	60 - 140	71
		Acenaphthene	µg/L	0.1	28	40	60 - 140	70
		Phenanthrene	µg/L	0.1	30	40	60 - 140	76
		Anthracene	µg/L	0.1	26	40	60 - 140	64
		Fluoranthene	µg/L	0.1	32	40	60 - 140	80
		Pyrene	µg/L	0.1	25	40	60 - 140	63
		Benzo(a)pyrene	µg/L	0.1	36	40	60 - 140	91
	Surrogates	d5-nitrobenzene (Surrogate)	µg/L	-	0.4	0.5	40 - 130	82
		2-fluorobiphenyl (Surrogate)	µg/L	-	0.4	0.5	40 - 130	78
		d14-p-terphenyl (Surrogate)	µg/L	-	0.5	0.5	40 - 130	104

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB130903.002		TRH C10-C14	mg/kg	20	47	40	60 - 140	118
		TRH C15-C28	mg/kg	45	<45	40	60 - 140	105
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	75
	TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	47	40	60 - 140	118
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	88
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	75

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB130886.002		TRH C10-C14	µg/L	50	1100	1200	60 - 140	93
		TRH C15-C28	µg/L	200	1300	1200	60 - 140	107
		TRH C29-C36	µg/L	200	1300	1200	60 - 140	110
	TRH F Bands	TRH >C10-C16 (F2)	µg/L	60	1200	1200	60 - 140	101
		TRH >C16-C34 (F3)	µg/L	500	1400	1200	60 - 140	113
		TRH >C34-C40 (F4)	µg/L	500	640	600	60 - 140	106

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB130876.002	Monocyclic	Benzene	mg/kg	0.1	2.2	2.9	60 - 140	77
	Aromatic	Toluene	mg/kg	0.1	2.3	2.9	60 - 140	79
		Ethylbenzene	mg/kg	0.1	2.4	2.9	60 - 140	83
		m/p-xylene	mg/kg	0.2	5.0	5.8	60 - 140	87
		o-xylene	mg/kg	0.1	2.6	2.9	60 - 140	90
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.0	5	60 - 140	80
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.1	5	60 - 140	82
		d8-toluene (Surrogate)	mg/kg	-	4.3	5	60 - 140	86
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.5	5	60 - 140	90

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB130935.002	Monocyclic	Benzene	µg/L	0.5	51	45.45	60 - 140	112
	Aromatic	Toluene	µg/L	0.5	51	45.45	60 - 140	112
		Ethylbenzene	µg/L	0.5	51	45.45	60 - 140	112
		m/p-xylene	µg/L	1	100	90.9	60 - 140	112
		o-xylene	µg/L	0.5	51	45.45	60 - 140	112

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

VOCs in Water (continued)

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB130935.002	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.7	5	60 - 140	93
		d4-1,2-dichloroethane (Surrogate)	µg/L	-	4.7	5	60 - 140	93
		d8-toluene (Surrogate)	µg/L	-	5.0	5	60 - 140	101
		Bromofluorobenzene (Surrogate)	µg/L	-	5.0	5	60 - 140	100

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB130876.002		TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	93
		TRH C6-C9	mg/kg	20	<20	23.2	60 - 140	84
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.0	5	60 - 140	80
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.1	5	60 - 140	82
		d8-toluene (Surrogate)	mg/kg	-	4.3	5	60 - 140	86
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.5	5	60 - 140	90
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	7.25	60 - 140	115

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB130935.002		TRH C6-C10	µg/L	50	930	946.63	60 - 140	99
		TRH C6-C9	µg/L	40	760	818.71	60 - 140	93
	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	4.7	5	60 - 140	93
		d4-1,2-dichloroethane (Surrogate)	µg/L	-	4.7	5	60 - 140	93
		d8-toluene (Surrogate)	µg/L	-	5.0	5	60 - 140	101
		Bromofluorobenzene (Surrogate)	µg/L	-	5.0	5	60 - 140	100
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	µg/L	50	630	639.67	60 - 140	98

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Original	Spike	Recovery%
SE169456.001	LB130903.021		Naphthalene	mg/kg	0.1	<0.1	4	108
			2-methylnaphthalene	mg/kg	0.1	<0.1	-	-
			1-methylnaphthalene	mg/kg	0.1	<0.1	-	-
			Acenaphthylene	mg/kg	0.1	<0.1	4	93
			Acenaphthene	mg/kg	0.1	<0.1	4	105
			Fluorene	mg/kg	0.1	<0.1	-	-
			Phenanthrene	mg/kg	0.1	0.4	4	88
			Anthracene	mg/kg	0.1	<0.1	4	105
			Fluoranthene	mg/kg	0.1	0.9	4	95
			Pyrene	mg/kg	0.1	0.7	4	112
			Benzo(a)anthracene	mg/kg	0.1	0.2	-	-
			Chrysene	mg/kg	0.1	0.2	-	-
			Benzo(b&j)fluoranthene	mg/kg	0.1	0.4	-	-
			Benzo(k)fluoranthene	mg/kg	0.1	0.2	-	-
			Benzo(a)pyrene	mg/kg	0.1	0.3	4	112
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.2	-	-
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	-	-
			Benzo(ghi)perylene	mg/kg	0.1	0.2	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	0.4	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	0.5	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	0.5	-	-
			Total PAH (18)	mg/kg	0.8	3.7	-	-
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	-	102
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.6	-	116
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.6	-	110

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

QC Sample	Sample Number		Parameter	Units	LOR	Original	Spike	Recovery%
SE169456.001	LB130903.020		TRH C10-C14	mg/kg	20	23	40	98
			TRH C15-C28	mg/kg	45	<45	40	100
			TRH C29-C36	mg/kg	45	63	40	90
			TRH C37-C40	mg/kg	100	<100	-	-
			TRH C10-C36 Total	mg/kg	110	130	-	-
			TRH C10-C40 Total	mg/kg	210	<210	-	-
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	<25	40	95
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	-	-
			TRH >C16-C34 (F3)	mg/kg	90	<90	40	103
			TRH >C34-C40 (F4)	mg/kg	120	<120	-	-

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE169454.001	LB130876.004	Monocyclic	Benzene	mg/kg	0.1	2.4	0	2.9	81
		Aromatic	Toluene	mg/kg	0.1	2.4	0.02	2.9	82
			Ethylbenzene	mg/kg	0.1	2.0	0	2.9	70
			m/p-xylene	mg/kg	0.2	4.2	0	5.8	73
			o-xylene	mg/kg	0.1	2.2	0	2.9	74
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	0	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.0	5.92	-	80
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.5	6.19	-	91
			d8-toluene (Surrogate)	mg/kg	-	4.0	5.92	-	81
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.3	5.86	-	87
		Totals	Total Xylenes	mg/kg	0.3	6.4	0	-	-
			Total BTEX	mg/kg	0.6	13	0.02	-	-

VOCs in Water

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE169511.001	LB130935.022	Monocyclic	Benzene	µg/L	0.5	57	0.06	45.45	125
		Aromatic	Toluene	µg/L	0.5	56	0.19	45.45	123
			Ethylbenzene	µg/L	0.5	52	0.03	45.45	115
			m/p-xylene	µg/L	1	100	0.09	90.9	115
			o-xylene	µg/L	0.5	53	0.04	45.45	117
		Polycyclic	Naphthalene	µg/L	0.5	55	0.01	-	-

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOCs in Water (continued)

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE169511.001	LB130935.022	Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.1	5.94	-	103
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.7	6.21	-	113
			d8-toluene (Surrogate)	µg/L	-	5.3	5.89	-	105
			Bromofluorobenzene (Surrogate)	µg/L	-	4.7	6.02	-	93

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE169454.001	LB130876.004		TRH C6-C10	mg/kg	25	<25	0	24.65	92
			TRH C6-C9	mg/kg	20	20	0	23.2	88
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.0	5.92	-	80
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.5	6.19	-	91
			d8-toluene (Surrogate)	mg/kg	-	4.0	5.92	-	81
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.3	5.86	-	87
		VPH F	Benzene (F0)	mg/kg	0.1	2.4	0	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	-0.02	7.25	130

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE169511.001	LB130935.023		TRH C6-C10	µg/L	50	850	0	946.63	90
			TRH C6-C9	µg/L	40	680	0	818.71	83
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.1	5.94	-	103
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.7	6.21	-	113
			d8-toluene (Surrogate)	µg/L	-	5.3	5.89	-	105
			Bromofluorobenzene (Surrogate)	µg/L	-	4.7	6.02	-	93
		VPH F	Benzene (F0)	µg/L	0.5	57	0.06	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	µg/L	50	530	-0.41	639.67	82

MATRIX SPIKE DUPLICATES

SE169457 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
-	Sample not analysed for this analyte.

IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to Analytical Report comments for further information.

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SAMPLE RECEIPT ADVICE

SE169457

CLIENT DETAILS

Contact	Davide Manozzi
Client	WSP AUSTRALIA PTY LIMITED
Address	Level 27, 680 George St NSW 2000
Telephone	02 9272 5100
Facsimile	02 9272 5101
Email	David.Menozzi@wsp.com
Project	**2189330D - Newcastle Police Station**
Order Number	**E66QBU**
Samples	4

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Wed 23/8/2017
Report Due	Wed 30/8/2017
SGS Reference	**SE169457**

SUBMISSION DETAILS

This is to confirm that 4 samples were received on Wednesday 23/8/2017. Results are expected to be ready by Wednesday 30/8/2017. Please quote SGS reference SE169457 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice
Samples received in correct containers	Yes	Sample counts by matrix	2 Soil, 2 Water
Date documentation received	23/8/2017	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	4.6°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

COMMENTS

7 soil samples have been placed on hold.

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SAMPLE RECEIPT ADVICE

SE169457

CLIENT DETAILS

Client WSP AUSTRALIA PTY LIMITED

Project 2189330D - Newcastle Police Station

SUMMARY OF ANALYSIS

No.	Sample ID	Moisture Content	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	TRH (Total Recoverable Hydrocarbons) in Soil	VOC's in Soil	VOCs in Water	Volatile Petroleum Hydrocarbons in Soil	Volatile Petroleum Hydrocarbons in Water
001	BH2_0.8	1	26	10	12	-	8	-
002	RB_210817	-	-	-	-	12	-	8
003	TB_210817	-	-	-	-	-	-	8
004	QA01	1	26	10	12	-	8	-

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE RECEIPT ADVICE

SE169457

CLIENT DETAILS

Client WSP AUSTRALIA PTY LIMITED

Project 2189330D - Newcastle Police Station

SUMMARY OF ANALYSIS

No.	Sample ID	PAH (Polynuclear Aromatic Hydrocarbons) in Water	TRH (Total Recoverable Hydrocarbons) in Water
002	RB_210817	22	9

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

source: M630_SR_20170824093522.pdf page: 1 SGS Ref: SE169457_COC

CHAIN OF CUSTODY & ANALYSIS REQUEST

SGS Environmental Services Sydney
Unit 16, 33 Maddox Street Alexandria,
Sydney NSW 2015
Ph. (02) 8594 0400

Company Name:	WSP Australia Pty Ltd	Project Name/No:	2189330D – Newcastle Police Station
Address:	Level 27, 680 George Street Sydney, NSW 2000 Australia	Purchase Order No:	
		Results Required Date:	Standard TAT
		Telephone:	0478 761 253
		Fax:	
Contact Name:	Davide Menozzi	Email Results to:	David.Menozzi@wsp.com Josh.Trahair@wsp.com
Quotation No:	E66QBU		

SGS ID	Client Sample ID	Sampling Date/ Time	Matrix (Tick as appropriate) Soil Sample	Water Sample	Other	NO. OF CONTAINERS
	BH1_0.2	21/08/2017	X			1
	BH1_0.5	21/08/2017	X			1
	BH2_0.2	21/08/2017	X			1
	BH2_0.5	21/08/2017	X			1
1	BH2_0.8	21/08/2017	X			1
	BH3_0.3	21/08/2017	X			1
	BH4_0.4	21/08/2017	X			1
2	RB_210817	21/08/2017	X			1
3	TB_210817	21/08/2017	X			1
4	QA01	21/08/2017	X			1
	QA01A	21/08/2017	x			1

ANALYSIS REQUESTED

Additional Report Formats
NEPM
CSV
ESDAT
DQO
GO, Guidelines ---------
Others _____

Notes/Guidelines/LOR/ Special instructions
KEEP ON HOLD – 30 DAYS

SGS EHS Alexandria Laboratory
SE169457 COC
Received: 24 – Aug – 2017

Relinquished By: D Menozzi	Date/Time: 21/08/2017	Received By:	Date/Time: 23/8/17 @ 1:40
Relinquished By:	Date/Time:	Received By:	Date/Time:
Samples Intact: (Yes) / No	Temperature: 4.6 °C	Sample Security Sealed: Yes / No	Hazards: e.g. may contain Asbestos
Comments / Subcontracting details:			

...lled template when printed

Re: Job# 2189330B - on its way to the lab

AU.Environmental.Sydney (Sydney)

Wed 23/08/2017 11:13 AM

To:Menozzi, David <David.Menozzi@wsp.com>;

Cc:Trahair, Joshua <Josh.Trahair@wsp.com>; AU.SampleReceipt.Sydney (Sydney) <AU.SampleReceipt.Sydney@sgs.com>;

Hi David,

Thanks for the information, we will update the testing as per the email below when the samples arrive.

Regards,

Erin Adams
Environment, Health & Safety
Customer Service

SGS Australia Pty Ltd
Unit 16, 33 Maddox Street
Alexandria NSW 2015

Phone: +61 (0)2 8594 0400
Fax: +61 (0)2 8594 0499
E-mail: au.environmental.sydney@sgs.com
Web: www.au.sgs.com

From: Menozzi, David <David.Menozzi@wsp.com>
Sent: Wednesday, 23 August 2017 11:07 AM
To: AU.Environmental.Sydney (Sydney)
Cc: Trahair, Joshua
Subject: Job# 2189330B - on its way to the lab

Hi,

I've just sent 1 esky containing a number of soil samples to your lab; you should receive it soon. WSP job number is: 2189330B.

On the COC, all samples are currently on **hold**.
Could I please order **PS3** analyses (TRH, BTEX and PAHs) on the following samples ONLY:

- BH2_0.8
- QA01
- RB_21082017

And C_6 - C_{10} for:
- TB_210817

Best regards,
David Menozzi
Graduate Environmental Scientist

A.B.N. 44 000 964 278
10 / 585 Blackburn Road
No. ng Hill, Vic, 3168
Telephone: (03) 9574 3200

Chartered Chemists

30-Aug-2017

REPORT NUMBER: M170838

Site/Client Ref: 2189330B

Order No: 2189330B

WSP Australia Pty Limited

Ernst & Young Centre
Level 27/ 680 George Street
Sydney
NSW 2000
Attention: David Menozzi

CERTIFICATE OF ANALYSIS

SAMPLES:	Six samples were received for analysis
DATE RECEIVED:	**24-Aug-2017**
DATE COMMENCED:	**24-Aug-2017**
METHODS:	See Attached Results
RESULTS:	Please refer to attached pages for results.

Note: Results are based on samples as received at SGS laboratories

REPORTED BY:

Majid Abdolali
Chemist

NATA Accredited Laboratory Number: 2562
Corporate Site Number: 14420
Accredited for compliance
with ISO/IEC 17025.

ANALYTICAL RESULTS

Matrix: Canister
Method: TO-15.04 Receipt Vacuum / Pressure
Units as Listed - ^^ Vacuum reported as inches of Mercury below standard atmospheric pressure

Test Started: 24/08/2017

Analyte Name		Leeder ID	2017011357	2017011358	2017011359	2017011360	2017011361
		Client ID	SV1 SC4241	SV2 SC3687	SV3 SC1108	SV4 SC4228	SV1 dup SC4236
		Sampled Date	21/08/2017	21/08/2017	21/08/2017	21/08/2017	21/08/2017
		PQL					
Receipt Pressure (PSIA)			13.4	13.1	13.6	14.5	13.3
Receipt Vacuum (inch Hg) ^^			2.45	3.06	2.04	0.204	2.65

ANALYTICAL RESULTS

Matrix: Canister
Method: TO-15.05 Volatile Organics (w/v)
Sample units are expressed in µg/m³

Test Started: 24/08/2017

Analyte Name	Sampled Date / PQL	Leeder ID: 2017011357 Client ID: SV1 SC4241 21/08/2017	2017011358 SV2 SC3687 21/08/2017	2017011359 SV3 SC1108 21/08/2017	2017011360 SV4 SC4228 21/08/2017	2017011361 SV1 dup SC4236 21/08/2017	2017011362 SV1 SC4241 Duplicate	2017011363 Method Blank
Benzene		4.7	17	8.0	52	3.6	4.9	<1
2-butanone(MEK)		<2.3	<2.4	<2.1	<2.1	160	<2.3	<1
n-Butylbenzene		<3.7	<3.8	<3.4	<3.3	<3.5	<3.7	<1.6
Carbon tetrachloride		<4.6	<4.7	<4.3	<4.1	<4.4	<4.6	<2
Chloroethane		<2.8	<2.8	<2.6	<2.5	<2.6	<2.8	<1.2
Chloromethane		<3.2	<3.3	<3	<2.9	<3.1	<3.2	<1.4
Cyclohexane		<1.8	<1.9	<1.7	15	<1.7	<1.8	<0.8
n-Decane		<9.7	<9.9	34	11	<9.2	<9.7	<4.2
Dibromochloromethane		<5.5	<5.6	<5.1	<4.9	<5.2	<5.5	<2.4
1,2-Dibromoethane		<5.5	<5.6	<5.1	<4.9	<5.2	<5.5	<2.4
Dichlorodifluoromethane		5.7	5.3	5.3	5.3	5.8	5.7	<0.8
1,1-Dichloroethane		<3.2	<3.3	<3	<2.9	<3.1	<3.2	<1.4
1,2-Dichloroethane		<4.6	<4.7	<4.3	<4.1	<4.4	<4.6	<2
1,1-Dichloroethene		<2.8	<2.8	<2.6	<2.5	<2.6	<2.8	<1.2
cis-1,2-Dichloroethene		<3.7	<3.8	<3.4	<3.3	<3.5	<3.7	<1.6
trans-1,2-Dichloroethene		<2.8	<2.8	<2.6	<2.5	<2.6	<2.8	<1.2
2,4-dimethylpentane		<4.6	<4.7	42	<4.1	<4.4	<4.6	<2
n-Dodecane		<9.7	<9.9	<8.9	<8.6	<9.2	<9.7	<4.2
Ethylbenzene		<2.8	<2.8	<2.6	6.7	<2.6	<2.8	<1.2
Ethylcyclohexane		<4.6	<4.7	<4.3	<4.1	<4.4	<4.6	<2
n-Heptane		<3.2	5.0	1200	110	<3.1	<3.2	<1.4
n-Hexane		<2.8	5.5	1200	54	<2.6	<2.8	<1.2
Isopropanol		190	570	660	1200	19000	180	<20
Isopropylbenzene		<3.7	<3.8	<3.4	<3.3	<3.5	<3.7	<1.6
4-Isopropyltoluene		<3.7	<3.8	<3.4	<3.3	<3.5	<3.7	<1.6
2-Methyl butane		8.4	19	1500	36	8.7	<4.6	<2
Methyl tert-butyl ether		<2.8	<2.8	<2.6	<2.5	<2.6	<2.8	<1.2
Methylcyclohexane		<4.6	<4.7	<4.3	27	<4.4	<4.6	<2
2-Methylhexane		<4.6	<4.7	450	27	<4.4	<4.6	<2
3-Methylhexane		<4.6	<4.7	<4.3	<4.1	<4.4	<4.6	<2
2-Methylpentane		<4.6	<4.7	1100	52	<4.4	<4.6	<2
3-Methylpentane		<4.6	<4.7	750	30	<4.4	<4.6	<2
Naphthalene		<9.7	<9.9	<8.9	<8.6	<9.2	<9.7	<4.2
n-Nonane		<5.5	<5.6	190	41	<5.2	<5.5	<2.4
n-Octane		<5.5	<5.6	600	81	<5.2	<5.5	<2.4
n-Pentane		<4.6	21	3600	75	<4.4	<4.6	<2
propylbenzene		<3.2	<3.3	<3	<2.9	<3.1	<3.2	<1.4
Tetrachloroethene		<5.1	<5.2	<4.7	<4.5	<4.8	<5.1	<2.2
Toluene		33	66	22	100	47	25	<1.2
1,1,1-trichloroethane		<3.7	<3.8	<3.4	<3.3	<3.5	<3.7	<1.6

ANALYTICAL RESULTS

Matrix: Canister
Method: TO-15.05 Volatile Organics (w/v)
Sample units are expressed in µg/m³ Test Started: 24/08/2017

Analyte Name		Leeder ID	2017011357	2017011358	2017011359	2017011360	2017011361	2017011362	2017011363
		Client ID	SV1 SC4241	SV2 SC3687	SV3 SC1108	SV4 SC4228	SV1 dup SC4236	SV1 SC4241	Method
		Sampled Date	21/08/2017	21/08/2017	21/08/2017	21/08/2017	21/08/2017		
		PQL						Duplicate	Blank
1,1,2-trichloroethane			<3.7	<3.8	<3.4	<3.3	<3.5	<3.7	<1.6
Trichloroethene			<4.1	<4.2	<3.8	<3.7	<3.9	<4.1	<1.8
Trichloromethane			110	<4.2	<3.8	<3.7	130	120	<1.8
1,2,4-Trimethylbenzene			<3.7	<3.8	<3.4	6.3	8.2	<3.7	<1.6
1,3,5-Trimethylbenzene			<2.8	<2.8	<2.6	4.9	<2.6	<2.8	<1.2
n-Undecane			<9.7	<9.9	18	<8.6	<9.2	<9.7	<4.2
Vinyl Chloride			<1.8	<1.9	<1.7	<1.6	<1.7	<1.8	<0.8
o-Xylene			<2.8	<2.8	<2.6	18	11	<2.8	<1.2
m&p-Xylenes			<6	<6.1	<5.5	40	13	<6	<2.6

Matrix: Canister
Method: TO-15 TPH.03 mg/m3 (w/v)
Sample units are expressed in mg/m³ Test Started: 24/08/2017

Analyte Name		Leeder ID	2017011357	2017011358	2017011359	2017011360	2017011361	2017011362	2017011363
		Client ID	SV1 SC4241	SV2 SC3687	SV3 SC1108	SV4 SC4228	SV1 dup SC4236	SV1 SC4241	Method
		Sampled Date	21/08/2017	21/08/2017	21/08/2017	21/08/2017	21/08/2017		
		PQL						Duplicate	Blank
C6-C10			0.13	0.14	11	2.1	3.4	0.12	<0.04

Matrix: Carbon Tube
Method: MA-5.ST.ADD.02 Additional Volatile Organics
Sample units are expressed in mg/m³ Test Started: 29/08/2017

Analyte Name		Leeder ID	2017011364
		Client ID	IPA Shroud 4745211852
		Sampled Date	21/08/2017
		PQL	
Isopropanol			270

ANALYTICAL RESULTS

Matrix: Carbon Tube
Method: MA-5.ST.ADD.01 Additional Volatile Organics
Sample units are expressed in µg total

Test Started: 29/08/2017

		Leeder ID	2017011365
		Client ID	Method
Analyte Name	**Sampled Date**		
		PQL	Blank
Isopropanol		0.5	nd

QA/QC RESULTS

Matrix: Canister
Method: TO-15.05 Volatile Organics (w/v)
Quality Control Results are expressed in Percent Recovery of expected result
Test Started: 24/08/2017

Analyte Name	Sampled Date / PQL	Leeder ID: 2017011366 Client ID: Method Spike
Cyclohexane		88
trans-1,2-Dichloroethene		111
n-Heptane		123
n-Hexane		91

Matrix: Canister
Method: TO-15.05 Volatile Organics (w/v)
Quality Control Results are expressed in Percent Recovery of expected result
Test Started: 24/08/2017

Analyte Name	Sampled Date / PQL	Leeder ID: 2017011366 Client ID: Method Spike
1,3,5-Trimethylbenzene		127

Matrix: Carbon Tube
Method: MA-5.ST.ADD.01 Additional Volatile Organics
Quality Control Results are expressed in Percent Recovery of expected result
Test Started: 29/08/2017

Analyte Name	Sampled Date / PQL	Leeder ID: 2017011368 / 2017011369 Client ID: Method / Method Spike	Spike Dup
Isopropanol		102	117

QUALIFIERS / NOTES FOR REPORTED RESULTS

PQL	Practical Quantitation Limit
nd	Not Detected – The analyte was not detected above the reported PQL.
is	Insufficient Sample to perform this analysis.
T	Tentative identification based on computer library search of mass spectra.
NC	Not calculated and/or Results below PQL
NV	No Vacuum, Canister received above standard atmospheric pressure
nr	Not Requested for analysis.
R	Rejected Result – results for this analysis failed QC checks.
SQ	Semi-Quantitative result – quantitation based on a generic response factor for this class of analyte.
IM	Inappropriate method of analysis for this compound
U	Unable to provide Quality Control data – high levels of compounds in sample interfered with analysis of QC results.
UF	Unable to provide Quality Control data- Surrogates failed QC checks due to sample matrix effects
L	Analyte detected at a level above the linear response of calibration curve.
E	Estimated result. NATA accreditation does not cover estimated results.
C1	These compounds co-elute.
--	Parameter Not Determined
CT	Elevated concentration. Results reported from carbon tube analysis
**	Sample shows non-petroleum hydrocarbon profile

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APPENDIX ONE.

CHAIN OF CUSTODY DOCUMENT

SGS

TO-15 Canister Chain of Custody Record

Dispatch samples to: Unit 10/585 Blackburn Road, Notting Hill, Victoria 3168, Australia

Attn: Sample Reception - Contact Ph: +613 9574 3311
Email: au.samplereceipt.melbourne@sgs.com

CLIENT NAME: DAVID MENOZZI
CLIENT ADDRESS: Level 27, 680 George St. Sydney 2000 NSW
ABN:
CONTACT: 0478 761253
SAMPLED BY: D. Menozzi
PROJECT REF: 2189330B

CONTACT PHONE No: 0478 761 253
CONTACT FAX No:
RESULTS REQUIRED BY: Standard TAT
EMAIL ADDRESS: david.menozzi@wsp.com
Josh.Traheir@wsp.com
LAB QUOTE NUMBER:
PURCHASE ORDER NUMBER:

PAGE 1 OF 1

Client Sample ID (Field Location)	Canister #	Back up Carbon Tube #	Soil Gas Train/ Mass Flow Controller #	Purge Volume	Leak Test Passed	PID	Vacuum	Carbon Tube Sample Volume	Date of Collection	Collection Time		Canister Pressure/Vacuum		Analysis Requested				
										Time on	Time Off	Inital	Final	ACH Volatiles Suite	C6 - C10	Isopropanol shrouded		
SV 1	SC4241	[redacted]	SG1032	[redacted]		1.6		[redacted]	21.08.17			-28	0	x	x			
SV 2	SC3687		SG1026			0.9			"			-29	0	x	x			
SV 3	SC1108		SG1029			3.4			"			-28	0	x	x			
SV 4	SC4223		SG1018			4.8			"			-28	0	x	x			
SV 1 dup	SC4236		SG1003						"			-28	0	x	x			
CARBON TUBE		4745 21 1852						[redacted] 1500ml	"							x		

Notes:

RELEASED BY: (Name) Davide Menozzi (Signature) (Date / Time) 21.08.2017
RECEIVED BY: (Name) Benedict Robinson (Signature) (Date / Time) 24/8/17 9:00am

Note: Pump was not functioning properly: unusual suction

ATTACHMENT G
LIMITATIONS

Limitations of Environmental Site Assessment Report (testing)

Scope of services

This environmental site assessment report (the report) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and WSP (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on data

In preparing the report, WSP has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, WSP has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WSP will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP

Environmental conclusions

In accordance with the scope of services, WSP has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Also, it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for benefit of client

The report has been prepared for the benefit of the client and no other party. WSP assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of WSP or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

Other limitations

WSP will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

Waste Analysis & Classification Report

9 Church Street, Newcastle NSW

Prepared for: Drumderg Services

DRD-87-17407 / WAC2
v1 final
30th March 2020

ADE CONSULTING GROUP
SOLUTIONS THROUGH INNOVATION

Waste Analysis & Classification Report

Prepared for: Drumderg Services

9 Church Street, Newcastle NSW

Version	Details	Date
v1 final	Written by Matthew O'Connor	30th March 2020

Report No: DRD-87-17407 / WAC2 / v1 final

Date: 30th March 2020

Written By:

Matthew O'Connor
Environmental Consultant
B. Env. Sci. Mgmt.

Reviewed By:

Kyle McClintock
Senior Environmental Consultant
B. Sci. Hons. (Env. Sci.)

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WASTE ANALYSIS & CLASSIFICATION REPORT
DRD-87-17407 / WAC2 / v1 final

1. INTRODUCTION

1.1. Background

ADE Consulting Group Pty Ltd (ADE) was commissioned by Drumderg Services (hereafter referred to as 'the client') to undertake a Waste Analysis and Classification / Characterisation Assessment of the subject materials located at 9 Church Street, Newcastle New South Wales (NSW) (refer to *Appendix I – Aerial Photograph*).

ADE were requested by the Client to determine the suitability of the subject materials for beneficial re-use on-site and for off-site disposal. Fieldworks were completed on the 16th and 18th March 2020, with the following report representing the conclusions of the analytical assessment.

1.2. Site Information

Table 1. Summary of Site and Project Information.

Site Project Details	
Client:	Drumderg Services
ADE Report No:	DRD-87-17407 / WAC2 / v1 final
Project:	Nihon University Newcastle Campus
Site Address:	9 Church Street, Newcastle NSW
Subject Stockpile:	Project worksite, former location of building A, south-eastern are of site, stockpiled aggregate material (refer to *Appendix I – Aerial Photograph*).
Dates of Field Work:	16th and 18th March 2020
Date of Report:	30th March 2020
Volume of Material:	Approximately 500 m^3 or 900 tonnes (using a bulking factor of 1.8 for dry gravels [500 m^3 x 1.8]).
Material Matrix:	Stockpiled aggregate materials generally consisted of crushed; concrete, brick and ceramics. Asbestos Containing Materials (ACM) and hydrocarbon staining / odours were not observed within the materials inspected.
Sample Size (one-off batch sampling):	Ten (10) Samples for Chemical Characterisation and Electrical Conductivity (EC); Ten (10) Samples for Foreign Materials analysis (FM); and Seven (7) 500 mL samples for asbestos analysis.

2. OBJECTIVES

The objective of works issued to ADE by the client was to classify and characterise the subject materials in accordance with the NEPM (2013), CRC CARE (2011) and NSW EPA The Recovered Aggregate Order (2014), issued under Part 9, Clause 93 of the *Protection of the Environment Operations (Waste) Regulation 2014* (NSW).

ADE was requested by the client to determine the suitability of the material to be reused onsite. As such ADE has screened samples collected against the following threshold criteria outlined in 'Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater' of the National Environment Protection Measure (NEPM). (1999, 2013 Amendment). *Assessment of Site Contamination* (NEPM, 2013) and Friebel, E & Nadebaum, P 2011, *Health screening levels for petroleum hydrocarbons in soil and groundwater. Part 2: Application document*, CRC CARE Technical Report no. 10, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia (CRC CARE, 2011):

- NEPM (2013), Health Screening Levels (HSL) for Asbestos Contamination on Soil, Residential B (HSL-B), Table 7;
- NEPM (2013), Health Investigation Levels (HIL), Residential B (Residential with Minimal Opportunities for Soil Access; Includes Dwellings with Fully and Permanently Paved Yard Space as High-Rise Buildings and Apartments) (HIL-B), Table 1A(1);
- NEPM (2013), HSL, High Density Residential (HSL-B), Table 1A(3);
- NEPM (2013), Ecological Investigation Levels (EIL), Urban Residential / Public Open Space, Tables 1B(1), 1B(2), 1B(3), 1B(4) & 1B(5);
- NEPM (2013), Ecological Screening Levels (ESL), Urban Residential & Public Open Space, Table 1B(6);
- NEPM (2103), Management Limits, Residential, Parkland and Public Open Space, Table 1B(7);
- CRC CARE (2011), HSL for Petroleum Hydrocarbons in Soil and Groundwater, Residential – High Density (HSL-B), Table B4.

ADE has been advised that the site is proposed to consist of a university campus with both residential and educational buildings (High Density Residential Land Use).

The Recovered Aggregate Order (2014) defines 'recovered aggregate' as:

> *"Material comprising of concrete, brick, ceramics, natural rock and asphalt processed into an engineered material. This does not include refractory bricks or associated refractory materials, or asphalt that contains coal tar.*
>
> *The requirements of this order apply, as relevant, to any person who supplies recovered aggregate that has been generated, processed or recovered by the person."*

The recovered aggregate material subject to this classification has been generated as part of a non-continuous process.

ADE was requested by the client to include additional analysis for Contaminants of Potential Concern (CoPC) which included asbestos and Polycyclic Aromatic Hydrocarbons (PAHs). As such ADE has screened samples collected against the following threshold criteria outlined NEPM (2013) and CRC CARE (2011).

3. SCOPE OF WORK

The scope of work required to achieve the objectives of the investigation involved the following:

- Completion of a Safety, Health & Environment Work Method Statement (SH&EWMS) prior to undertaking works;
- Visual inspection of the stockpiled aggregate materials;
- Collection of composite samples for chemical characterisation, electrical conductivity and foreign material assessment in accordance with The Recovered Aggregate Order (2014);
- Collection of 10 L soil samples for sieving and / or screening of ACM and fibrous asbestos (FA) in accordance with NEPM (2013);
- Collection of 500 mL soil samples for analysis of asbestos fines (AF) in accordance with NEPM (2013);
- Submission of collected samples under Chain of Custody (CoC) conditions to a National Association of Testing Authorities (NATA) accredited laboratory for analysis;
- Evaluation of analyte concentrations in accordance with assessment criteria outlined in the NSW EPA's The Recovered Aggregate Order (2014);
- Evaluation of analyte concentrations against NEPM (2013) and CRC CARE (2011); and
- Preparation of a report outlining the investigation methodology, interpretation of the site data (results), classification and conclusions.

4. PRELIMINARY DESKTOP STUDY

4.1. Former Waste Classification Reports and Anecdotal Information

ADE was advised by the client that the subject materials (refer to *Appendix I – Aerial Photograph* and *Appendix II – Photographs*) were originally sourced from demolition of construction materials within the former Newcastle Courthouse, Building A.

Prior to demolition of Building A, ADE undertook several asbestos material clearance inspections which have been combined into the following reports listed below (refer to *Appendix VI – Asbestos Materials Clearance Reports*):

- ADE (2020), Asbestos Materials Clearance Report, DRD-87-17254 9 Church Street, Newcastle NSW.CLR1.v1 final;
- ADE (2020), Asbestos Materials Clearance Report, DRD-87-17407 9 Church Street, Newcastle NSW.CLR1.v1 final; and
- ADE (2020), Asbestos Materials Clearance Report, DRD-87-17407 9 Church Street, Newcastle NSW.CLR2.v1 final.

The above mentioned reports confirm that ACM within building A were removed to a satisfactory standard prior to demolition and crushing of construction materials to generate the subject material.

ADE also undertook the following waste analysis and classification investigations and asbestos materials pre-demolition survey:

- ADE (2020), Waste Analysis & Classification Report, DRD-87-17254 9 Church Street, Newcastle NSW.WAC1.v1 final;

- ADE (2020), Waste Analysis & Classification Report, DRD-87-17407 9 Church Street, Newcastle NSW.WAC1.v1 final; and
- ADE (2019), Asbestos Materials Pre-Demolition Survey Report, DRD-82-16979 Newcastle Courthouse, Church Street, Newcastle NSW.HMS1.v1 final.

The client has provided ADE with the following report prior to investigations:

- Napier & Blakeley (2008), Asbestos Materials Report, The Newcastle Courthouse, Church Street, Newcastle, NSW, File Ref 4009632.AA1.

In addition, anecdotal information supplied to ADE by the client indicated that Douglas Partners referenced soils on site to contain elevated concentrations of heavy metals, PAHs and asbestos. Due to the subject materials consisting of crushed construction materials only and have only been placed on the soil surface while being generated the following contaminants are included as CoPC:

- Heavy Metals – Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc;
- Polycyclic Aromatic Hydrocarbons (PAHs); and
- Asbestos.

No additional reports regarding on-site contamination have been provided to ADE prior to this investigation.

5. SAMPLING PLAN, METHODOLOGY, FIELD INVESTIGATIONS AND INVESTIGATION PATTERN

5.1. Sampling Methodology

Sampling of the aggregate was undertaken as per Standard Australia 2016, *Amendment No.1 to AS 1141.3.1-2012 Methods for sampling and testing aggregates Method 3.1: Sampling – Aggregates, Section 9.4* (Standards Australia 2016) aided by power equipment. This method was deemed most appropriate due to the location and nature of the material.

Composite sampling was achieved by mixing the sample from each side and bottom of each sampling point to achieve 5 subsamples which were combined into the one primary sample at each location.

5.2. One-Off Batch Sampling

As per the requirements of The Recovered Aggregate Order (2014):

> *"Where the recovered aggregate is not generated as part of a continuous process, the processor must undertake one-off sampling of a batch, truckload or stockpile of the recovered aggregate, by collecting 10 composite samples from every 4,000 tonnes (or part thereof) processed and testing each sample for the chemicals and other attributes listed in Column 1 of Table 1"*

One-off batch sampling of the processed material was undertaken, where ten (10) composite samples were collected and analysed for the chemicals and other attributers listed in Column 1 of Table 1 of the order.

5.3. Scope of Analysis

The following analytes were included in the batch sampling as per The Recovered Aggregate Order (2014):

- Heavy Metals – Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc (M8);
- Electrical Conductivity (EC);
- RTA T276 Foreign Materials Type III (metal, plaster, rubber, plastic, bitumen, paper, cloth, paint, wood and vegetable matter).

Additional contaminants included in the scope of analysis were:

- PAHs;
- pH; and
- Asbestos (NEPM 2013).

5.4. Sampling Plan

For the assessment of the subject materials, ADE adopted the minimum sampling density as prescribed in The Recovered Aggregate Order 2014 as outlined in Section 5.2 on the previous page. Where recovered aggregate is generated as part of one-off batch sampling, the processor must undertake the following outlined in **Table 2** below.

Table 2. Minimum Sampling Density for Assessment of the Subject Materials.

Sampling of Subject Material					
Aggregate Quantity (tonnes)[1]	**Minimum Number of Samples Required**	**Validation**	**Approximate Quantity of the Subject Materials (tonnes)**	**Number of Test Pits / Samples Collected**	**Minimum Sampling Density Achieved?**
4,000	10	Required	900 tonnes (using a bulking factor of 1.8 for dry gravels [500 m^3 x 1.8])	10 / 10	Yes

Notes to Table 2

1. Where the recovered aggregate is not generated as part of a continuous process, the processor must undertake one-off sampling of a batch, truckload or stockpile of the recovered aggregate, by collecting 10 composite samples from every 4,000 tonnes (or part thereof) processed (NSW EPA, 2014. The *Recovered Aggregate Order 2014*).

5.5. Asbestos Sampling

For the asbestos assessment of the subject stockpiled aggregate materials, ADE adopted the Western Australian Department of Health (WA DoH) *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia – May 2009* (WA DoH, 2009), as referenced in NEPM (2013). For the assessment of asbestos in stockpiles, WA DoH (2009) recommends sampling for asbestos be undertaken at fourteen (14) locations per 1,000 m^3. ADE deemed the subject materials were approximately 500 m^3, therefor ADE undertook asbestos screening and sampling at seven (7) locations within the stockpile.

In accordance with the NEPM (2013) guidelines, one (1) 10 L sample was collected from each sample point. Samples were sieved and / or screened manually onsite for inspection on contrasting-colour plastic sheeting. Any identified or suspected ACM or FA were separated and collected to be analysed and weighed in the laboratory in order to calculate the weight by weight percentage (w / w%) of asbestos in soil. Following the sieving and / or screening, one (1) 500 mL soil sample was collected from a total of seven (7) sample points for the analysis of FA.

5.6. Equipment Decontamination

ADE's standard decontamination procedures were undertaken before collecting each of the samples to avoid the possibility of cross-contamination. The aggregate sampling equipment and items likely to come into contact with aggregate samples were thoroughly washed, followed by rinsing with phosphate-free detergent and portable water before the collection of samples. Due care was taken with the disposal of any washings and residues from such cleaning operations. Dedicated disposable materials (e.g. nitrile gloves) were also used which were changed between each sample. As such, additional decontamination procedures were not deemed necessary. All disposable sampling equipment and rubbish was collected and removed prior to leaving site.

5.7. Documentation

A field observation log was kept by sampling personnel. Details recorded in the log included:

- Location and sample number;
- Sampling method;
- Sample identification;
- Sample description; and
- Sample point measurements.

A comprehensive master sample register was maintained. As samples were received, they were given a unique sequential number from the sample register into which details from the labels were entered. A summary of the sample numbers, locations and depths is provided on the following page (refer to **Table 3**). Before packing and dispatch of samples for analysis, a CoC form was completed. This form recorded details of the individual samples being dispatched and the type of analysis required for each sample.

5.8. Sampling and Laboratory Submission

Samples were collected from ten (10) test pit locations using a shovel and excavator provided by the client. Composite samples were collected from the side walls and base of each test pit, combining five (5) discrete sub-samples of equal size into a single sample for the purpose of analysis.

Field activities were conducted by experienced environmental consultants in accordance with Australian Standard AS 1114.3.1-2012 *Methods for sampling and testing aggregates - Sampling - Aggregates* (Standards Australia, 2012). The samples to be analysed for chemical characterisation were placed into sample bags, containers and sterile glass jars with teflon lined lids. The PAH samples were transferred to a cooler box which contained ice packs in order to maintain the samples at a temperature below approximately 4 °C.

The following outlines the NATA accredited laboratory used for analytical testing:

- Samples collected by ADE on 16 March 2020 for analysis of M8, EC, and Foreign Materials were submitted to Sydney Laboratory Services (SLS); and
- Samples collected by ADE on 18 March 2020 for analysis for PAHs , pH and asbestos were submitted to SLS.

Copies of the completed CoC forms were retained on the Central Filing System and the original was sent to the analytical laboratory together with the samples (refer to *Appendix V – Chain of Custody*).

Table 3 below summarises the sample type, description, location and depth of samples collected on the 16 and 18 March 2020.

Table 3. Summary of Samples Collected.

Sample I.D	Sample Type	Sample Description	Sample Location	Sample Depth (m BSS)
Samples collected on 16 March 2020				
WAC2.TP01/ FM01	Aggregate (Chemical & EC analysis) Aggregate (Foreign Materials)	Crushed concrete, brick, ceramics	Test Pit 1	0.5
WAC2.TP02/ FM02	Aggregate (Chemical & EC analysis) Aggregate (Foreign Materials)	Crushed concrete, brick, ceramics	Test Pit 2	1.0
WA21.TP03/ FM03	Aggregate (Chemical & EC analysis) Aggregate (Foreign Materials)	Crushed concrete, brick, ceramics	Test Pit 3	0.5
WAC2.TP04/ FM04	Aggregate (Chemical & EC analysis) Aggregate (Foreign Materials)	Crushed concrete, brick, ceramics	Test Pit 4	1.0
WAC2.TP05/ FM05	Aggregate (Chemical & EC analysis) Aggregate (Foreign Materials)	Crushed concrete, brick, ceramics	Test Pit 5	0.5
WAC2.TP06/ FM06	Aggregate (Chemical & EC analysis) Aggregate (Foreign Materials)	Crushed concrete, brick, ceramics	Test Pit 6	1.0
WAC2.TP07/ FM07	Aggregate (Chemical & EC analysis) Aggregate (Foreign Materials)	Crushed concrete, brick, ceramics	Test Pit 7	0.5
WA2.TP08/ FM08	Aggregate (Chemical & EC analysis) Aggregate (Foreign Materials)	Crushed concrete, brick, ceramics	Test Pit 8	1.0
WAC2.TP09/ FM09	Aggregate (Chemical & EC analysis) Aggregate (Foreign Materials)	Crushed concrete, brick, ceramics	Test Pit 9	0.5
WAC2.TP10/ FM10	Aggregate (Chemical & EC analysis) Aggregate (Foreign Materials)	Crushed concrete, brick, ceramics	Test Pit 10	1.0
Samples Collected on 18 March 2020				
WAC2.TP01	Aggregate (Chemical – PAHs)	Crushed concrete, brick, ceramics	Test Pit 1	0.5
WAC2.TP02	Aggregate (Chemical – PAHs)	Crushed concrete, brick, ceramics	Test Pit 2	1.0
WAC2.TP03	Aggregate (Chemical – PAHs)	Crushed concrete, brick, ceramics	Test Pit 3	0.5
WAC2.TP04	Aggregate (Chemical – PAHs)	Crushed concrete, brick, ceramics	Test Pit 4	1.0

Table 3. Continued…

Sample I.D	Sample Type	Sample Description	Sample Location	Sample Depth (m BSS)
Samples Collected on 18 March 2020 Continued…				
WAC2.TP05	Aggregate (Chemical – PAHs)	Crushed concrete, brick, ceramics	Test Pit 5	0.5
WAC2.TP06	Aggregate (Chemical – PAHs)	Crushed concrete, brick, ceramics	Test Pit 6	1.0
WAC2.TP07	Aggregate (Chemical – PAHs)	Crushed concrete, brick, ceramics	Test Pit 7	0.5
WAC2.TP08	Aggregate (Chemical – PAHs)	Crushed concrete, brick, ceramics	Test Pit 8	1.0
WAC2.TP09	Aggregate (Chemical – PAHs)	Crushed concrete, brick, ceramics	Test Pit 9	0.5
WAC2.TP10	Aggregate (Chemical – PAHs)	Crushed concrete, brick, ceramics	Test Pit 10	1.0
NEPM01	Aggregate (asbestos analysis – 500 mL	Crushed concrete, brick, ceramics	Test Pit 1	0.2
NEPM02	Aggregate (asbestos analysis – 500 mL	Crushed concrete, brick, ceramics	Test Pit 2	0.2
NEPM03	Aggregate (asbestos analysis – 500 mL	Crushed concrete, brick, ceramics	Test Pit 3	0.2
NEPM04	Aggregate (asbestos analysis – 500 mL	Crushed concrete, brick, ceramics	Test Pit 4	0.2
NEPM05	Aggregate (asbestos analysis – 500 mL	Crushed concrete, brick, ceramics	Test Pit 5	0.2
NEPM06	Aggregate (asbestos analysis – 500 mL	Crushed concrete, brick, ceramics	Test Pit 6	0.2
NEPM07	Aggregate (asbestos analysis – 500 mL	Crushed concrete, brick, ceramics	Test Pit 7	0.2

5.9. Limitations of field investigation

This report is limited to the aggregate materials within the specified subject stockpile (refer to *Appendix I – Aerial Photograph* and *Appendix II – Photographs*). If there are any unexpected finds that are not consistent with this classification, please contact ADE immediately on (02) 8541 7214.

6. SUMMARY OF RESULTS

6.1. Summary of Field Observations

Stockpiled aggregate materials generally consisted of crushed; concrete, brick and ceramics. ACM and hydrocarbon staining / odours were not present within the materials inspected.

Following visual inspection of the aggregate materials and surrounding site, the scope of analysis for aggregate samples listed in Section 5.3 of this report was considered adequate at the time of inspection.

6.2. Asbestos Assessment

During the NEPM asbestos assessment, a total of seven (7) × 500 mL soil and one (1) fibre cement sample were submitted to a NATA accredited laboratory for analytical testing. Copies of the completed CoC forms were retained on the central file system and the original was sent to the analytical laboratory together with the samples.

No asbestos was detected within any of the samples collected from within the subject stockpile or observed on the stockpile surface.

6.3. Summary of Analytical Results (The Recovered Aggregate Order 2014)

A summary of analytical results to determine the chemical classification of the subject materials are summarised below in **Table 4**. Explanatory notes are given at the end of the table (refer to *Appendix III – Analytical Reports* for individual samples results).

Table 4. Summary of Analytical Results–Characterisation of Stockpile.

Site Assessment Criteria			Results		Conclusion
Chemicals and Other Attributes	**Maximum Average Concentration for Characterisation (mg/kg)**	**Absolute Maximum Concentration (mg/kg)**	**Maximum Average Concentration Detected (mg/kg)**	**Absolute Maximum Concentration Detected (mg/kg)**	**Chemical Characterisation as Recovered Aggregate**
Arsenic	20	40	ND	ND	Acceptable
Cadmium	0.5	1.5	ND	ND	Acceptable
Chromium (total)	60	120	7.2	12	Acceptable
Copper	60	150	8.2	19	Acceptable
Lead	75	150	**89.7**	107	**Unacceptable**
Mercury	0.5	1	ND	ND	Acceptable
Nickel	40	80	ND	ND	Acceptable
Zinc	200	350	125	296	Acceptable
Electrical Conductivity	1.5 dS/m	3 dS/m	1.25 dS/m	1.72 dS/m	Acceptable
Metal	1%	2%	0.03 %	0.25 %	Acceptable
Plaster	0.25%	0.5%	0.00 %	0.00 %	Acceptable
Rubber, plastic, paper, cloth, paint, wood and vegetable matter	0.2%	0.3%	0.00 %	0.00 %	Acceptable

Notes to table 4
ND – Not detected / below Practical Quantitation Limit (PQL)

The concentrations of metals (As, Cd, Cr, Cu, Hg, Ni & Zn), EC and Foreign Materials in the samples collected from the subject materials meet the requirements for NSW EPA The Recovered Aggregate Order (2014) with the exception of lead. Lead returned a maximum average concentration of 89.7 mg/kg which is above the criteria of 75 mg/kg.

6.4. Soil Characterisation Assessment NEPM (2013)

As per the scope of works issued to ADE, the subject materials have been compared against the land use criteria outlined in the NEPM (2013) (refer to **Table 5**), to determine the suitability for the re-use of the soil materials within project worksite.

6.4.1. HILs

The NEPM (2013) guidelines describe four broad land use settings for the assessment of potential human health risks for a broad range of metals and organic substances. These four HIL categories are used to assess human health risk via all relevant pathways of exposure for the following broad land use categories:

- HIL A - Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake, no poultry, also includes children's day care centers, preschools and primary schools;
- **HIL B - Residential with minimal opportunities for soil access includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats**;
- HIL C - Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. It does not include undeveloped public open space (such as urban bushland and reserves) which should be subject to a Site-specific assessment where appropriate; and
- HIL D - Commercial / industrial such as shops, offices, factories and industrial Sites.

In accordance with the Site development information provided to ADE by the Client the HIL-B assessment criteria was adopted for this investigation. The HIL-B assessment criteria for this investigation were taken from Schedule B1 of NEPM (2013) and are summarised in **Table 5**.

6.4.2. HSLs

HSLs have been developed for selected petroleum compounds and fractions and are applicable to assessing human health risk via the inhalation and direct contact pathways. The HSLs depend on specific soil physicochemical properties, land use scenarios, and the characteristics of building structures. NEPM 2013 presents Tier 1 screening criteria for BTEX, naphthalene and TRH fractions C6-C10 and C10-C16 for vapour intrusion. As there is a potential pathway of exposure in relation to direct contact and ingestion for both construction workers and future users of the site, further tier 1 HSL screening criteria as per *Friebel and Nadebaum's 'Health Screening levels for petroleum hydrocarbons in soil and groundwater, Part 2: Application Document, Technical report No. 10* (2011)' has been adopted to include HSL-B levels for direct human contact, outlined in **Table 5**. For the vapour intrusion pathway for the proposed development, ADE considers that HSL-B is the appropriate criteria.

In addition, the contaminants BTEX and TRH fractions have not been considered as they were not identified as a CoPC.

6.4.3. EILs and ESLs

The EILs assigned by the NEPM (2013) Schedule B5a - *Guideline on Ecological Risk Assessment* presents the methodology for deriving terrestrial EILs using both fresh and aged (i.e. > 2 years old) contamination for soil with the following land use types:

- Areas of ecological significance;
- **Urban residential / public open space**; and
- Commercial / industrial.

Ambient Background Concentrations (ABCs) were not determined for this investigation, and as a result the Added Contaminant Limit (ACL)s alone were conservatively adopted as the EILs wherever generic EILs have not been otherwise established. ADE has adopted the most conservative ACLs using pH for **Urban residential / public open space**, as per Schedule B1 of NEPM (2013) (refer to **Table 5**).

ESLs are presented based on a review of Canadian guidance for petroleum hydrocarbons in soil and application of the Australian methodology (Schedule B5b) to derive Tier 1 ESLs for BTEX, B(a)P and F1 and F2. The Canadians have adopted risk-based TPH standards for human health and ecological aspects for various land uses, refer to the technical supplement Canada-wide standard for petroleum hydrocarbons (PHC) in soil (CCME, 2008) directed by the Canadian Council of the Ministers of the Environment (CCME). The standards established soil values (refer to *Table 1B (6) of the NEPM 2013)* including ecologically based criteria for sites affected by TPH contamination for coarse-grained and fine-grained soil types.

In addition, BTEX, F1 and F2 EILs and ESLs of NEPM (2013) have not been considered as as they were not identified as a CoPC.

Table 5. Site Assessment Criteria for Soil Contamination – Sample Concentrations in mg/kg (unless specified otherwise).

Analyte	Health Investigation Levels (HILs)	Health Screening Levels (HSLs), Ecological Screening Level (ESLs) and Ecological Investigation Levels (EILs)[2]			Results		Conclusion
	HIL-B (mg/kg)	Vapour Intrusion (0 m to <1 m) – HSL-A & HSL-B (mg/kg)	Soil HSL – Direct Contact HSL-B (mg/kg)	EIL / ESL Urban Residential / Public Open Space (mg/kg)[5]	Maximum Total Concentration Detected, (mg/kg)	95% Upper Confidence Limit (UCL)[6]	Chemical Characterisation for HIL/HSL/EIL/ESL-B
Arsenic (total)	500	-	-	100	ND	-	Acceptable
Cadmium	150	-	-	-	ND	-	Acceptable
Chromium (Total)	500	-	-	190	12		Acceptable
Copper	30 000	-	-	800	19	-	Acceptable
Lead	1 200	-	-	1 100	107	97.42	Acceptable
Mercury (inorganic)	120	-	-	-	ND		Acceptable
Nickel	1 200	-	-	30	ND	-	Acceptable
Zinc	60 000	-	-	230	**296**	168	Acceptable
Benzo(a)pyrene	-	-	-	0.7	ND	-	Acceptable
Carcinogenic PAHs (as BaP TEQ)[1]	4	-	-	-	0.0	-	Acceptable
Polycyclic aromatic hydrocarbons (PAHs)	400	-	-	-	1.2	-	Acceptable
Naphthalene	-	3	2 200	170	ND	-	Acceptable
pH[4]	-	-	-	Min 4.5 Max 10	**11.6**	-	**Unacceptable**

Note to Table 6

1 Carcinogenic PAHs: HIL is based on the 8 carcinogenic PAHs and their Toxic Equivalency Factor (TEFs) (potency relative to B(a)P). The B(a)P TEQ (Toxic Equivalency Quantity) is calculated by multiplying the concentration of each carcinogenic PAH in the sample by its B(a)P TEF.

2 Most conservative criteria adopted outlined for vapour intrusion and direct contact. Values adopted for 'Sand, 0m-<1m' and 'coarse texture' where applicable for screening purposes.

3 Generic EILs (Urban residential and public open space; Commercial and Industrial).

4 The Excavated Natural Material Order 2014 – Absolute Maximum Concentration criteria has been adopted for pH.

5 The most conservative added contaminate limit (ACL) using pH for urban residential / public open space has been adopted.

6 Refer to Appendix IV - 95% Upper Confidence Limit for calculations.

ND Non Detect

It must be noted that the NSW EPA (2014) *The Excavated Natural Material Order* – absolute maximum concentration criteria was adopted for pH. Results returned elevated concentrations of pH above the absolute maximum concentration criteria. As a result, the subject materials should not be used for any other purpose other than as engineering fill in an urban residential environment without any ecological receptors, for example in landscaped areas, public open spaces, below or close to the water table as the subject materials are not 'fit for purpose' for such uses due to the elevated pH levels.

ADE has been advised by the client that the subject materials were to be assessed for re-use as engineering fill only, in urban residential environment without any ecological receptors and will be above the water table, covered by a marker layer and capped with concrete. As such ADE considers that the use of EILs / ESLs is not warranted, and therefore the subject materials are 'fit for purpose'.

6.4.4. HSLs for Asbestos

NEPM (2013) categorises different forms of asbestos as:

- Bonded ACM: Bonded Asbestos-Containing Material in sound condition, e.g. vinyl tiles, cement fencing or resin that cannot pass through a 7 mm sieve;
- FA ACM in a degraded condition 'that can be broken or crumbled by hand pressure'. This may be unbounded or severely degraded ACM;
- AF includes free and small fibre bundles and ACM fragments that pass through a 7 mm sieve; and
- Free fibres: Although not explicitly defined in the NEPM definition of AF, the NEPM asserts that there is no validated method available to reliability estimate the concentrations of free fibres in soil.

Table 6 below defines the maximum concentration of asbestos acceptable for developments.

Table 6. NEPM (2013) Health Screening Levels for Asbestos.

Health Screening Level (w/w)				
Form of asbestos	**Residential A**	**Residential B**	**Residential C**	**Commercial/Industrial D**
Bonded ACM	0.01%	0.04%	0.02%	**0.05%**
FA and AF (friable asbestos)	**0.001%**			
All forms of asbestos	**No visible asbestos on soil surface**			

6.4.4.1. Results of Asbestos Samples Collected

Results of the asbestos analysis are summarised in **Table 7** below.

Table 7. Summary of Asbestos Sample Identification Results.

ADE Sample No.	Analyte	Matrix	Identification Results	Sample Location (refer to *Appendix I – Aerial Photograph*)
WAC2.NEPM01	Asbestos	Soil (500 mL)	No asbestos detected	Test Pit 1
WAC2.NEPM02	Asbestos	Soil (500 mL)	No asbestos detected	Test Pit 2
WAC2.NEPM03	Asbestos	Soil (500 mL)	No asbestos detected	Test Pit 3
WAC2.NEPM04	Asbestos	Soil (500 mL)	No asbestos detected	Test Pit 4
WAC2.NEPM04.FC	Asbestos	Vinyl Fragment (10 Litre Screening)	No asbestos detected	Test Pit 4
WAC2.NEPM05	Asbestos	Soil (500 mL)	No asbestos detected	Test Pit 5
WAC2.NEPM06	Asbestos	Soil (500 mL)	No asbestos detected	Test Pit 6
WAC2.NEPM07	Asbestos	Soil (500 mL)	No asbestos detected	Test Pit 7

As outlined above in **Table 7**, no asbestos was detected within the seven (7) x 500 mL soil samples collected from within the subject stockpile (refer to *Appendix III – Analytical Reports*).

In addition, no ACM were identified within the seven (7) x 10 L screened soil samples collected from within the subject stockpile. Therefore, the subject stockpile meets the HSL B criteria for asbestos assigned to the future proposed Residential B land use.

7. DATA QUALITY ASSESSMENT

In order to carry out the assessment of the data acquired in the course of the investigation, the US EPA Guidelines were used.

The Guidelines provide general strategy on assessing data quality criteria and performance specifications for decision making. The following is the output from the Data Quality Assessment (DQA) Process provided in the Guidelines. For the purpose of this report, a reduced QA/QC program was employed.

7.1. Data Review

Quality control reports from the laboratories subcontracted for sample analyses were reviewed. The data included laboratory blank samples, duplicate samples, control samples, spiked samples and method blanks.

The review of the QA/QC program was conducted in accordance with the items recommended by the NSW EPA to be included in the consultants' reports. Some additional recommendations from the US EPA methodology referred to by AS 4482.1 were also followed.

7.1.1. COC

Australian Standard AS 4482.1 defines the Chain-Of-Custody (COC) documentation as the link in the transfer of samples between the time of collection and arrival at the laboratory.

The COC utilised by ADE included the items recommended by the Standard:

a) Name of person who transferred the samples;
b) Name of person who received the samples;
c) Date the samples were collected;
d) Date the samples were received at the laboratory; and
e) Name and contact details of client.

The Sample Receipt Advice documentation was also supplied by SLS, where time of samples received was specified.

7.1.2. Record of Holding Times

The objective was to ascertain the validity of the analysis results based on the holding time of the samples from the time of collection to the time of analysis.

The technical holding time criteria for soil samples are as follows:

<u>Inorganics</u>

- Metals: 6 months

<u>Organics</u>

- PAHs: 14 days (Chill and prevent exposure to light)

It is recommended to preserve soil samples at 4°C ± 2°C until analysis.

Evaluation:

Holding times provided by SLS Laboratories met the recommended criteria. All soil samples were analysed within 2-3 days from the time of collection (refer to *Appendix III – Analytical Reports*).

7.1.3. Analytical Methods Used

Refer to Appendix III – Analytical Reports for the specification of analytical methods used by the laboratories.

7.1.4. Laboratory Accreditation for Analytical Methods Used

Refer to Appendix III – Analytical Reports for the details of laboratory accreditations for analytical methods used.

7.1.5. Percent Recoveries of Spikes and Surrogates

According to the US EPA methodology, it is recommended to consider the following actions based on the spike recovery results for inorganic analytes:

- If the spike recovery is >125% and the reported sample results are less than the Practical Quantitation Limit (< PQL), the data is acceptable for use,
- If the spike recovery is >125% or <75% and the sample results are > PQL, qualify the data for these samples as “estimated”,
- If the spike recovery falls within the range of 30-74% and the sample results are < PQL, qualify the data for these samples as “estimated and may be inaccurate or imprecise”,
- If spike recovery results fall <30% and the sample results are < PQL, qualify the data for these samples as “unusable”.

SLS Laboratory limit of 70-130% for inorganics / metals, and 60-140% for organics was used in order to validate matrix spikes and laboratory control samples. The laboratory limit of 50-150% was implemented in order to validate surrogate recoveries for organic analytes. These criteria, generally, conform to the USEPA recommended standards.

Analysis of spikes and surrogates showed 34 valid values and 0 invalid values.

7.1.6. Laboratory Duplicate Results

Duplicate sample determinations were provided by the laboratories to demonstrate acceptable method precision at the time of analysis. Duplicates are, generally, analysed at a frequency of 1 for every 10 samples. AS 4482.1 provides an acceptable range of the Relative Percent Difference (RPD) values up to 50% for quality control samples.

Analysis of laboratory duplicates showed 18 valid values and 0 invalid values of RPD. Refer to the quality results section of the reports provided in Appendix III – Analytical Reports.

7.1.7. Laboratory Blank Results

The assessment of blank analysis results was to determine the existence and magnitude of contamination resulting from laboratory activities.

The assessment of blank analysis results was carried out in order to determine the existence and magnitude of contamination resulting from laboratory activities. No contaminants were found in the blanks analysed by the laboratory.

Analysis of laboratory blanks showed 32 valid values and 0 invalid values. Refer to the quality results section of the reports provided in Appendix III – Analytical Reports.

7.1.8. Instrument Detection Limits / Methods Detection Limits / Matrix or Practical Quantification Limits

The smallest amount of a substance that can be detected by SLS Laboratory above the noise in a procedure and within a stated confidence level is the detection limit. Current practice identifies several detection limits. These are the instrument detection limit (IDL), the lower level detection (LLD), the method detection limit (MDL) and the practical quantitation limit (PQL).

The relationship among these levels is approximately IDL : LLD : MDL : PQL = 1 : 2 : 4 : 10. Refer to Appendix III – Analytical Reports for the list of PQLs provided by SLS Laboratory. When dilution of a sample is involved in the sample preparation, the method detection limit is adjusted by the dilution factor.

7.2. QA/QC Data Evaluation

The qualitative and quantitative descriptors, so called Data Quality Indicators (DQIs), were used in interpreting the degree of acceptability of the data acquired in the course of the investigation.

Precision	Precision is a measure of agreement among replicate measurements of the same property, made under prescribed similar conditions. Review of laboratory duplicate measurements showed acceptable levels of precision.
Accuracy	Accuracy is a measure of the closeness of an individual measurement to the true value. Accuracy is determined by analysing a reference material of known pollutant concentration or by re-analysing a sample to which a material of known concentration or amount of pollutant has been added. Accuracy was also evaluated by reviewing the values of percentage recoveries reported in spike samples.
Representativeness	Representativeness is a measure of the degree to which data accurately and precisely represent a characteristic of a population parameter at a sampling point or for a process condition or environmental condition. It was verified that each point in space had an equal probability of being selected for sampling. The site investigation revealed that samples collected were representative of the subject materials from which they were collected. It appears that measurements of the

	population of interest were made in such a manner that the resulting data appropriately reflect the environment investigated.
Comparability	Comparability is the qualitative term that expresses the ability to fairly compare sample test results taken from the same site at different times.
Comparability Continued…	ADE's field personnel assigned for the project had considerable experience in the environmental investigations of contaminated sites. Training records of the personnel are kept in the Quality Assurance Manual ADE-QAM-III. Sampling and measurements in the field were performed by the same personnel during the field stage of the investigation. ADE's standard environmental investigation procedures were used by the personnel in the field. No deviations from the sampling procedures were observed by the site supervisor during the fieldwork. Therefore, none or negligent bias in the data collection was expected. The spatial and temporal changes on the site during this period did not have significant influence in order to bias the data due to the environmental dynamics. Units in which the data was measured in the field and the laboratory analysis had the same metrics.
Completeness	Documentation Completeness: In the author's opinion, the documentation used in the course of the investigation, including: • Field observation logs, • Chain of Custodies, • Orders, • Laboratory accreditation, and • Laboratory reports. were completed to satisfactory standards. Data Completeness: Please see the following table, providing a summary of the data validity.

The principle DQIs are precision, accuracy, representativeness, comparability, and completeness referred to by the acronym PARCC. Precision and accuracy are the quantitative measures, representativeness and comparability are qualitative, and completeness is a combination of both quantitative and qualitative measures.

Table 8 on the following page summarises the Data Quality Objectives (DQO) reconciliation.

Table 8. Summary of DQO Reconciliation

QA/QC Item	DQO Criteria	Valid Data	Not Valid Data	Completeness	Conclusion
Laboratory duplicate samples	95 %	18	0	100%	Acceptable
Laboratory blank samples	100 %	32	0	100%	Acceptable
Laboratory spike/surrogate recoveries	95 %	34	0	100%	Acceptable
Overall Completeness:	**95 %**	**84**	**0**	**100%**	**Acceptable**

The ratio of the valid data to the total number of the analyses conducted in the QA/QC program yielded 100%. As such, the data collected in the course of the investigation meets the target result for the completeness of the QA/QC program stated in the DQOs (95%).

8. CONCLUSION

Based on the data and evidence collected in the course of the investigation, it is the opinion of ADE that:

- The concentrations of metals (As, Cd, Cr, Cu, Hg, Ni & Zn), EC and Foreign Materials in the samples collected from the subject materials meet the requirements for NSW EPA 'The Recovered Aggregate Order 2014' with the exception of lead. Lead returned a maximum average concentration of 89.7 mg/kg which is above the criteria of 75 mg/kg;

- The subject materials meet the chemical characterisation land use criteria for re-use within the site (HIL-B, HSL-B, EIL / ESL – Urban Residential / Public Open Space) for the CoPC that have been analysed;

- Please note the CoPC have been deemed sufficient by Douglas Partners and verbally confirmed by the auditor (refer to Bozinovski, C., 2020. *Example Waste Classification Report (Nihon - 91667.03) - Onsite Crushed Materials - Testing Suite*. [email]). Douglas Partners advice is interim only and will be subject to auditor review;

- Asbestos materials identified within building 'A' were removed prior to demolition and crushing of the subject materials, asbestos clearance reports provided (refer to *Appendix VI– Asbestos Materials Clearance Reports*);

- No ACM was detected within any of the samples collected from within the subject stockpile or observed on the stockpile surface during the investigation;

- It must be noted that the subject materials contain elevated pH concentrations and should not be used for any other purpose other than as engineering fill in an urban residential environment without any ecological receptors, for example in landscaped areas, public open spaces, below or close to the water table as the subject materials are not 'fit for purpose' for such uses;

- ADE has been advised by the client that the subject materials were to be assessed for re-use as engineering fill only, in urban residential environment without any ecological receptors and will be above the water table, covered by a marker layer and capped with concrete. As such ADE considers that the use of EILs / ESLs is not warranted, and therefore the subject materials are 'fit for purpose';

- The ratio of the valid data to the total number of the analyses conducted in the QA/QC program yielded 100%, which meets the target result for the completeness of the QA/QC program stated in the DQOs (95%);

- Any material being excavated and transported off-site for disposal may require additional investigations to meet the NSW EPA (2014), *Waste Classification Guidelines – Part 1: Classifying Waste*;

- The subject materials tested have the potential to meet the criteria for classification as 'General Solid Waste – non putrescible) in accordance with the NSW EPA (2014), *Waste Classification Guidelines – Part 1: Classifying Waste*. However, this was not part of the scope provided to ADE by the client; and

- If there are any unexpected finds that are not consistent with this classification, please contact ADE immediately on (02) 8541 721.

9. CLASSIFICATION AND CHARACTERISATION

Material Description:	Stockpiled aggregate materials generally consisted of crushed; concrete, brick and ceramics.
Approximate Waste Volume:	500 m^3 or 900 tonnes (using a bulking factor of 1.8 for dry gravels [500 m^3 x 1.8])
Beneficial Re-use within the Site:	Subject materials meet HIL-B, HSL-B, EIL / ESL – Urban Residential / Public Open Space criteria assigned to the future proposed high density residential land use, in accordance with NEPM (2013). However, due to elevated pH concentrations the subject materials should not be used within landscaped areas, public open spaces, below or close to the water table.
Waste Classification:	Subject materials do not meet 'Recovered Aggregate' as per NSW EPA (2014), *The Recovered Aggregate Order 2014*. Subject materials have the potential to meet 'General Solid Waste – non putrescible) as per NSW EPA (2014), *Waste Classification Guidelines – Part 1: Classifying Waste*, subject to further investigation.

10. REFERENCES

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11. LIMITATIONS

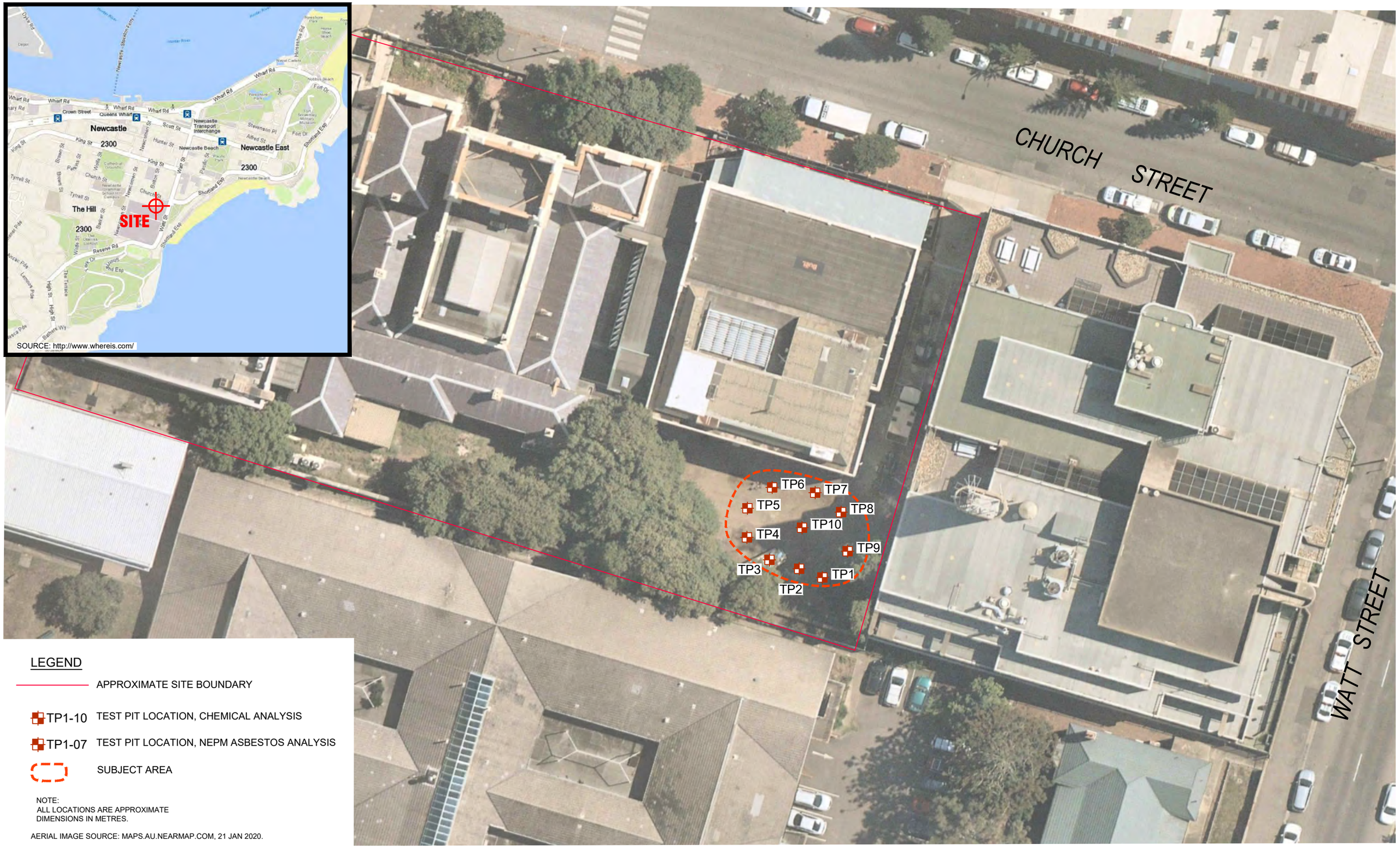
This report has been prepared for the exclusive use of the client. ADE has used a degree of care and skill ordinarily exercised in similar investigations by reputable members of the environmental industry in Australia. No other warranty, expressed or implied, is made or intended. No one section or part of a section, of this report should be taken as giving an overall idea of this report. Each section must be read in conjunction with the whole of this report, including its appendices and attachments.

Any other party should satisfy themselves that the scope of work conducted, and report herein meets their specific needs. ADE cannot be held liable for third party reliance on this document, as ADE is not aware of the specific needs of the third party.

The subsurface environment can present substantial uncertainty due to its complex heterogeneity. The conclusions presented in this report are based on limited investigation of conditions at specific sampling locations chosen to be as representative as possible under the given circumstances. However, it is possible that this investigation may not have encountered all areas of contamination at the site due to the limited sampling and testing program undertaken.

ADE's professional opinions are based upon its professional judgement, experience, training and results from analytical data. In some cases, further testing and analysis may be required, thus producing different results and / or opinions. ADE has limited its investigation to the scope agreed upon with its client.

APPENDIX I – AERIAL PHOTOGRAPH



LEGEND

- APPROXIMATE SITE BOUNDARY
- TP1-10 TEST PIT LOCATION, CHEMICAL ANALYSIS
- TP1-07 TEST PIT LOCATION, NEPM ASBESTOS ANALYSIS
- SUBJECT AREA

NOTE:
ALL LOCATIONS ARE APPROXIMATE
DIMENSIONS IN METRES.

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM, 21 JAN 2020.

revision	no.	description	drawn	approved	date
	A	FIRST ISSUE	MC	CM	25/03/20

0 4 8 12 16 20
SCALE 1:400 @A3 METRES

drawn	MC
approved	CM
date	25/03/2020
scale	AS SHOWN
original size	A3

client: DRUMDERG SERVICES

project: WASTE ANALYSIS & CLASSIFICATION REPORT
OLD NEWCASTLE COURT HOUSE
9 CHURCH STREET, NEWSCASTLE, NSW

title: SUBJECT AREA AND SITE LOCATION PLAN

project no: DRD-87-17407_WAC2 | figure no: FIGURE 1 | rev: A

ADE CONSULTING GROUP
Newcastle Office:
ADE Consulting Group Pty Ltd
Unit 9 / 103 Glenwood Drive, Thornton, NSW 2322
www.ADE.group | info@ade.group | 1300 976 922

PLOT DATE: 25/03/2020 10:00:18 PM DWG FILE: W:\DRD - DRUMDERG SERVICES\DRD-87 CHURCH STREET, NEWCASTLE CM\DRD-87-17407 INS CHURCH STREET, NEWCASTLE 03.03.2020 CM\CAD\DRD-87-17407_WAC2.DWG

APPENDIX II – PHOTOGRAPHS

Photograph 1. Stockpile of processed aggregate material within the project worksite, facing south west (as observed on 16.03.2020).

Photograph 2. Stockpile of processed aggregate material within the project worksite, facing north east (as observed on 16.03.2020).

APPENDIX III – ANALYTICAL REPORTS

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
Unit 4/10-11 Millennium Court,
Silverwater 2128
Ph: (02) 9648-6669

A.B.N. 52 093 452 950

Analysis report: DRD-87-17407 ASB 5

Date Received: 20.03.2020
Date Analysed: 23.03.2020
Report Date: 23.03.2020
Client: Drumderg Services
Job Location: 9 Church Street, Newcastle
Analytical method: Polarised Light Microscopy with dispersion staining (ADE method ABI)

*Asbestos identification as per "National Environment Protection (Assessment of site contamination) Measure, Schedule B1" and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" is not coverd by NATA scope of accreditation

Analysis performed by:

Jiaqi Zhou
Approved asbestos identifier

Results Authorised By:

Jiaqi Zhou
Approved Signatory

Accreditation No.14664.
Accredited for compliance with ISO/IEC 17025 - Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Tests not covered by NATA are denoted with *.

General Comments:

Sydney Laboratory Services is responsible for all the information in the report, except that provided by the customer. All sampling information included in the report has been provided by customer; ADE Consulting Group.
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.
Samples are stored for minimum period of 1 month if longer time is not advised by client.
Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.01g/kg (0.001% w/w) for friable asbestos and 0.1g/kg (0.01% w/w) for bonded asbestos.
This form of analysis is outside the scope of NATA accreditation.
Bonded asbestos containing material (bonded ACM) : Bonded ACM comprises asbestos-containing-material which is in sound condition, although possibly broken or fragmented, and where the asbestos is bound in a matrix such as cement or resin.This term is restricted to material that cannot pass a 7 mm x 7 mm sieve.
Fibrous asbestos (FA): FA comprises friable asbestos material and includes severely weathered cement sheet, insulation products and woven asbestos material. This type of friable asbestos is defined here as asbestos material that is in a degraded condition such that it can be broken or crumbled by hand pressure. This material is typically unbonded or was previously bonded and is now significantly degraded (crumbling).
Asbestos fines (AF): AF includes free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve.
Note: The screening level of 0.001% w/w asbestos in soil for FA and AF (i.e. non-bonded/friable asbestos) only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres.

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Tests not covered by NATA are denoted with *.

Client Sample ID.	Laboratory Sample No.	Sample Description/Matrix	Sample Dimensions (cm) unless stated otherwise	Result	Comments
WAC2.NEPM01	17407-Asb9	Soil	500 ml	No Chrysotile asbestos found	Nil
				No Amosite asbestos found	Nil
				No Crocidolite asbestos found	Nil
				No Synthetic Mineral Fibres found	Nil
				Organic fibres found	Nil
WAC2.NEPM02	17407-Asb10	Soil	500 ml	No Chrysotile asbestos found	Nil
				No Amosite asbestos found	Nil
				No Crocidolite asbestos found	Nil
				No Synthetic Mineral Fibres found	Nil
				Organic fibres found	Nil
WAC2.NEPM03	17407-Asb11	Soil	500 ml	No Chrysotile asbestos found	Nil
				No Amosite asbestos found	Nil
				No Crocidolite asbestos found	Nil
				No Synthetic Mineral Fibres found	Nil
				Organic fibres found	Nil
WAC2.NEPM04	17407-Asb12	Soil	500 ml	No Chrysotile asbestos found	Nil
				No Amosite asbestos found	Nil
				No Crocidolite asbestos found	Nil
				No Synthetic Mineral Fibres found	Nil
				Organic fibres found	Nil
WAC2.NEPM05	17407-Asb13	Soil	500 ml	No Chrysotile asbestos found	Nil
				No Amosite asbestos found	Nil
				No Crocidolite asbestos found	Nil
				No Synthetic Mineral Fibres found	Nil
				Organic fibres found	Nil
WAC2.NEPM06	17407-Asb14	Soil	500 ml	No Chrysotile asbestos found	Nil
				No Amosite asbestos found	Nil
				No Crocidolite asbestos found	Nil
				No Synthetic Mineral Fibres found	Nil
				Organic fibres found	Nil
WAC2.NEPM07	17407-Asb15	Soil	500 ml	No Chrysotile asbestos found	Nil
				No Amosite asbestos found	Nil
				No Crocidolite asbestos found	Nil
				No Synthetic Mineral Fibres found	Nil
				Organic fibres found	Nil

Client Sample ID.	Laboratory Sample No.	Sample Description/Matrix	Sample Dimensions (cm) unless stated otherwise	Result	Comments
WAC2.NEPM04 FC	17407-Asb16	Vinyl Fragment	2.4 x 1.8 x 0.3	No Chrysotile asbestos found	Nil
				No Amosite asbestos found	Nil
				No Crocidolite asbestos found	Nil
				No Synthetic Mineral Fibres found	Nil
				Organic fibres found	Nil

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
A.C.N. 093 452 950
Unit 4/10-11 Millennium Court,
Silverwater 2128
Ph: (02) 9648-6669

Accreditation No.14664
Accredited for compliance with ISO/IEC 17025 - Testing.

This certificate of analysis contains General Comments and Analytical Results. Quality Control Report and Laboratory Quality Acceptance Criteria have been issued separately.

This report supersedes any previous report(s) with this reference. This document shall not be reproduced, except in full.

This report has been electronically signed by authorised signatories below.

Authorised By

Jasmine Franco

General Comments

Samples are analysed on as received basis. Sampling is not covered by NATA accreditation.

Where moisture determination has been performed, results are reported on dry weight basis.

Where the PQL of reported result differs from standard PQL, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Samples were analysed within holding time described by laboratory internal procedures if not stated otherwise. If samples delivered do not meet required analytical criteria, results will be marked with ^.

However surrogate standards are added to samples, results are not corrected for standards recoveries.

Analysis of VOC in water samples are performed on unfiltered waters (as received) spiked with surrogates and injection standards only.

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All sampling information included in the report has been provided by customer; ADE Consulting Group.

Information provided by ADE Consulting Group can affect the validity of the results.

Certificate of Analysis

Contact:	Cameron Mitchell	**Date Reported:**	18/03/2020
Customer:	ADE Consulting Group	**No. of Samples:**	10
Address:	Unit 9 103 Glenwood Drive Thornton NSW	**Date Received:**	17/03/2020
		Date of Analysis:	17/03/2020

Cust Ref: DRD-87-17407

Glossary:

*NATA accreditation does not cover the performance of this service
ND-not detected,
NT-not tested
INS-Insufficient material to perform the test
LCS-Laboratory Control Sample
RPD-Relative Percent Difference
N/A-Not Applicable
< less than
> greater than
PQL- Practical Quantitation Limit
^Analytical result might be compromised due to sample condition or holding time requirements
Reaction rate 1 = Slight
Reaction rate 2 = Moderate
Reaction rate 3 = High
Reaction rate 4 = Vigorous

Batch Number : 2000671

Report Number : DRD-87-17407 (404-413)

Certificate of Analysis

	Sample ID:	2020004404	2020004405	2020004406	2020004407	2020004408	2020004409	2020004410	2020004411	2020004412	2020004413
	Sample Name	WAC2.TP01	WAC2.TP02	WAC2.TP03	WAC2.TP04	WAC2.TP05	WAC2.TP06	WAC2.TP07	WAC2.TP08	WAC2.TP09	WAC2.TP10
Parameter	***Units***	***PQL***									
ESA-P-16											
EC	dS/m		0.99	1.11	1.68	0.83	1.12	1.72	1.07	1.59	1.08	1.27
ESA-MP-01,ICP-01											
Arsenic	mg/kg	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Cadmium	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium	mg/kg	5	5	9	11	5	7	5	5	12	7	6
Copper	mg/kg	5	6	7	19	6	6	<5	7	5	14	7
Lead	mg/kg	10	67	96	107	96	85	88	76	77	103	102
Mercury	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Nickel	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Zinc	mg/kg	5	72	87	296	91	103	117	103	77	219	92
ESA-P-12											
% Moisture Content	%		8.5	11.3	9.7	8.4	10.9	11.9	7.8	11.1	11.9	13.2

Sydney Laboratory Services
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Silverwater 2128
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Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
A.C.N. 093 452 950
Unit 4/10-11 Millennium Court,
Silverwater 2128
Ph: (02) 9648-6669

Accreditation No.14664
Accredited for compliance with ISO/IEC 17025 - Testing.

This Quality Control Report contains results of QAQC samples analysis and the Laboratory Acceptance Criteria.

This report supersedes any previous report(s) with this reference. This document shall not be reproduced, except in full.

This report has been electronically signed by authorised signatories below.

Authorised By

Jasmine Franco

General Comments

Duplicate samples and matrix spike may not be prepared on smaller jobs, however are analysed at frequency. QAQC samples shown within the report as e.g. Batch Blank, Batch Matrix Spike were performed on samples not reported on that Certificate of Analysis.

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 the same manner as for samples.
Duplicate This is the interlaboratory split of a random sample from the processed batch
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.
Surr. (Surrogate Spike) Surrogates are known additions to each sample, blank and matrix spike or LCS in a batch. Surrogates are chosen as a compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Blank shall be < PQL
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals, 60-140% for organics is acceptable. Matrix heterogeneity may result in matrix spike analyses falling outside these limits
RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:
Results <10 times the PQL : No Limit
Results between 10-20 times the PQL : RPD must lie between 0-50%
Results >20 times the PQL : RPD must lie between 0-30%
Surrogate Recoveries : Recoveries must lie between 50-150%

SLS is responsible for all the information in the report, except that provided by the customer.

All sampling information included in the report has been provided by customer; ADE Consulting Group.

Information provided by ADE Consulting Group can affect the validity of the results.

Quality Control Report

Contact:	Cameron Mitchell	**Date Reported:**	18/03/2020
Customer:	ADE Consulting Group	**No. of Samples:**	10
Address:	Unit 9 103 Glenwood Drive Thornton NSW	**Date Received:**	17/03/2020
		Date of Analysis:	17/03/2020

Cust Ref: DRD-87-17407

Glossary:

*NATA accreditation does not cover the performance of this service
ND-not detected,
NT-not tested
INS-Insufficient material to perform the test
LCS-Laboratory Control Sample
RPD-Relative Percent Difference
N/A-Not Applicable
< less than
> greater than
PQL- Practical Quantitation Limit
^Analytical result might be compromised due to sample condition or holding time requirements
Reaction rate 1 = Slight
Reaction rate 2 = Moderate
Reaction rate 3 = High
Reaction rate 4 = Vigorous

Quality Control Report

	Sample ID:	D202000415604	D202000431801	D202000432701
	Sample Name	SP3-WAC2	WAC101-TP1-0.7-0.8m	WAC101-TP6-0.0-0.3m
Parameter	**Units**	**PQL**		
ESA-MP-01,ICP-01				
Arsenic			Pass	Pass	Pass
Cadmium			Pass	Pass	Pass
Chromium			Pass	Pass	Pass
Copper			Pass	Pass	Pass
Lead			Pass	Pass	Pass
Mercury			Pass	Pass	Pass
Nickel			Pass	Pass	Pass
Zinc			Pass	Pass	Pass

	Sample ID:	Q2020001465	Q2020001473
	Sample Name		
Parameter	**Units**	**PQL**	Metals Blank Sp-Soil	Metals Blank Sp-Soil
ESA-MP-01,ICP-01				
Arsenic	%		100	108
Cadmium	%		100	103
Chromium	%		102	105
Copper	%		102	106
Lead	%		103	107
Mercury	%		122	127
Nickel	%		103	104
Zinc	%		104	106

	Sample ID:	D202000433401
	Sample Name	WAC1.TP2

Parameter	Units	PQL	
ESA-MP-01,ICP-01			
Arsenic			Pass
Cadmium			Pass
Chromium			Pass
Copper			Pass
Lead			Pass
Mercury			Pass
Nickel			Pass
Zinc			Pass

	Sample ID:	S202000415504	S202000431701
	Sample Name	SP3-WAC1	WAC101-TP1-0.0-0.3m

Parameter	Units	PQL		
ESA-MP-01,ICP-01				
Arsenic	%		108	113
Cadmium	%		111	109
Chromium	%		107	103
Copper	%		97	109
Lead	%		111	113
Mercury	%		114	124
Nickel	%		114	107
Zinc	%		110	111

	Sample ID:	**Q2020001464**	**Q2020001472**
	Sample Name		
Parameter	***Units***	***PQL***	Metals Blank - Soil	Metals Blank - Soil
ESA-MP-01,ICP-01				
Arsenic	mg/kg	5	<5	<5
Cadmium	mg/kg	0.3	<0.3	<0.3
Chromium	mg/kg	5	<5	<5
Copper	mg/kg	5	<5	<5
Lead	mg/kg	10	<10	<10
Mercury	mg/kg	0.2	<0.2	<0.2
Nickel	mg/kg	10	<10	<10
Zinc	mg/kg	5	<5	<5

Sydney Laboratory Services
Construction Material Testing
Unit 7/24 Skarrat Street
Silverwater NSW 2128
Ph: (02) 9648-6669
A.C.N. 093 452 950

Analysis Report: **DRD-87-17407 FM01-FM10 Foreign Materials Content Test Result**

Customer:	Drumderg Services	**Job No.:**	DRD-87-17407
Project:	Old Newcastle Courthouse	**Date Sampled:**	16.03.2020
Location:	Church Street, Newcastle	**Date Tested:**	19.03.2020
Sampler:	MOC	**Tested By:**	KC

Test Procedure:	RTA T276 | RMS T276	Sample Preparation Method	Oven-Dried

Sample ID:	Metal	Glass	Asphalt	Ceramics	Slag (Other than Blast Furnace Slag)	**Total TYPE I Materials**	Brick	Plaster	Friable Materials	**Total TYPE II Materials**	Rubber	Plastic	Bitumen	Paper	Cloth	Paint	Construction & Processed Timber	**Total TYPE III Materials**	**Total Foreign Material Content (%)**
FM1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FM2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FM3	0.00	0.06	0.00	0.19	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25
FM4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FM5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FM6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FM7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FM8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FM9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FM10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes:

Accreditation No.14664.
Accredited for compliance with ISO/IEC 17025 - Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

Tests not covered by NATA are denoted with *.

Authorised Signatory:

Ashwin Tatikonda
Laboratory Manager

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
A.C.N. 093 452 950
Unit 4/10-11 Millennium Court,
Silverwater 2128
Ph: (02) 9648-6669

Accreditation No.14664
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Authorised By

Jasmine Franco

General Comments

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Sydney Laboratory Services
A division of A. D. Envirotech Australia Pty Ltd
Unit 4/10-11 Millennium Court
Silverwater 2128
Ph: (02) 9648-6669

Certificate of Analysis

Contact:	Cameron Mitchell	**Date Reported:**	23/03/2020
Customer:	ADE Consulting Group	**No. of Samples:**	10
Address:	Unit 9 103 Glenwood Drive Thornton NSW	**Date Received:**	20/03/2020
		Date of Analysis:	20/03/2020
Cust Ref:	DRD-87-17407		

Glossary:

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Reaction rate 1 = Slight
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Sydney Laboratory Services
A division of A. D. Envirotech Australia Pty Ltd
Unit 4/10-11 Millennium Court
Silverwater 2128
Ph: (02) 9648-6669

Certificate of Analysis

	Sample ID:	2020004569	2020004570	2020004571	2020004572	2020004573	2020004574	2020004575	2020004576	2020004577	2020004578
	Sample Name	WAC2.TP01	WAC2.TP02	WAC2.TP03	WAC2.TP04	WAC2.TP05	WAC2.TP06	WAC2.TP07	WAC2.TP08	WAC2.TP09	WAC2.TP10
Parameter	Units	PQL									
ESA-P-12											
% Moisture Content	%		7.3	6.8	12.1	9.5	7.8	8.3	6.2	11.8	7.3	8.3
ESA-P-ORG(11 - 15)											
Acenaphthene	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Acenaphthylene	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Anthracene	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Benzo[a]anthracene	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Benzo[a]pyrene	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Benzo[b]fluoranthene	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Benzo[g,h,i]perylene	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Benzo[k]fluoranthene	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chrysene	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Dibenzo[a,h]anthracene	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Fluoranthene	mg/kg	0.3	0.4	0.5	<0.3	<0.3	0.3	0.4	0.4	0.4	0.4	0.4
Fluorene	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Indeno(1,2,3-cd)pyrene	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Naphthalene	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Phenanthrene	mg/kg	0.3	0.3	0.3	<0.3	<0.3	<0.3	<0.3	0.3	0.3	0.3	0.3
Pyrene	mg/kg	0.3	0.4	0.4	<0.3	<0.3	0.3	0.3	0.4	0.3	0.4	0.3
Sum of Positive PAHs	mg/kg		1.1	1.2	0.0	0.0	0.6	0.7	1.1	1.0	1.1	1.0
Benzo(a)pyrene TEQ (Zero)	mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzo(a)pyrene TEQ (Half PQL)	mg/kg		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Benzo(a)pyrene TEQ (PQL)	mg/kg		0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
p-Terphenyl-d14 (Surr.)	%		72	76	77	80	78	80	82	71	90	76

Sydney Laboratory Services
A division of A. D. Envirotech Australia Pty Ltd
Unit 4/10-11 Millennium Court
Silverwater 2128
Ph: (02) 9648-6669

Sydney Laboratory Services

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A.C.N. 093 452 950
Unit 4/10-11 Millennium Court,
Silverwater 2128
Ph: (02) 9648-6669

Accreditation No.14664
Accredited for compliance with ISO/IEC 17025 - Testing.

This Quality Control Report contains results of QAQC samples analysis and the Laboratory Acceptance Criteria.

This report supersedes any previous report(s) with this reference. This document shall not be reproduced, except in full.

This report has been electronically signed by authorised signatories below.

Authorised By

Jasmine Franco

General Comments

Duplicate samples and matrix spike may not be prepared on smaller jobs, however are analysed at frequency. QAQC samples shown within the report as e.g. Batch Blank, Batch Matrix Spike were performed on samples not reported on that Certificate of Analysis.

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 the same manner as for samples.
Duplicate This is the interlaboratory split of a random sample from the processed batch
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.
Surr. (Surrogate Spike) Surrogates are known additions to each sample, blank and matrix spike or LCS in a batch. Surrogates are chosen as a compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Blank shall be < PQL
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals, 60-140% for organics is acceptable. Matrix heterogeneity may result in matrix spike analyses falling outside these limits
RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:
Results <10 times the PQL : No Limit
Results between 10-20 times the PQL : RPD must lie between 0-50%
Results >20 times the PQL : RPD must lie between 0-30%
Surrogate Recoveries : Recoveries must lie between 50-150%

SLS is responsible for all the information in the report, except that provided by the customer.

All sampling information included in the report has been provided by customer; ADE Consulting Group.

Information provided by ADE Consulting Group can affect the validity of the results.

Sydney Laboratory Services
A division of A. D. Envirotech Australia Pty Ltd
Unit 4/10-11 Millennium Court
Silverwater 2128
Ph: (02) 9648-6669

Quality Control Report

Contact:	Cameron Mitchell	**Date Reported:**	23/03/2020
Customer:	ADE Consulting Group	**No. of Samples:**	4
Address:	Unit 9 103 Glenwood Drive Thornton NSW	**Date Received:**	20/03/2020
		Date of Analysis:	20/03/2020

Cust Ref: DRD-87-17407

Glossary:

*NATA accreditation does not cover the performance of this service
ND-not detected,
NT-not tested
INS-Insufficient material to perform the test
LCS-Laboratory Control Sample
RPD-Relative Percent Difference
N/A-Not Applicable
< less than
> greater than
PQL- Practical Quantitation Limit
^Analytical result might be compromised due to sample condition or holding time requirements
Reaction rate 1 = Slight
Reaction rate 2 = Moderate
Reaction rate 3 = High
Reaction rate 4 = Vigorous

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Quality Control Report

Sample ID:	**D202000457001**
Sample Name	**WAC2.TP02**

Parameter	*Units*	*PQL*	
ESA-P-ORG(11 - 15)			
Acenaphthene			Pass
Acenaphthylene			Pass
Anthracene			Pass
Benzo[a]anthracene			Pass
Benzo[a]pyrene			Pass
Benzo[b]fluoranthene			Pass
Benzo[g,h,i]perylene			Pass
Benzo[k]fluoranthene			Pass
Chrysene			Pass
Dibenzo[a,h]anthracene			Pass
Fluoranthene			Pass
Fluorene			Pass
Indeno(1,2,3-cd)pyrene			Pass
Naphthalene			Pass
Phenanthrene			Pass
Pyrene			Pass
p-Terphenyl-d14	%		76

Sample ID:	**Q2020001564**
Sample Name	

Parameter	*Units*	*PQL*	PCB Blank - Soil
ESA-P-ORG(11 - 15)			
Acenaphthene	mg/kg	0.3	<0.3
Acenaphthylene	mg/kg	0.3	<0.3
Anthracene	mg/kg	0.3	<0.3
Benzo[a]anthracene	mg/kg	0.3	<0.3
Benzo[a]pyrene	mg/kg	0.3	<0.3
Benzo[b]fluoranthene	mg/kg	0.3	<0.3

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Benzo[g,h,i]perylene	mg/kg	0.3	<0.3
Benzo[k]fluoranthene	mg/kg	0.3	<0.3
Chrysene	mg/kg	0.3	<0.3
Dibenzo[a,h]anthracene	mg/kg	0.3	<0.3
Fluoranthene	mg/kg	0.3	<0.3
Fluorene	mg/kg	0.3	<0.3
Indeno(1,2,3-cd)pyrene	mg/kg	0.3	<0.3
Naphthalene	mg/kg	0.3	<0.3
Phenanthrene	mg/kg	0.3	<0.3
Pyrene	mg/kg	0.3	<0.3

Sample ID: **Q2020001565**

Sample Name

Parameter	***Units***	***PQL***	PCB Blank Sp - Soil
ESA-P-ORG(11 - 15)			
Acenaphthene	%		92
Anthracene	%		93
Fluoranthene	%		89
Naphthalene	%		91
Phenanthrene	%		93
Pyrene	%		89
p-Terphenyl-d14 (Surr.)	%		80

Sample ID: **S202000456901**

Sample Name **WAC2.TP01**

Parameter	***Units***	***PQL***	
ESA-P-ORG(11 - 15)			
Acenaphthene	%		95
Anthracene	%		95
Fluoranthene	%		93
Naphthalene	%		95
Phenanthrene	%		94
Pyrene	%		91
p-Terphenyl-d14 (Surr.)	%		82

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Unit 4/10-11 Millennium Court
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Ph: (02) 9648-6669

Batch Number : 2000799

Report Number : DRD-87-17407(089-098)

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
A.C.N. 093 452 950
Unit 4/10-11 Millennium Court,
Silverwater 2128
Ph: (02) 9648-6669

Accreditation No.14664
Accredited for compliance with ISO/IEC 17025 - Testing.

This certificate of analysis contains General Comments and Analytical Results. Quality Control Report and Laboratory Quality Acceptance Criteria have been issued separately.

This report supersedes any previous report(s) with this reference. This document shall not be reproduced, except in full.

This report has been electronically signed by authorised signatories below.

Authorised By

Jasmine Franco

General Comments

Samples are analysed on as received basis. Sampling is not covered by NATA accreditation.

Where moisture determination has been performed, results are reported on dry weight basis.

Where the PQL of reported result differs from standard PQL, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Samples were analysed within holding time described by laboratory internal procedures if not stated otherwise. If samples delivered do not meet required analytical criteria, results will be marked with ^.

However surrogate standards are added to samples, results are not corrected for standards recoveries.

Analysis of VOC in water samples are performed on unfiltered waters (as received) spiked with surrogates and injection standards only.

SLS is responsible for all the information in the report, except that provided by the customer.

All sampling information included in the report has been provided by customer; ADE Consulting Group.

Information provided by ADE Consulting Group can affect the validity of the results.

Sydney Laboratory Services
A division of A. D. Envirotech Australia Pty Ltd
Unit 4/10-11 Millennium Court
Silverwater 2128
Ph: (02) 9648-6669

Certificate of Analysis

Contact:	Cameron Mitchell	**Date Reported:**	26/03/2020
Customer:	ADE Consulting Group	**No. of Samples:**	10
Address:	Unit 9 103 Glenwood Drive Thornton NSW	**Date Received:**	25/03/2020
		Date of Analysis:	25/03/2020
Cust Ref:	DRD-87-17407		

Glossary:

*NATA accreditation does not cover the performance of this service
ND-not detected,
NT-not tested
INS-Insufficient material to perform the test
LCS-Laboratory Control Sample
RPD-Relative Percent Difference
N/A-Not Applicable
< less than
> greater than
PQL- Practical Quantitation Limit
^Analytical result might be compromised due to sample condition or holding time requirements
Reaction rate 1 = Slight
Reaction rate 2 = Moderate
Reaction rate 3 = High

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Certificate of Analysis

	Sample ID:	2020005089	2020005090	2020005091	2020005092	2020005093	2020005094	2020005095	2020005096	2020005097	2020005098
	Sample Name	WAC2.TP01	WAC2.TP02	WAC2.TP03	WAC2.TP04	WAC2.TP05	WAC2.TP06	WAC2.TP07	WAC2.TP08	WAC2.TP09	WAC2.TP10
Parameter	Units	PQL									
ESA-P-21											
pH(Ave. of 3 Reading)	-		11.6	11.6	11.3	11.6	11.6	11.6	11.6	11.6	11.5

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APPENDIX IV – 95% UPPER CONFIDENCE LIMIT (UCL)

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.126/03/2020 1:26:11 PM
From File	DRD-87-17407 / WAC2 / v1 final
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lead

General Statistics

Total Number of Observations	10	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	67	Mean	89.7
Maximum	107	Median	92
SD	13.32	Std. Error of Mean	4.211
Coefficient of Variation	0.148	Skewness	-0.384

Normal GOF Test

Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.182	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.262	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	97.42	95% Adjusted-CLT UCL (Chen-1995)	96.08
		95% Modified-t UCL (Johnson-1978)	97.33

Gamma GOF Test

A-D Test Statistic	0.324	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.724	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.2	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.266	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	48.12	k star (bias corrected MLE)	33.75
Theta hat (MLE)	1.864	Theta star (bias corrected MLE)	2.658
nu hat (MLE)	962.5	nu star (bias corrected)	675
MLE Mean (bias corrected)	89.7	MLE Sd (bias corrected)	15.44
		Approximate Chi Square Value (0.05)	615.8
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	605.9

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	98.34	95% Adjusted Gamma UCL (use when n<50)	99.94

51	**Lognormal GOF Test**											
52					Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk Lognormal GOF Test**					
53					5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level					
54					Lilliefors Test Statistic	0.194	**Lilliefors Lognormal GOF Test**					
55					5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level					
56	**Data appear Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59					Minimum of Logged Data	4.205	Mean of logged Data	4.486				
60					Maximum of Logged Data	4.673	SD of logged Data	0.154				
61												
62	**Assuming Lognormal Distribution**											
63					95% H-UCL	98.76	90% Chebyshev (MVUE) UCL	102.9				
64					95% Chebyshev (MVUE) UCL	108.8	97.5% Chebyshev (MVUE) UCL	117.1				
65					99% Chebyshev (MVUE) UCL	133.3						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
69												
70	**Nonparametric Distribution Free UCLs**											
71					95% CLT UCL	96.63	95% Jackknife UCL	97.42				
72					95% Standard Bootstrap UCL	96.39	95% Bootstrap-t UCL	96.93				
73					95% Hall's Bootstrap UCL	95.88	95% Percentile Bootstrap UCL	96.1				
74					95% BCA Bootstrap UCL	95.6						
75					90% Chebyshev(Mean, Sd) UCL	102.3	95% Chebyshev(Mean, Sd) UCL	108.1				
76					97.5% Chebyshev(Mean, Sd) UCL	116	99% Chebyshev(Mean, Sd) UCL	131.6				
77												
78	**Suggested UCL to Use**											
79					95% Student's-t UCL	97.42						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												
86	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
87	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
88												

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.126/03/2020 1:28:37 PM
From File	DRD-87-17407 / WAC2 / v1 final
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Zinc

General Statistics

Total Number of Observations	10	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	72	Mean	125.7
Maximum	296	Median	97.5
SD	72.96	Std. Error of Mean	23.07
Coefficient of Variation	0.58	Skewness	1.902

Normal GOF Test

Shapiro Wilk Test Statistic	0.704	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.347	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.262	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	168	95% Adjusted-CLT UCL (Chen-1995)	178.5
		95% Modified-t UCL (Johnson-1978)	170.3

Gamma GOF Test

A-D Test Statistic	1.092	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.729	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.302	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.268	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.669	k star (bias corrected MLE)	3.335
Theta hat (MLE)	26.92	Theta star (bias corrected MLE)	37.69
nu hat (MLE)	93.38	nu star (bias corrected)	66.7
MLE Mean (bias corrected)	125.7	MLE Sd (bias corrected)	68.83
		Approximate Chi Square Value (0.05)	48.91
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	46.27

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	171.4	95% Adjusted Gamma UCL (use when n<50)	181.2

51	**Lognormal GOF Test**											
52					Shapiro Wilk Test Statistic	0.811	**Shapiro Wilk Lognormal GOF Test**					
53					5% Shapiro Wilk Critical Value	0.842	Data Not Lognormal at 5% Significance Level					
54					Lilliefors Test Statistic	0.276	**Lilliefors Lognormal GOF Test**					
55					5% Lilliefors Critical Value	0.262	Data Not Lognormal at 5% Significance Level					
56	**Data Not Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59					Minimum of Logged Data	4.277	Mean of logged Data	4.723				
60					Maximum of Logged Data	5.69	SD of logged Data	0.458				
61												
62	**Assuming Lognormal Distribution**											
63					95% H-UCL	173.9	90% Chebyshev (MVUE) UCL	178.1				
64					95% Chebyshev (MVUE) UCL	202.8	97.5% Chebyshev (MVUE) UCL	237.1				
65					99% Chebyshev (MVUE) UCL	304.5						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data do not follow a Discernible Distribution (0.05)**											
69												
70	**Nonparametric Distribution Free UCLs**											
71					95% CLT UCL	163.6	95% Jackknife UCL	168				
72					95% Standard Bootstrap UCL	161.3	95% Bootstrap-t UCL	308.7				
73					95% Hall's Bootstrap UCL	406	95% Percentile Bootstrap UCL	165.4				
74					95% BCA Bootstrap UCL	177.1						
75					90% Chebyshev(Mean, Sd) UCL	194.9	95% Chebyshev(Mean, Sd) UCL	226.3				
76					97.5% Chebyshev(Mean, Sd) UCL	269.8	99% Chebyshev(Mean, Sd) UCL	355.3				
77												
78	**Suggested UCL to Use**											
79					95% Student's-t UCL	168	or 95% Modified-t UCL	170.3				
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												

APPENDIX V – CHAIN OF CUSTODY

Sydney Laboratory Services / ABI Laboratory

SAMPLES SUBMITTED BY:	ADE Consulting Group, Unit 9 / 103 Glenwood Drive, Thornton 2322 NSW OCCUPATIONAL HYGIENE DEPARTMENT	LABORATORY REF. NO.:	17407-ASB5
SAMPLERS:	Matthew Deegan	RECEIVED BY:	J
REPORT FORMAT:	DISK: E-MAIL: X	TIME:	20.03.20. 11:35 am.
JOB CONTACT E-MAIL:	matthew.deegan@ade.group ; cameron.mitchell@ade.group	SIGNATURE:	
SAMPLING DATE:	18.03.2020		
CLIENT:	Drumderg Services		
CLIENT CODE - PROJECT NUMBER - INVOICE NUMBER	**DRD-87-17407**	SIGNATURE:	
JOB LOCATION:	9 Church Street, Newcastle		
HOLDING TIME 1 MONTH IF NOT ADVISED DIFFERENTLY			
LONGER TIME	YES / NO REQUIRED HOLDING TIME:		

SAMPLE DATA			SAMPLE						SAMPLES SUBMITTED		DATA NEEDED	
Sample ID (Lab Use)	INVOICE NUMBER	SAMPLE NUMBER	BULK	DUST	DUST SWAB	SOIL 65g	SOIL 500mL for NEPM	Material description and comments	DATE	TIME	DATE	TIME
17407-ASB9	17407	WAC2.NEPM01					X	Soil	19.03.20	1000	ASAP	ASAP
10	17407	WAC2.NEPM02					X	Soil	19.03.20	1000	ASAP	ASAP
11	17407	WAC2.NEPM03					X	Soil	19.03.20	1000	ASAP	ASAP
12	17407	WAC2.NEPM04					X	Soil	19.03.20	1000	ASAP	ASAP
13	17407	WAC2.NEPM05					X	Soil	19.03.20	1000	ASAP	ASAP
14	17407	WAC2.NEPM06					X	Soil	19.03.20	1000	ASAP	ASAP
15	17407	WAC2.NEPM07					X	Soil	19.03.20	1000	ASAP	ASAP
16	17407	WAC2. NEPM04 FC	X					Vinyl fragment	19.03.20	1000	ASAP	ASAP

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ESA-F-02 COC - Chain Of Custody (Internal: Sydney Laboratory Services)

Document Revision Date:

ADE GROUP

PROJECT:	Central Waste Station	LABORATORY REFERENCE NO. (Lab use ONLY):	17407
PROJECT NUMBER - INVOICE NUMBER	DRD-87-17407		
SAMPLES DELIVERED BY:	ADE Consulting Group 6/7 Millennium Ct, Silverwater NSW 2128	RECEIVED BY: Aurora	SIGNATURE:
SAMPLERS:	Matthew O'Connor	SAMPLES: CHILLED: ☐ PRESERVED: ☐	PRESERVATION METHOD: CUSTODY SEAL INTACT: ☐
TURNAROUND:	24h: X 48h: ☐ 72h: ☐ 5 WORKING DAYS:	MINIMAL HEADSPACE: ☐ WITHIN HOLDING TIME: ☐	
SAMPLING DATE: 16.03.20		DATE: 17/03/2020 TIME: 11:30am	TEMPERATURE UPON RECEIPT: °C
AFTER TEST STORAGE:	ROOM TEMP: ☐ FRIDGE: X FREEZER: ☐ >>4 WEEKS: ☐ OTHER: ☐	LIMS LOT NO. 200071	LIMS/EXCEL SIGNATURE: COMMENTS:
REPORT FORMAT:	HARD COPY: ☐ E-MAIL: X		
CONSULTANTS SIGNATURE:	CONSULTANT E-MAIL: matthew.oconnor@ade.group		
PROJECT MANAGERS SIGNATURE:	PROJECT MANAGERS E-MAIL: cameron.mitchell@ade.group		

SAMPLE DATA				CONTAINER DATA		ANALYSES REQUIRED										OTHER				TCLP				NOTES
LIMS Sample ID (Lab Use)	Sample ID (ADE)	MATRIX	SAMPLE DATE	TYPE & PRESERVATIVE	NO.	6 Metal Suite	8 Metal Suite (495/1446)	BTEX	PAH	OCP/OPP	PCB	vTRH (C6-C10)	TRH (C10-C40)	EC	pH/pH fox					TCLP Prep ONLY	TCLP PAH B(a)P PQL<0.2 ug/L	TCLP PAH B(a)P PQL<5.0 ug/L	TCLP Metals (SPECIFY METALS WHICH NEED TO BE ANALYSED)	POTENTIAL HAZARDOUS CONTAMINANTS: ☐ ASBESTOS ☐ HYDROCARBONS ☐ LEAD/ARSENIC ☑ NO KNOWN CONTAMINATION ☐ OTHER:_____ LAB PLEASE *EMAIL COC RECEIPT: ☐
2020004																								
404	WAC2.TP01	Aggregate	16.03.20	J	1		X							X										
405	WAC2.TP02	Aggregate	16.03.20	J	2		X							X										
406	WAC2.TP03	Aggregate	16.03.20	J	3		X							X										
407	WAC2.TP04	Aggregate	16.03.20	J	4		X							X										
408	WAC2.TP05	Aggregate	16.03.20	J	5		X							X										
409	WAC2.TP06	Aggregate	16.03.20	J	6		X							X										
410	WAC2.TP07	Aggregate	16.03.20	J	7		X							X										
411	WAC2.TP08	Aggregate	16.03.20	J	8		X							X										
412	WAC2.TP09	Aggregate	16.03.20	J	9		X							X										
413	WAC2.TP10	Aggregate	16.03.20	J	10		X							X										

Comments:

Container Type and Preservative: P = Unpreserved Plastic; PN = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; PNA = Sodium Hydroxide Preserved Plastic; PC = HCl preserved Plastic; VC = Vial HCl Preserved; SP = Sulfuric Preserved Plastic; VB = Vial Sodium Bisulphate Preserved; VS = Vial Sulfuric Preserved; V = Unpreserved Vial; G = Amber Glass Unpreserved; SG = Sulfuric Preserved Amber Glass; F = Formaldehyde Preserved Glass; HS = HCl preserved Speciation bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; J = Unpreserved Glass Jar; ASS = Plastic Bag for Acid Sulfate Soils; B = Unpreserved Bag.

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Construction Material Testing Laboratory

CLIENT/PROJECT:	Old Newcastle Courthouse / Drumderg Services
CLIENT CODE - PROJECT NUMBER - INVOICE NUMBER	DRD-87-17407
SAMPLES DELIVERED BY:	ADE Consulting Group VIA FAST WAY COURIER
POSTAL ADDRESS:	6/7 Millennium Ct, Silverwater NSW 2128
SAMPLERS:	Matthew O'Connor
STORAGE/DISPOSAL:	4 WEEKS: >4 WEEKS:
SAMPLING DATE:	16.03.2020
TURNAROUND:	24h: X 48h: 72h: 5 WORKING DAYS: 10 WORKING DAYS:
REPORT FORMAT:	DISK: X E-MAIL:
SIGNATURE:	JOB CONTACT E-MAIL: matthew.oconnor@ade.group

LABORATORY REFERENCE NO: (Lab use ONLY):

RECEIVED BY:

SAMPLES VOLUME: SUFFICIENT: INSUFFICIENT:

DATE: 10/3/20 TIME: 1245

SIGNATURE:

SAMPLE DATA

Sample ID (Lab Use)	Sample Name: Invoice Number	Sample Name: Sample number	Density Data - Gauge (Only for Compaction): Field Wet Density t/m³	Density Data - Gauge (Only for Compaction): Moisture Content %	MATRIX	DELIVERY DATE	DELIVERY TIME	CONTAINER	Particle Size Distribution (ADVISE PSD RANGE)	Plasticity Index - Atteberg Limit	Particle Size Distribution (ADVISE PSD RANGE)	Plasticity Index - Atteberg Limit	Linear Shrinkage	CBR	Compaction Effort- Standard (AS1289.5.1)	Compaction Effort- Modified (AS1289.5.2.1)	Compaction-HILF	Texture	Foreign Materials (T276 Recovered Aggregate Order see below)			NOTES
	17407	FM01			Aggregate	17.03.2020	10:00AM	Ziplock bag											X			
	17407	FM02			Aggregate	17.03.2020	10:00AM	Ziplock bag											X			
	17407	FM03			Aggregate	17.03.2020	10:00AM	Ziplock bag											X			
	17407	FM04			Aggregate	17.03.2020	10:00AM	Ziplock bag											X			
	17407	FM05			Aggregate	17.03.2020	10:00AM	Ziplock bag											X			
	17407	FM06			Aggregate	17.03.2020	10:00AM	Ziplock bag											X			
	17407	FM07			Aggregate	17.03.2020	10:00AM	Ziplock bag											X			
	17407	FM08			Aggregate	17.03.2020	10:00AM	Ziplock bag											X			
	17407	FM09			Aggregate	17.03.2020	10:00AM	Ziplock bag											X			
	17407	FM10			Aggregate	17.03.2020	10:00AM	Ziplock bag											X			

Foreign Materials: Type 1. Metal. Type 2. Plaster. Type 3. Rubber, plastic, paper, cloth, paint, wood, and other vegetable matter

©Copyright ADE

| Document Revision Date: | ESA-F-02 COC - Chain Of Custody (Internal: Sydney Laboratory Services) | | |

20/3

| Document Revision Date: | ESA-F-02 COC - Chain Of Custody (Internal: Sydney Laboratory Services) | | |

APPENDIX VI – ASBESTOS MATERIALS CLEANRENCE REPORTS

Asbestos Materials Clearance Report

9 Church Street, Newcastle NSW

Prepared for: Drumderg Services Pty Ltd

DRD-87-17254 / CLR1
v1 final
20th February 2020

Asbestos Materials Clearance Report

Prepared for:

Drumderg Services Pty Ltd

9 Church Street, Newcastle NSW

Version	Details	Date
v1 final	Written by Matthew Deegan	Thursday 20th February 2020

Report No: DRD-87-17254 / CLR1 / v1 final

Date: Thursday, 20th February 2020

Written By:

Matthew Deegan
Occupational Hygienist
B. Sci. (Biotechnology)
LAA number LAA001328

Reviewed By:

Cameron Mitchell
Project Manager
LAA number LAA001292

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ASBESTOS MATERIALS CLEARANCE REPORT

ADE Report No. DRD-87-17254 / CLR1 / v1 final

Date of Report:	20.02.2020
Date of Inspections:	29.01.2020 to 18.02.2020
Project Address:	9 Church Street, Newcastle NSW
Removal Contractor:	Drumderg Services Pty Ltd
Client:	Drumderg Services Pty Ltd
Subject of Works:	Removal of asbestos containing materials from subject areas.
Subject Areas:	**Subject area A:** Internal, building B, level one (1), male toilets, ceiling and wall linings throughout, former location of asbestos containing fibre cement sheeting (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*); **Subject area B:** Internal, building A, level one (1), male toilets, adjacent court seven (7) chambers, wall linings, former location of asbestos containing fibre cement sheeting (*refer to Appendix I – Aerial Photograph* & *Appendix II – Photographs*); **Subject area C:** Internal, building A, levels one (1), two (2) and three (3), northern stair landings, former location of asbestos containing vinyl floor tiles (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*); **Subject area D:** Internal, building C, levels two (2) and three (3), public space, fire and electrical cupboard walls and ceiling linings, former location of asbestos containing fibre cement (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*); **Subject area E:** External, building C, level four (4), skylight above courts one (1) and two (2), eaves, former location of asbestos containing fibre cement (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*); **Subject area F:** Internal, building C, level one (1), south west corner of carpark, infill panels, former location of asbestos containing fibre cement (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*); **Subject area G:** Internal, building C, level one (1), northern section including (D.O.C.S Records, D.O.C.S room and adjacent hallway), floor, former location of asbestos containing vinyl floor tiles (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*); **Subject area H:** Internal, building B, level one (1), D.O.C.S officers amenities, floor, former location of asbestos containing vinyl floor tiles (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*).; **Subject area I:** Internal, building A, level one (1), toilets, adjacent chambers court zero (0), wall linings, former location of asbestos containing fibre cement sheeting (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*);

Subject area J: External, building C, level one (1), northern border adjacent Church Street, eaves, former location of asbestos containing fibre cement (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*);
Subject area K: Internal, building A, level one (1), store room, floor, former location of vinyl tiles deemed to contain asbestos (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*);
Subject area L: External, building A, level four (4), rooftop, concrete surface, former location asbestos containing debris (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*);
Subject area M: Internal, building C, level two (2), northern section including (sheriff security, jury and associates'CT1 room), floor, former location of asbestos containing vinyl floor tiles (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*);
Subject area N: Internal, building C, level three (3), northern section including (public defender rooms, library and court reporter room), floor, former location of asbestos containing vinyl floor tiles (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*);
Subject area O: Internal, building C, level one (1), cleaner storage room, floor, former location of asbestos containing vinyl floor tiles (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*);
Subject area P: Internal, building C, level three (3), southern section including (old gym store, law library, senior crown prosecutor, remote witness, robing and I.T room), floor, former location of asbestos containing vinyl floor tiles (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*); and
Subject area Q: Internal, building C, level two (2), southern section including (associate, Jury Legal profession, female witness rooms and adjoining hallway), floor, former location of asbestos containing vinyl floor tiles (refer to *Appendix I – Aerial Photograph* & *Appendix II – Photographs*).

1. INTRODUCTION AND BACKGROUND

1.1 General

ADE Consulting Group Pty Ltd (ADE) was commissioned by Drumderg Services Pty Ltd (hereafter referred to as 'the client') to undertake an Asbestos Materials Clearance Inspection of the subject areas located at 9 Church Street, Newcastle NSW (refer to *Appendix I – Aerial Photograph*).

The visual inspection following the removal works within the subject areas was carried out between 29th of January and 18th of February 2020 by SafeWork NSW Licensed Asbestos Assessor Matthew Deegan (LAA001328) and Matthew O'Connor (LAA001363) representing ADE. This report represents the results of the inspection.

1.2 Scope

The scope of work involved the following:

- Completion of a Safety, Health & Environment Work Method Statement (SH&EWMS) prior to undertaking works;
- Visual inspection of the subject areas following removal works;
- Airborne asbestos monitoring during removal works;
- Analysis of samples by a National Association of Testing Authorities (NATA) accredited laboratory; and
- Preparation of an Asbestos Materials Clearance Inspection report outlining the site data and conclusions.

1.3 Legislative Requirements

The survey works, and production of this report have been undertaken in accordance with the requirements of:

- NSW Government. (2017). *Work Health and Safety Regulation 2017*;
- NSW Government. (2011). *Work Health and Safety Act 2011*;
- Safe Work Australia. (2019). *NSW Code of Practice: How to Manage and Control Asbestos in the Workplace;* and
- Safe Work Australia. (2019). *NSW Code of Practice: How to Safely Remove Asbestos.*

1.4 Whole Report

No one section or part of a section, of this report should be taken as giving an overall idea of this report. Each section must be read in conjunction with the whole of this report, including its appendices and attachments.

2. SITE INSPECTION DETAILS

2.1 Visual Inspection and Sampling

Visual inspection of the subject areas following the removal works revealed that the asbestos containing materials (ACM) had been removed to a satisfactory standard.

Airborne asbestos monitoring undertaken during the removal works revealed that the concentration of airborne fibres was below the detection limit of 0.01 fibres / mL (refer to *Appendix III – Analytical Results;* ADE Report No. DRD-87-17254 / AAM1-AAM16).

The subject areas contained no visible ACM following the completion of the removal works. A visual clearance certificate was issued to the client following the removal works (refer to *Appendix IV - Supporting Documents).*

2.2 Restrictions / Limitations

Please note that this inspection is limited to the specified subject areas stated within this report. Areas adjacent have not been inspected and are outside the scope of this report.

3. CONCLUSIONS

Based on the information presented in this report, it is the opinion of ADE that:

- Visual inspection of the subject areas following the removal works revealed that the ACM had been removed to a satisfactory standard;
- Airborne asbestos monitoring undertaken during the removal works revealed that the concentration of airborne fibres was below the detection limit of the method;
- At the time of inspection, the subject areas were considered **safe** regarding the asbestos hazard;
- The site-specific asbestos register should be updated to document the ACM removed and reference this Asbestos Materials Clearance Inspection Report; and
- Please remain diligent and adhere to the restrictions within the body of this report and the limitations stated below.

4. LIMITATIONS

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only and has been based on information provided by the client. The advice herein relates only to this project and all results, conclusions and recommendations made should be reviewed by a competent and experienced person with experience in environmental investigations, before being used for any other purpose. ADE Consulting Group Pty Ltd (ADE) accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced or amended in any way without prior approval by the client or ADE and should not be relied upon by any other party, who should make their own independent enquiries.

This report does not provide a complete assessment of the environmental status of the site and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, ADE reserves the right to review the report in the context of the additional information.

ADE's professional opinions are based upon its professional judgment, experience, training and results from analytical data. In some cases, further testing and analysis may be required, thus producing different results and / or opinions. ADE has limited investigation to the scope agreed upon with its client.

ADE has used a degree of care and skill ordinarily exercised in similar investigations by reputable member of the Environmental Industry within Australia. No other warranty, expressed or implied, is made or intended.

APPENDIX I – AERIAL PHOTOGRAPH

revision	no.	description	drawn	approved	date
	A	FIRST ISSUE	MC	cm	12/11/19

0 6 12 18 24 30
SCALE 1:600 @A3 METRES

drawn	MC
approved	CM
date	18/02/19
scale	AS SHOWN
original size	A3

client: DRUMDERG SERVICE PTY LTD

project: NEWCASTLE COURTHOUSE
CHURCH STREET, NEWCASTLE, NSW

title: SITE LOCATION AND SITE LAYOUT PLAN

project no: DRD-87-17254 | figure no: FIGURE 1 | rev: A

ADE CONSULTING GROUP
Sydney Office
ADE Consulting Group Pty Ltd
Unit 6 / 7 Millennium Court, Silverwater, NSW 2128
www.ADE.group | info@ade.group | 1300 976 922

PLOT DATE: 12/11/2019 1:15:36 PM DWG FILE: W:\DRD - DRUMDERG SERVICES\DRD-82-16979 INS CHURCH STREET - NEWCASTLE 07.11.2019 CM\CAD\DRD-82-16979.DWG

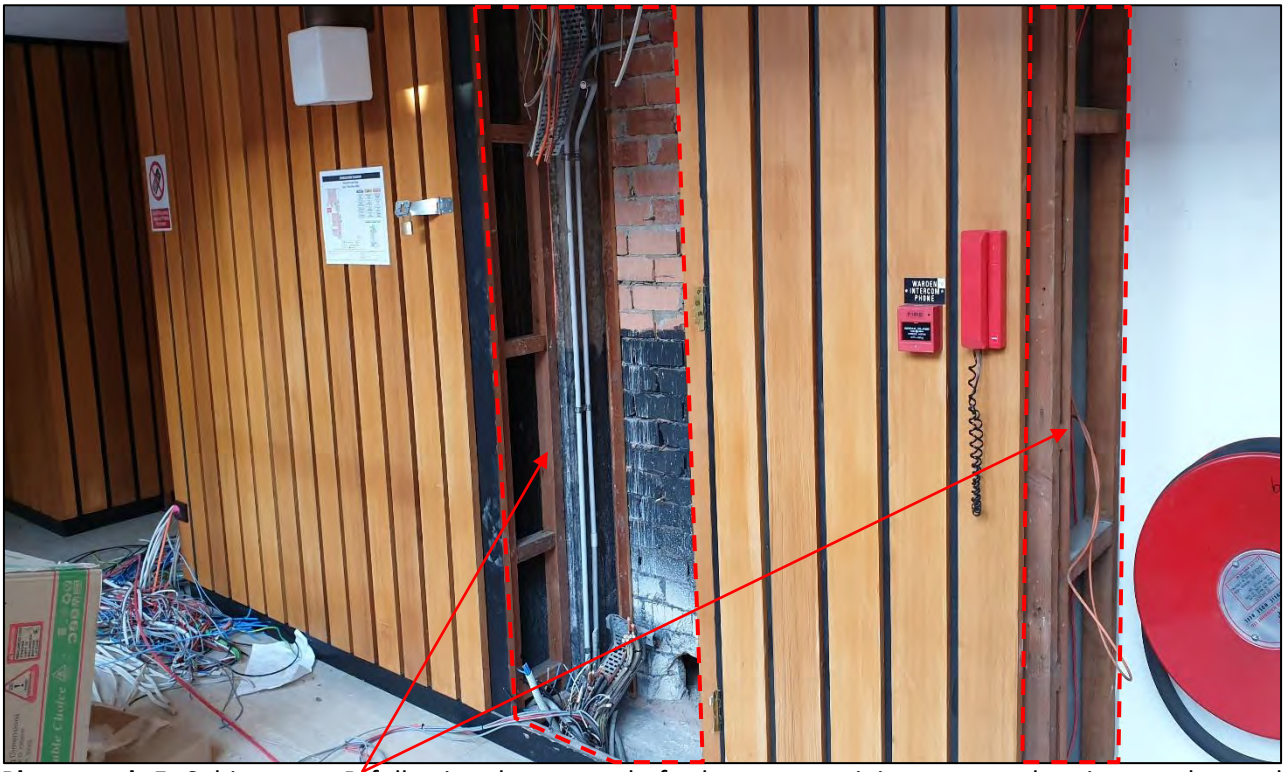
APPENDIX II – PHOTOGRAPHS

Photograph 1. Subject area A following the removal of asbestos containing fibre cement, as observed on 29.01.2020.

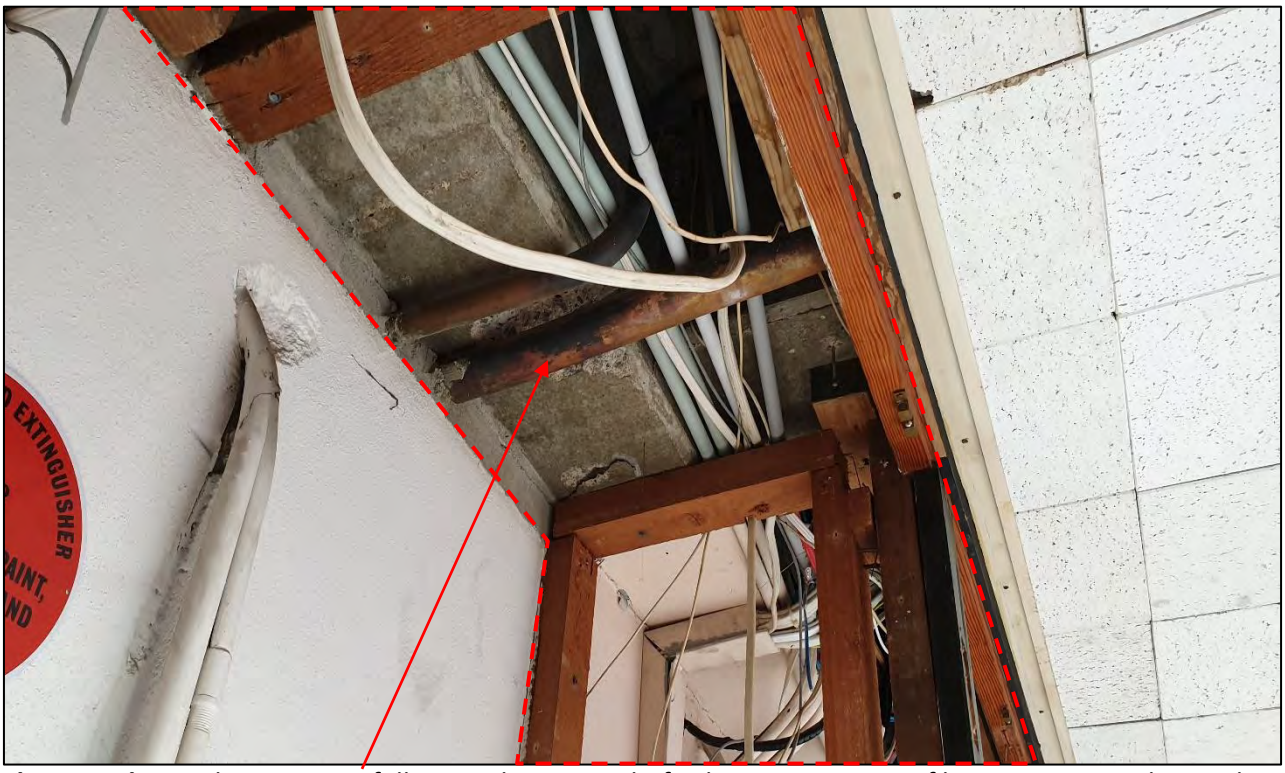
Photograph 2. Subject area A following the removal of asbestos containing fibre cement, as observed on 29.01.2020.

Photograph 3. Subject area B following the removal of asbestos containing fibre cement, as observed on 03.02.2020.

Photograph 4. Subject area C following the removal of asbestos containing vinyl floor tiles, as observed on 07.02.2020.

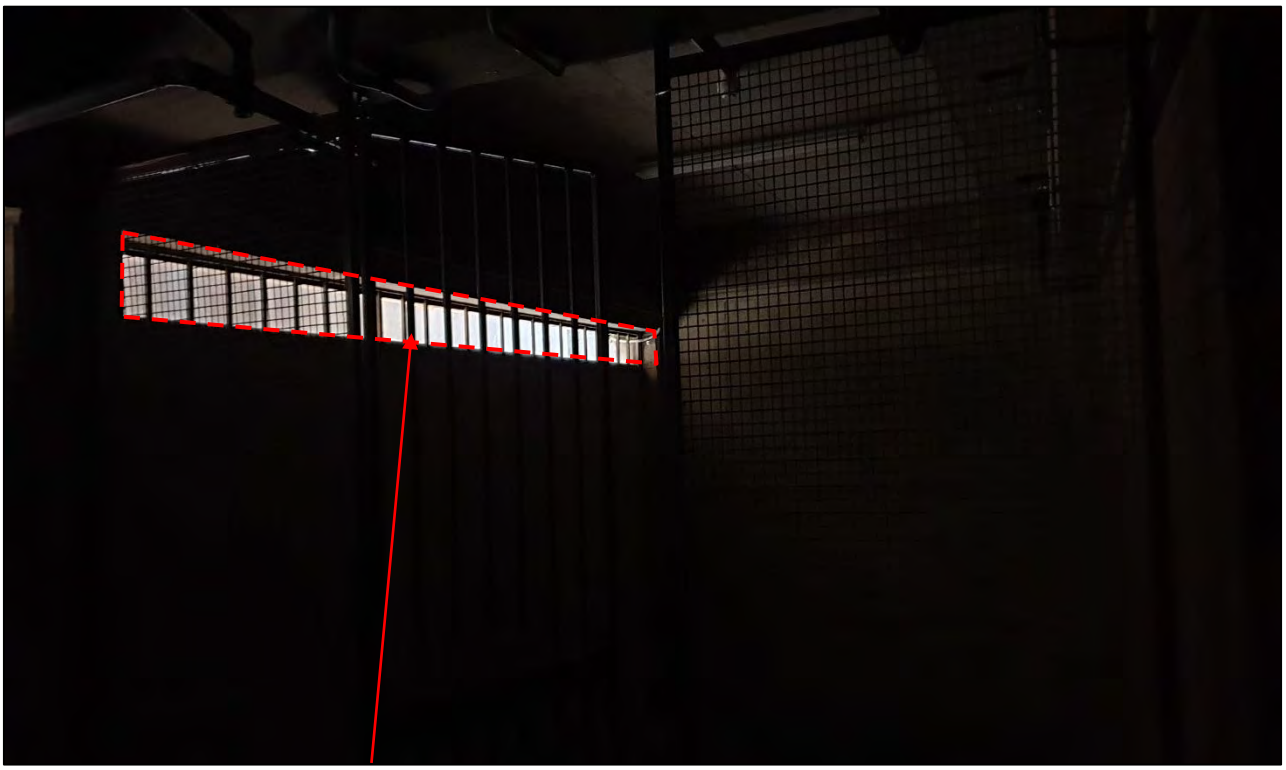


Photograph 5. Subject area D following the removal of asbestos containing cement sheeting, as observed on 11.02.2020.



Photograph 6. Subject area D following the removal of asbestos containing fibre cement, as observed on 11.02.2020.

Photograph 7. Subject area E following the removal of asbestos containing cement sheeting, as observed on 11.02.2020.



Photograph 8. Subject area F following the removal of asbestos containing fibre cement, as observed on 13.02.2020.

Photograph 9. Subject area D.O.C.S records room following the removal of asbestos containing vinyl floor tiles, as observed on 13.02.2020.

Photograph 10. Subject area G, D.O.C.S room following the removal of asbestos containing vinyl floor tiles, as observed on 13.02.2020.

Photograph 11. Subject area G, hallway following the removal of asbestos containing vinyl floor tiles, as observed on 13.02.2020.

Photograph 12. Subject area H following the removal of asbestos containing vinyl floor tiles, as observed on 13.02.2020.

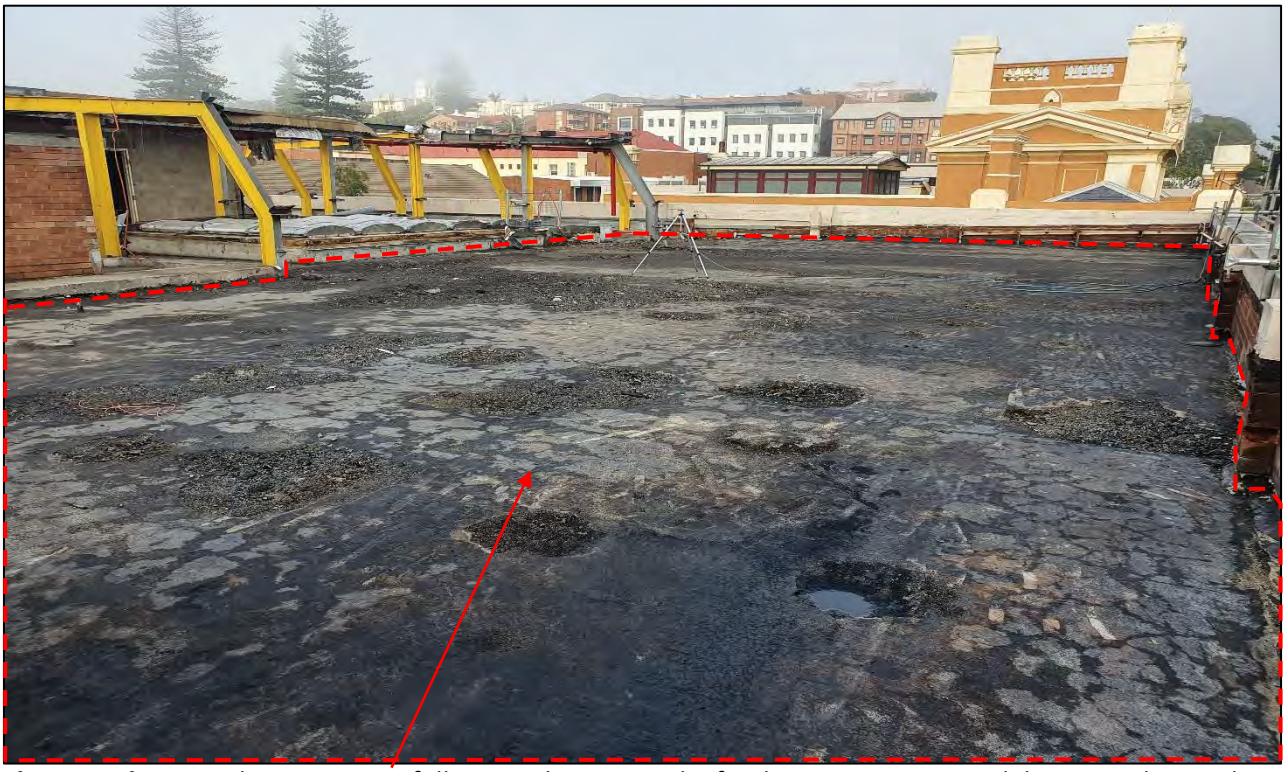
Photograph 13. Subject area H following the removal of asbestos containing vinyl floor tiles, as observed on 13.02.2020.

Photograph 14. Subject area I, following the removal of asbestos containing fibre cement, as observed on 13.02.2020.

Photograph 15. Subject area J, following the removal of asbestos containing fibre cement, as observed on 13.02.2020.

Photograph 16. Subject area J, following the removal of asbestos containing fibre cement, as observed on 13.02.2020.

Photograph 17. Subject area K, following the removal of asbestos containing vinyl floor tiles, as observed on 14.02.2020.



Photograph 18. Subject area L, following the removal of asbestos containing debris, as observed on 18.02.2020.

Photograph 19. Subject area M, associates CT1 room, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

Photograph 20. Subject area M, jury room, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

Photograph 21. Subject area M, Sherriff security room, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

Photograph 22 Subject area N, court reporter room, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

Photograph 23. Subject area N, public defender library, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

Photograph 24. Subject area N, public defender room two (2), following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

Photograph 25. Subject area N, public defender room one (1), following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

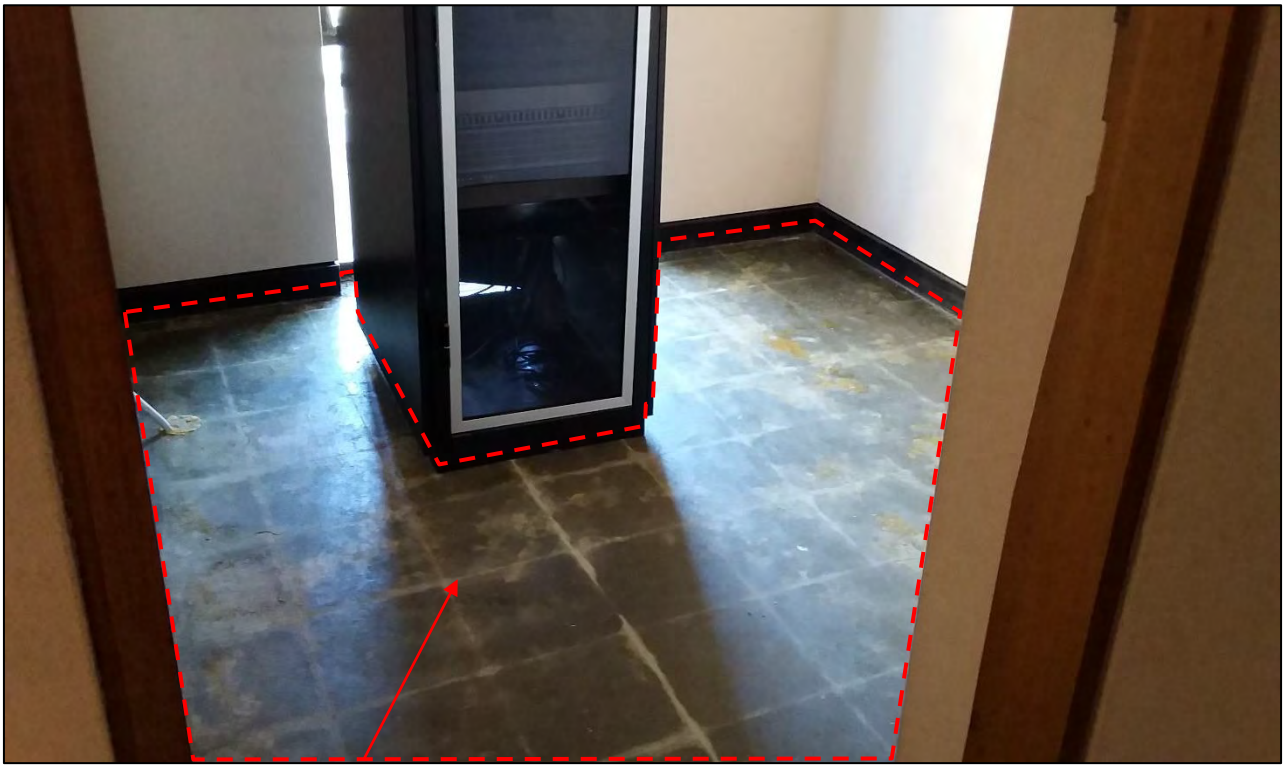
Photograph 26. Subject area O, cleaner storage room, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

Photograph 27. Subject area P, old gym store, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

Photograph 28. Subject area P, law library, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

Photograph 29. Subject area P, senior crown prosecutor room, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

Photograph 30. Subject area P, remote witness room, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.



Photograph 31. Subject area P, Comm I.T room, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

Photograph 32. Subject area P, robing room, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

Photograph 33. Subject area Q, associates room, following the removal of asbestos containing floor tiles, as observed on 18.02.2020.

Photograph 34. Subject area Q, Jury room, following the removal of asbestos containing floor tiles, as observed on 18.02.2020.

Photograph 35. Subject area Q, Legal professional room, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

Photograph 36. Subject area Q, female witness room, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

Photograph 37. Subject area Q, hallway, following the removal of asbestos containing vinyl floor tiles, as observed on 18.02.2020.

APPENDIX III – ANALYTICAL RESULTS

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.C.N. 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 29.01.2020
Reference: DRD-87-17254/ AAM1
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Courthouse, Church Street Newcastle, NSW
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
28.01.2020	Blank	-	0	-	-	-	-	-	-	-
28.01.2020	A1	1	1	2.00	2.00	2.00	0737	1622	525	<0.01
28.01.2020	A2	1	2	2.00	2.00	2.00	0741	1625	524	<0.01
28.01.2020	A3	1	3	2.00	2.00	2.00	0748	1619	511	<0.01
28.01.2020	A4	1	4	2.00	2.00	2.00	0750	1618	508	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

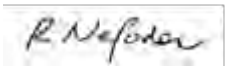
This document shall not be reproduced, except in full.

Monitoring Locations:
0 Blank
1 Newcastle Courthouse worksite, external, north east corner of site, adjacent site entry, attached to temporary fence 1.8m above ground level.
2 Newcastle Courthouse worksite, external, south west corner of site, sitting on air conditioning unit 1.6m above ground level.
3 Newcastle Courthouse worksite, internal, hallway outside of site office, sitting on table 1.2m above ground level.
4 Newcastle Courthouse worksite, internal, lunchroom, northern wall, sitting on hook, 1.8m above ground level.

Remarks:
Sample analysed as received.
The samples collection was undertaken by trained ADE Consulting Group staff.
Sydney Laboratory Services is responsible for the data.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

Signature

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.C.N. 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 30.01.2020
Reference: DRD-87-17254/ AAM2
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Courthouse, Church Street Newcastle, NSW
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
29.01.2020	Blank	-	0	-	-	-	-	-	-	-
29.01.2020	A5	1	1	2.00	2.00	2.00	0748	1654	546	<0.01
29.01.2020	A6	1	2	2.00	2.00	2.00	0751	1630	519	<0.01
29.01.2020	A7	1	3	2.00	2.00	2.00	0744	1650	546	<0.01
29.01.2020	A8	1	4	2.00	2.00	2.00	0742	1649	547	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

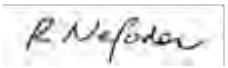
This document shall not be reproduced, except in full.

Monitoring Locations:
0 Blank
1 Newcastle Courthouse worksite, external, north east corner of site, adjacent site entry, attached to temporary fence 1.8m above ground level.
2 Newcastle Courthouse worksite, external, south west corner of site, sitting on air conditioning unit 1.6m above ground level.
3 Newcastle Courthouse worksite, internal, hallway outside of site office, sitting on table 1.2m above ground level.
4 Newcastle Courthouse worksite, internal, lunchroom, northern wall, sitting on hook, 1.8m above ground level.

Remarks:
Sample analysed as received.
The samples collection was undertaken by trained ADE Consulting Group staff.
Sydney Laboratory Services is responsible for the data.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

Signature

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 03.02.2020
Reference: DRD-87-17254/AAM3
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House(old), Church Street, Newcastle East, NSW
Sampler Name/Certificate ID: Matthew O'Connor/CON-020
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
30.01.2020	A9	1	1	2.00	2.00	2.00	0707	1714	607	<0.01
30.01.2020	A10	1	2	2.00	2.00	2.00	0712	1717	605	<0.01
30.01.2020	A11	1	3	2.00	2.00	2.00	0714	1721	601	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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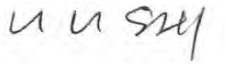
Monitoring Locations:
0 Blank
1 Old Newcastle Courthouse, northern perimeter, far western corner, attached temporary fencing, 1.5m above ground level.
2 Old Newcastle Courthouse, northern perimeter, approximately 10m east of access gate, 1.5m above ground level.
3 Old Newcastle Courthouse, northern perimeter, 3m west of access gate, 1.5m above ground level.

Remarks:
Sydney Laboratory Services is responsible for all the information in the report, except that provided by the customer. All sampling information included in the report has been provided by customer; ADE Consulting Group.
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Yue Hu

Signature

Approved Signatory:  Lili Shi

Signature

Sydney Laboratory Services

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Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 19.02.2020
Reference: DRD-87-17254/AAM16
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew O'Connor
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for EstimatingAirborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
18.02.2020	A66	1	1	2.00	2.00	2.00	0739	1525	466	<0.01
18.02.2020	A67	1	2	2.00	2.00	2.00	0705	1410	545	<0.01
18.02.2020	A68	1	3	2.00	2.00	2.00	0710	1412	542	<0.01
18.02.2020	A69	1	4	2.00	2.00	2.00	0711	1414	543	<0.01
18.02.2020	A70	1	5	2.00	2.00	2.00	0734	1513	459	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.8m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, internal, hallway adjacent office, attached to framework, 1.7m above ground level.
5 Newcastle Courthouse, external, south eastern corner, attached to boundary fence, 1.7m above ground level.

Remarks:

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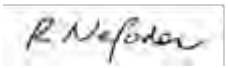
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

Signature

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Silverwater NSW Australia 2128
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A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 04.02.2020
Reference: DRD-87-17254/AAM5
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name/Certificate ID: Matthew O'Connor/CON-020
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
03.02.2020	A15	1	1	2.00	2.00	2.00	1200	1658	298	<0.01
03.02.2020	A16	1	2	2.00	2.00	2.00	1203	1701	298	<0.01
03.02.2020	A17	1	3	2.00	2.00	2.00	1206	1657	291	<0.01
03.02.2020	A18	1	4	2.00	2.00	2.00	1215	1704	289	<0.01
03.02.2020	A19	1	5	2.00	2.00	2.00	1220	1707	282	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, roof, north eastern corner, top of facade, 1.2m above ground level.
2 Newcastle Courthouse, roof, south eastern corner, top of air conditioning unit 1.8m above ground level.
3 Newcastle Courthouse, roof, north western corner, top of façade, 1.2m above ground level.
4 Newcastle Courthouse, northern perimeter, north western corner, 5m east of western perimeter attached to temporary fence, 1.5m above ground level.
5 Newcastle Courthouse, eastern perimeter, adjacent police station, attached to metal fencing, 2.0m above ground level.

Remarks:

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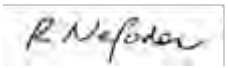
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 05.02.2020
Reference: DRD-87-17254/AAM6
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
04.02.2020	A20	1	1	2.00	2.00	2.00	0723	1607	524	<0.01
04.02.2020	A21	1	2	2.00	2.00	2.00	0728	1610	522	<0.01
04.02.2020	A22	1	3	2.00	2.00	2.00	0731	1612	521	<0.01
04.02.2020	A23	1	4	2.00	2.00	2.00	0735	1617	522	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, southern boundary, top of air conditioning unit 1.8m above ground level.

Remarks:

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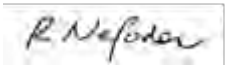
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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AIRBORNE ASBESTOS MONITORING REPORT

Date: 06.02.2020
Reference: DRD-87-17254/AAM7
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
05.02.2020	A24	1	1	2.00	2.00	2.00	0713	1611	538	<0.01
05.02.2020	A25	1	2	2.00	2.00	2.00	0715	1612	538	<0.01
05.02.2020	A26	1	3	2.00	2.00	2.00	0720	1620	540	<0.01
05.02.2020	A27	1	4	2.00	2.00	2.00	0720	1617	537	<0.01
05.02.2020	A28	1	5	2.00	2.00	2.00	0726	1608	522	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, eastern boundary, sitting on boundary fence, 1.2m above ground level.
5 Newcastle Courthouse, internal, hallway adjacent office, sitting on table, 1m above ground room.

Remarks:

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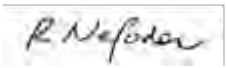
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 07.02.2020
Reference: DRD-87-17254/AAM8
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
06.02.2020	A29	1	1	2.00	2.00	2.00	0715	1635	560	<0.01
06.02.2020	A30	1	2	2.00	2.00	2.00	0711	1627	556	<0.01
06.02.2020	A31	1	3	2.00	2.00	2.00	0725	1649	564	<0.01
06.02.2020	A32	1	4	2.00	2.00	2.00	0726	1649	563	<0.01
06.02.2020	A33	1	5	2.00	2.00	2.00	0717	1636	559	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, eastern boundary, sitting on boundary fence, 1.2m above ground level.
5 Newcastle Courthouse, internal, hallway adjacent office, sitting on table, 1m above ground room.

Remarks:

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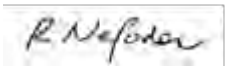
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 12.02.2020
Reference: DRD-87-17254/AAM9
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
07.02.2020	A34	1	1	2.00	2.00	2.00	0729	1630	541	<0.01
07.02.2020	A35	1	2	2.00	2.00	2.00	0732	1630	538	<0.01
07.02.2020	A36	1	3	2.00	2.00	2.00	0732	1630	538	<0.01
07.02.2020	A37	1	4	2.00	2.00	2.00	0723	1630	547	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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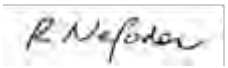
Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, eastern boundary, sitting on boundary fence, 1.2m above ground level.
4 Newcastle Courthouse, internal, hallway adjacent office, sitting on table, 1m above ground room.

Remarks:

Sydney Laboratory Services is responsible for all the information in the report, except that provided by the customer. All sampling information included in the report has been provided by customer; ADE Consulting Group.
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 12.02.2020
Reference: DRD-87-17254/AAM10
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
10.02.2020	A38	1	1	2.00	2.00	2.00	0723	1640	557	<0.01
10.02.2020	A39	1	2	2.00	2.00	2.00	0725	1638	553	<0.01
10.02.2020	A40	1	3	2.00	2.00	2.00	0727	1646	559	<0.01
10.02.2020	A41	1	4	2.00	2.00	2.00	0729	1646	557	<0.01
10.02.2020	A42	1	5	2.00	2.00	2.00	0721	1642	561	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, eastern boundary, sitting on boundary fence, 1.2m above ground level.
5 Newcastle Courthouse, internal, hallway adjacent office, sitting on table, 1m above ground room.

Remarks:

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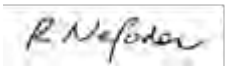
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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Phone: (02) 9648 6669

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AIRBORNE ASBESTOS MONITORING REPORT

Date: 12.02.2020
Reference: DRD-87-17254/AAM11
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
11.02.2020	A43	1	1	2.00	2.00	2.00	0729	1627	538	<0.01
11.02.2020	A44	1	2	2.00	2.00	2.00	0730	1625	535	<0.01
11.02.2020	A45	1	3	2.00	2.00	2.00	0733	1631	538	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.

Remarks:

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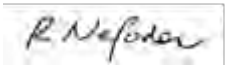
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 18.02.2020
Reference: DRD-87-17254/AAM12
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House(old), Church Street, Newcastle East, NSW
Sampler Name/Certificate ID: Matthew O'Connor/CON-020
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
12.02.2020	A46	1	1	2.00	2.00	2.00	0724	1625	541	N/A*
12.02.2020	A47	1	2	2.00	2.00	2.00	0726	1623	537	N/A*
12.02.2020	A48	1	3	2.00	2.00	2.00	0730	1631	541	N/A*
12.02.2020	A49	1	4	2.00	2.00	2.00	0731	1636	545	<0.01
12.02.2020	A50	1	5	2.00	2.00	2.00	0720	1628	548	N/A*

*Air filter overloaded with dust.

Sample Type:

1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

This document shall not be reproduced, except in full.

Monitoring Locations:

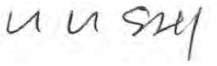
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, eastern boundary, sitting on boundary fence, 1.2m above ground level.
5 Newcastle Courthouse, internal, hallway adjacent office, sitting on table, 1m above ground room.

Remarks:

Sydney Laboratory Services is responsible for all the information in the report, except that provided by the customer. All sampling information included in the report has been provided by customer; ADE Consulting Group.
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Yue Hu

Signature

Approved Signatory:  Lili Shi

Signature

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 18.02.2020
Reference: DRD-87-17254/AAM13
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House(old), Church Street, Newcastle East, NSW
Sampler Name/Certificate ID: Matthew O'Connor/CON-020
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	
13.02.2020	A51	1	1	2.00	2.00	2.00	0732	1624	532	<0.01
13.02.2020	A52	1	2	2.00	2.00	2.00	0734	1621	527	<0.01
13.02.2020	A53	1	3	2.00	2.00	2.00	0736	1631	535	<0.01
13.02.2020	A54	1	4	2.00	2.00	2.00	0738	1633	535	<0.01
13.02.2020	A55	1	5	2.00	2.00	2.00	0728	1628	540	N/A*

*Air filter overloaded with dust.

Sample Type:

1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

This document shall not be reproduced, except in full.

Monitoring Locations:

0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, eastern boundary, sitting on boundary fence, 1.2m above ground level.
5 Newcastle Courthouse, internal, hallway adjacent office, sitting on table, 1m above ground room.

Remarks:

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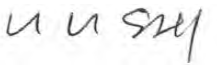
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Yue Hu

Signature

Approved Signatory:  Lili Shi

Signature

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 18.02.2020
Reference: DRD-87-17254/AAM14
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
14.02.2020	A56	1	1	2.00	2.00	2.00	0728	1625	537	<0.01
14.02.2020	A57	1	2	2.00	2.00	2.00	0729	1622	533	<0.01
14.02.2020	A58	1	3	2.00	2.00	2.00	0736	1630	534	<0.01
14.02.2020	A59	1	4	2.00	2.00	2.00	0738	1632	534	<0.01
14.02.2020	A60	1	5	2.00	2.00	2.00	0732	1627	535	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

This document shall not be reproduced, except in full.

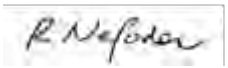
Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, south eastern corner, attached to boundary fence, 1.7m above ground level.
5 Newcastle Courthouse, internal, hallway adjacent office, attached to framework, 1.7m above ground level.

Remarks:

Sydney Laboratory Services is responsible for all the information in the report, except that provided by the customer. All sampling information included in the report has been provided by customer; ADE Consulting Group.
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

Signature

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 18.02.2020
Reference: DRD-87-17254/AAM15
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for EstimatingAirborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
17.02.2020	A56	1	1	2.00	2.00	2.00	0727	1630	543	<0.01
17.02.2020	A57	1	2	2.00	2.00	2.00	0735	1628	533	<0.01
17.02.2020	A58	1	3	2.00	2.00	2.00	0733	1644	551	<0.01
17.02.2020	A59	1	4	2.00	2.00	2.00	0732	1643	551	<0.01
17.02.2020	A60	1	5	2.00	2.00	2.00	0725	1634	549	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

This document shall not be reproduced, except in full.

Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, south eastern corner, attached to boundary fence, 1.7m above ground level.
5 Newcastle Courthouse, internal, hallway adjacent office, attached to framework, 1.7m above ground level.

Remarks:

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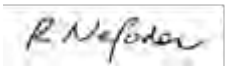
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

Signature

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 19.02.2020
Reference: DRD-87-17254/AAM16
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew O'Connor
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for EstimatingAirborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
18.02.2020	A66	1	1	2.00	2.00	2.00	0739	1525	466	<0.01
18.02.2020	A67	1	2	2.00	2.00	2.00	0705	1410	545	<0.01
18.02.2020	A68	1	3	2.00	2.00	2.00	0710	1412	542	<0.01
18.02.2020	A69	1	4	2.00	2.00	2.00	0711	1414	543	<0.01
18.02.2020	A70	1	5	2.00	2.00	2.00	0734	1513	459	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

This document shall not be reproduced, except in full.

Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.8m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, internal, hallway adjacent office, attached to framework, 1.7m above ground level.
5 Newcastle Courthouse, external, south eastern corner, attached to boundary fence, 1.7m above ground level.

Remarks:

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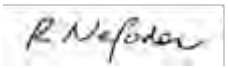
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

Signature

APPENDIX IV – SUPPORTING DOCUMENTS

ADECONSULTINGGROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006133

Onsite Visual Asbestos Clearance Certificate

Job Number: DRD-87-17254 **Date:** 13/2/2020

Client / Contractor: Drumderg services

Client Contact: Mark Bishop **Client Contact Number:**

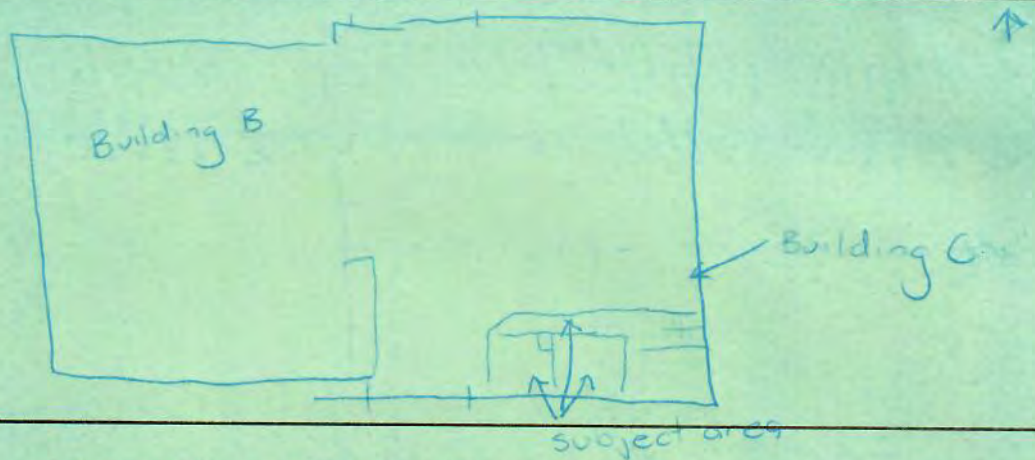
Address / Location: Newcastle courthouse, church street, East Newcastle

Subject Area: Internal Building C, level 1, North west corner, Floor of OOCS and record rooms and hallways, former location of asbestos containing floor tiles

Scope of removal works: Removal of ~~vinyl~~ asbestos containing vinyl floor tiles from the subject area

Inspection details: Visual inspection of the subject area showed no signs of the asbestos containg vinyl floor tiles

Drawing / Map



Limitations on visual clearance / areas not accessible / notes:

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew Deegan **Name:** Mark Bishop

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADE CONSULTING GROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006135

Onsite Visual Asbestos Clearance Certificate

Job Number: DRD-87-17245 **Date:** 13.02.20

Client / Contractor: Drumderg services

Client Contact: Mark Bishop **Client Contact Number:**

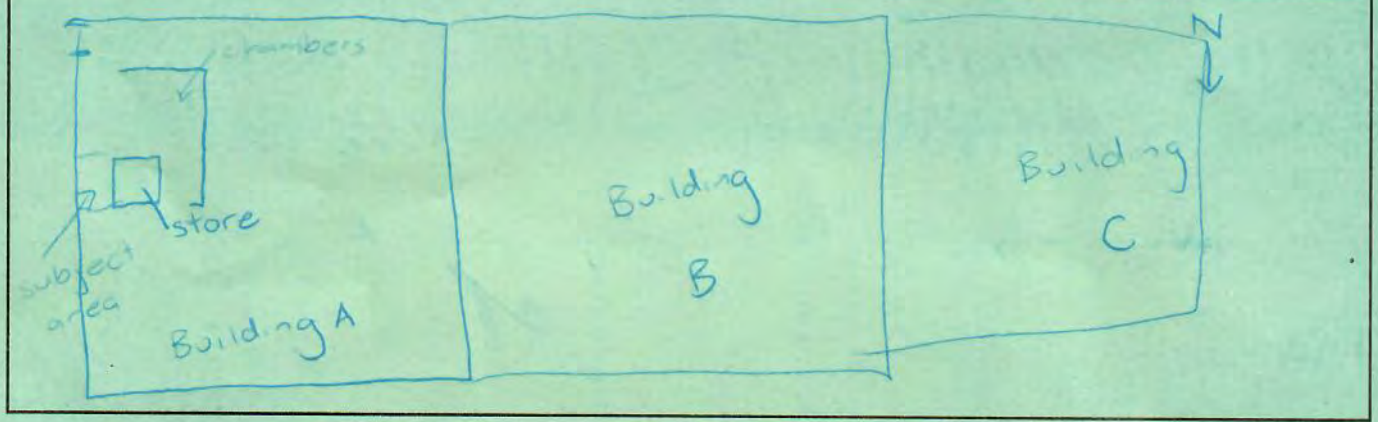
Address / Location: Newcastle courthouse, church street, Newcastle

Subject Area: Internal, Building A, level 1, toilet adjacent Eastern wall of chambers, walls, asbestos containing fibre cement wall sheeting

Scope of removal works: Removal of fibre cement sheeting from subject area.

Inspection details: Visual inspection of the subject area showed no visible signs of asbestos containing fibre cement sheeting

Drawing / Map



Limitations on visual clearance / areas not accessible / notes:

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew Deegan **Name:** Mark Bishop

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADE CONSULTING GROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006134

Onsite Visual Asbestos Clearance Certificate

Job Number: DRD-87-17254 **Date:** 13.2.20

Client / Contractor: Drumdery services

Client Contact: Mark bishop **Client Contact Number:**

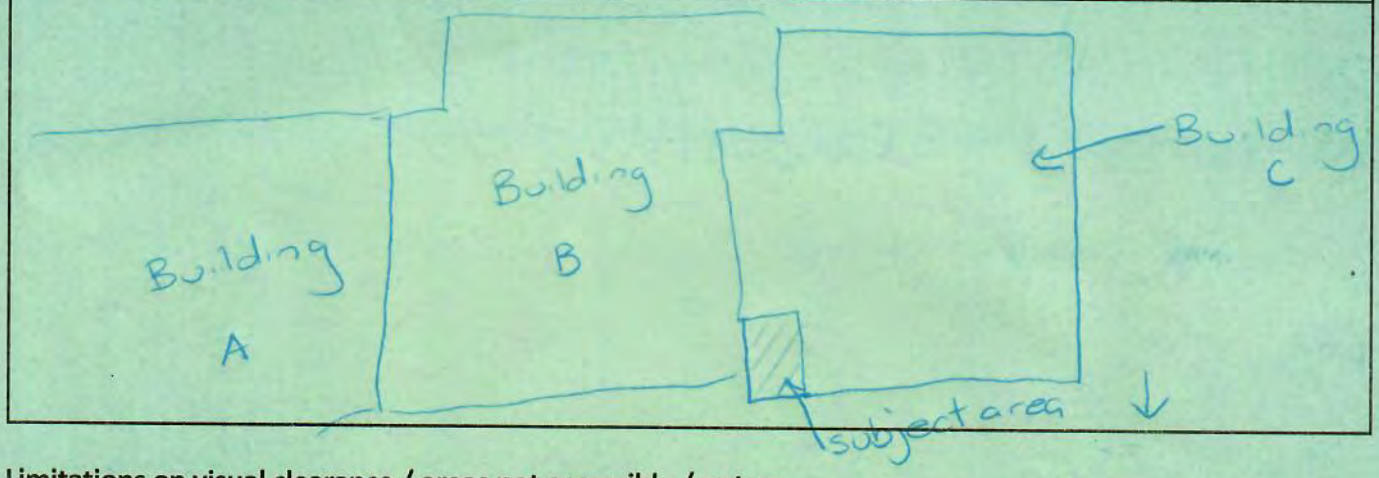
Address / Location: Newcastle courthouse, church street, East Newcastle

Subject Area: Internal Building B, level 1, North west corner, Officers amenities, floor, asbestos containing vinyle tiles

Scope of removal works: Removal of asbestos containing vinyl floor tiles from within the subject area

Inspection details: Visual inspection of the subject area showed no signs of the asbestos containing vinyl floor tiles

Drawing / Map



Limitations on visual clearance / areas not accessible / notes:

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew Deegan **Name:** Mark Bishop

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADE CONSULTING GROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006136

Onsite Visual Asbestos Clearance Certificate

Job Number: DBD-87-17254 **Date:** 14.2.20

Client / Contractor: Drumderg services

Client Contact: Mark Bishop **Client Contact Number:**

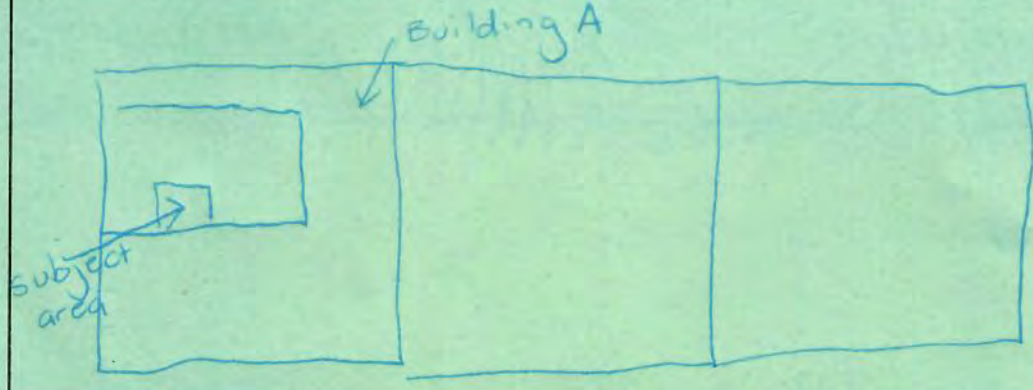
Address / Location: Newcastle Courthouse, Church Street East Newcastle

Subject Area: Internal, Building A, Level 1, southern store room, floor, former location of orange asbestos containing tiles

Scope of removal works: Removal of asbestos containing vinyl floor tiles from within the subject area

Inspection details: Visual inspection of the subject area showed no visible signs of the asbestos containing vinyl tiles

Drawing / Map



Limitations on visual clearance / areas not accessible / notes: Areas outside of the subject area may contain asbestos

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew Deegan **Name:** Mark Bishop

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADE CONSULTING GROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006128

Onsite Visual Asbestos Clearance Certificate

Job Number: DRD-87-17254 **Date:** 29/1/20

Client / Contractor: Drumderg services

Client Contact: Mark Bishop **Client Contact Number:**

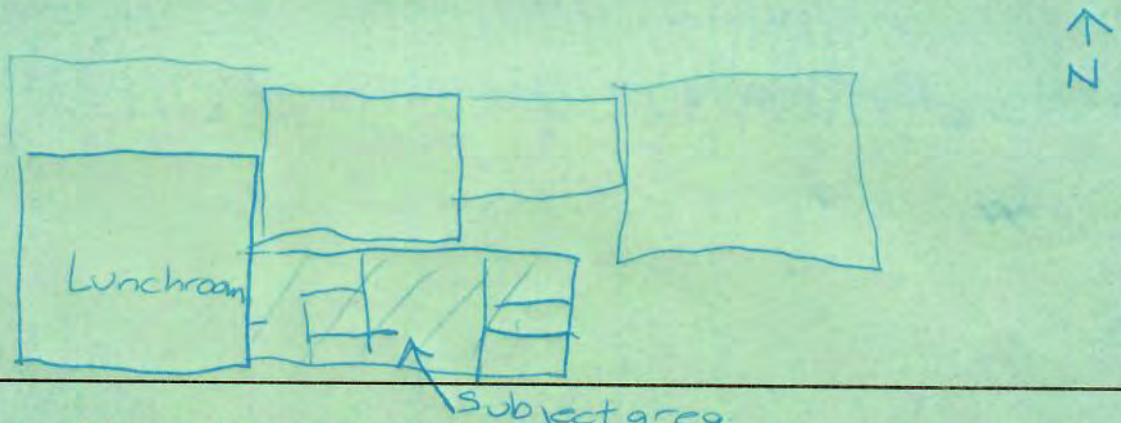
Address / Location: Cnr Newcastle courthouse, church st Newcastle

Subject Area: Newcastle courthouse, ground floor, interior male toilet fibre cement sheeting, walls and ceiling

Scope of removal works: Removal of asbestos containing fibre cement sheeting

Inspection details: Visual inspection of the subject area showed no signs of the former asbestos containing sheeting

Drawing / Map



Limitations on visual clearance / areas not accessible / notes: Visual inspection is limited to the subject area. Areas outside may contain asbestos

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew Deegan **Name:** Steve Kluis

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADECONSULTINGGROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006027

Onsite Visual Asbestos Clearance Certificate

Job Number: NRO-87-17254 **Date:** 13.02.19

Client / Contractor: Boundary Services.

Client Contact: Mark Bishop. **Client Contact Number:**

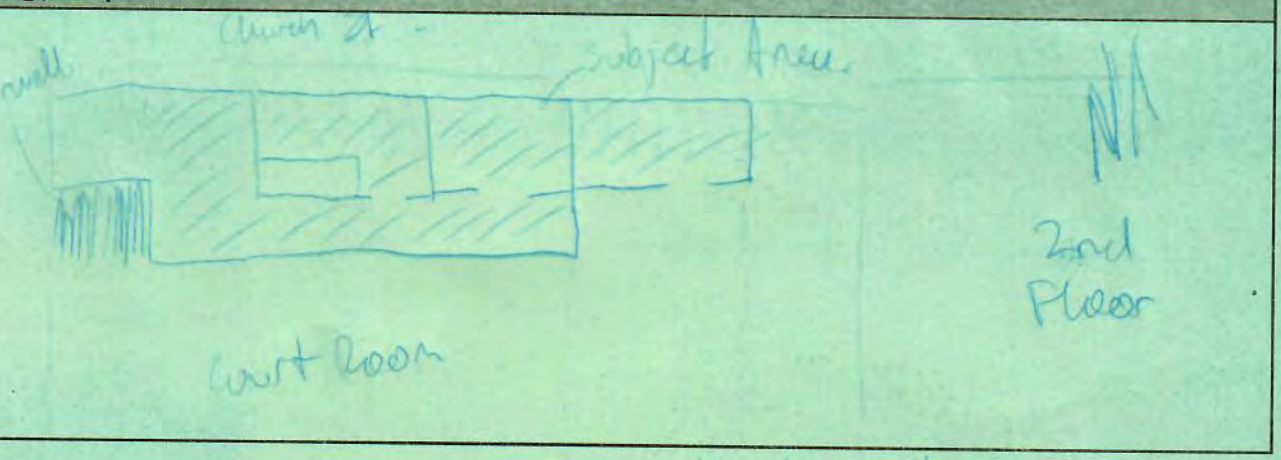
Address / Location: Old Newcastle Courthouse - Church St Newcastle NSW.

Subject Area: 2nd Floor interior northern side public defenders rooms and library + kitchenette top & floor (Building)

Scope of removal works: Removal of bonded ~~asbestos~~ containing vinyl tile from floor surface

Inspection details: Visual inspection revealed that the asbestos containing vinyl tile had been removed to a satisfactory standard.

Drawing / Map



Limitations on visual clearance / areas not accessible / notes: Visual inspection limited to floor surface of subject areas only. Areas adjacent to / below have not been inspected and are outside the scope of this clearance inspection.

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew O'Connor **Name:** MARK BISHOP

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADE CONSULTING GROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006027

Onsite Visual Asbestos Clearance Certificate

Job Number: DRO-87-17254 **Date:** 13.02.19

Client / Contractor: Dunlop Services.

Client Contact: Mark Bishop. **Client Contact Number:**

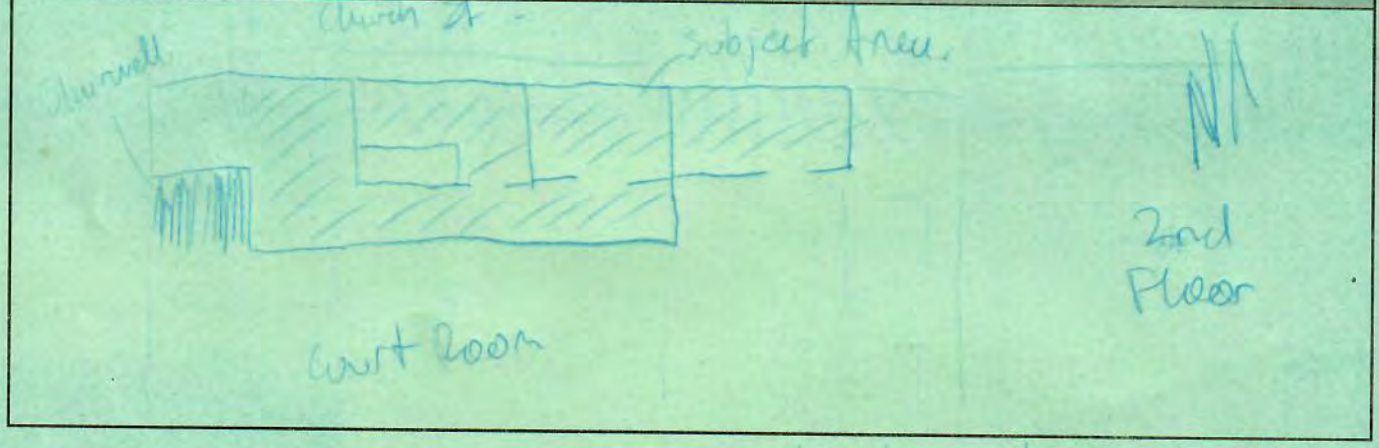
Address / Location: Old Newcastle Courthouse - Church St Newcastle NSW.

Subject Area: 2nd Floor interior northern side public defenders rooms and library + kitchenette top & floor (Building)

Scope of removal works: Removal of bonded ~~asbestos~~ containing vinyl tile from floor surface

Inspection details: Visual inspection revealed that the asbestos containing vinyl tile had been removed to a satisfactory standard

Drawing / Map



Limitations on visual clearance / areas not accessible / notes: Visual inspection limited to floor surface of subject areas only. Areas adjacent to / below have not been inspected and are outside the scope of this clearance inspection.

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew O'Connor **Name:** MARK BISHOP

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADECONSULTINGGROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006026

Onsite Visual Asbestos Clearance Certificate

Job Number: PRD-37-17254 **Date:** 18.02.14

Client / Contractor: Boundary Services

Client Contact: Mark Bishop. **Client Contact Number:**

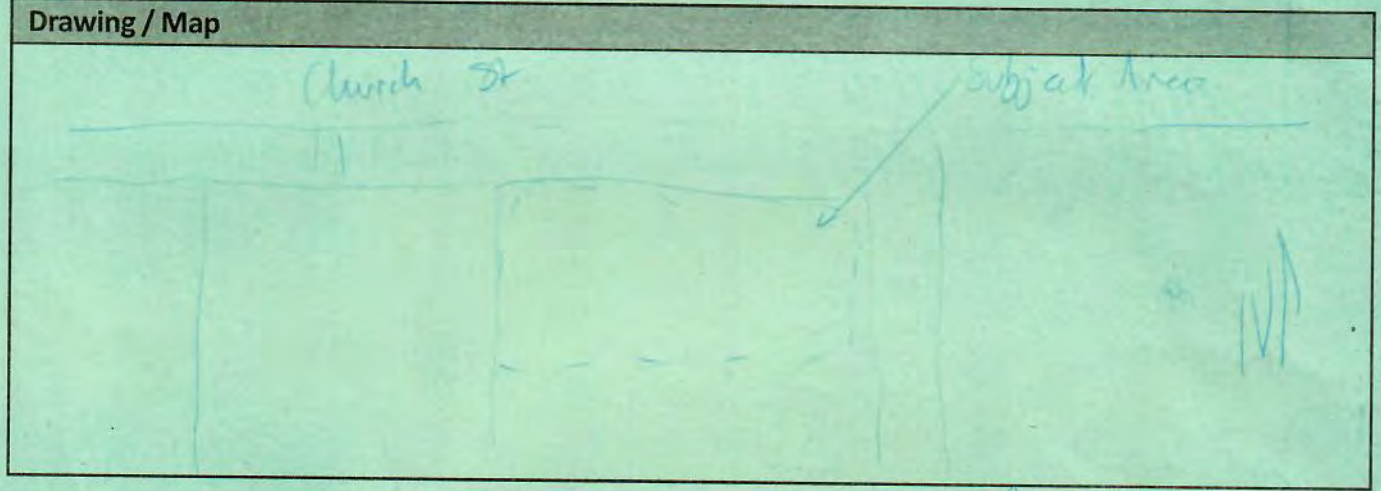
Address / Location: Old Newcastle Courthouse - Church St, Newcastle NSW.

Subject Area: Building A rooftop, southern section, roof surface exposed concrete approx 60m²

Scope of removal works: Removal of ACM ~~flashing~~ membrane material from roof surface and loose soil + pointing.

Inspection details: Inspector revealed the ACM had been removed to a satisfactory standard. Associated soils removed as well.

Drawing / Map



Limitations on visual clearance / areas not accessible / notes: Inspection limited to concrete surface of the subject area only. Areas adjacent to / below have not been inspected and are outside the scope of this inspection

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew O'Connor **Name:** Mark Bishop

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADECONSULTINGGROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006130

Onsite Visual Asbestos Clearance Certificate

Job Number: DRD-87-17254 **Date:** 11/2/20

Client / Contractor: Drumderg services

Client Contact: Mark Bishop **Client Contact Number:**

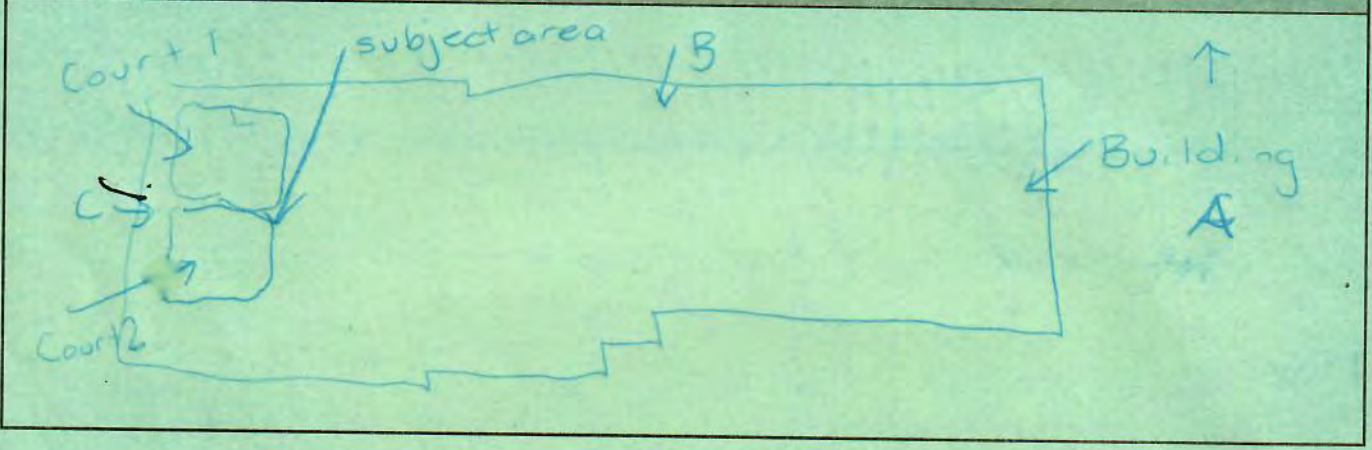
Address / Location: Newcastle courthouse, Church street, East Newcastle

Subject Area: Internal, building C, se level 2 and level 3, services shaft outse court 1 and court 2, wall and ceiling lining former location of asbestos fibre cement sheeting

Scope of removal works: Removal of asbestos containing fibre cement sheeting from the subject area

Inspection details: Visual inspection of the subject area showed no signs of the former asbestos containing fibre cement sheeting

Drawing / Map



Limitations on visual clearance / areas not accessible / notes: Visual inspection is limited to the subject area. Areas outside may contain asbestos

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Mathew Deegan **Name:** Mark Bishop

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADECONSULTINGGROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006131

Onsite Visual Asbestos Clearance Certificate

Job Number: DBD-87-17254 **Date:** 11-02-20

Client / Contractor: Drumderg services

Client Contact: Mark Bishop **Client Contact Number:**

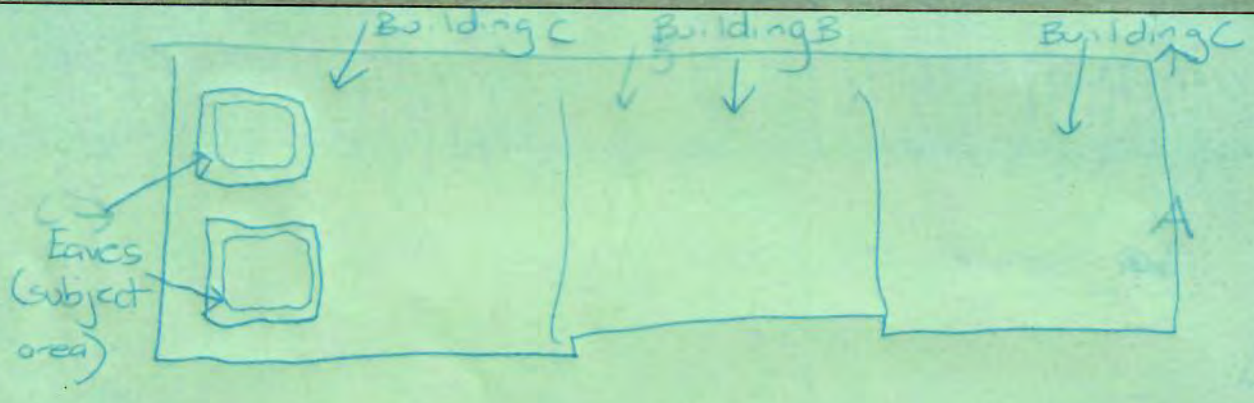
Address / Location: Newcastle courthouse, church street, East Newcastle

Subject Area: External building C, rooftop, courtroom 1 and 2 structures, eaves, former location of asbestos cement sheeting

Scope of removal works: removal of asbestos containing sheeting from within the subject area

Inspection details: visual inspection of the subject area showed no signs of the asbestos containing sheeting

Drawing / Map



Limitations on visual clearance / areas not accessible / notes: visual inspection is limited to the subject area. Areas outside may contain asbestos

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew Deegan **Name:** Mark Bishop

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADE CONSULTING GROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006129

Onsite Visual Asbestos Clearance Certificate

Job Number: DRD-87-17254 **Date:** 7/2/20

Client / Contractor: Drumderg services

Client Contact: Mark Bishop **Client Contact Number:**

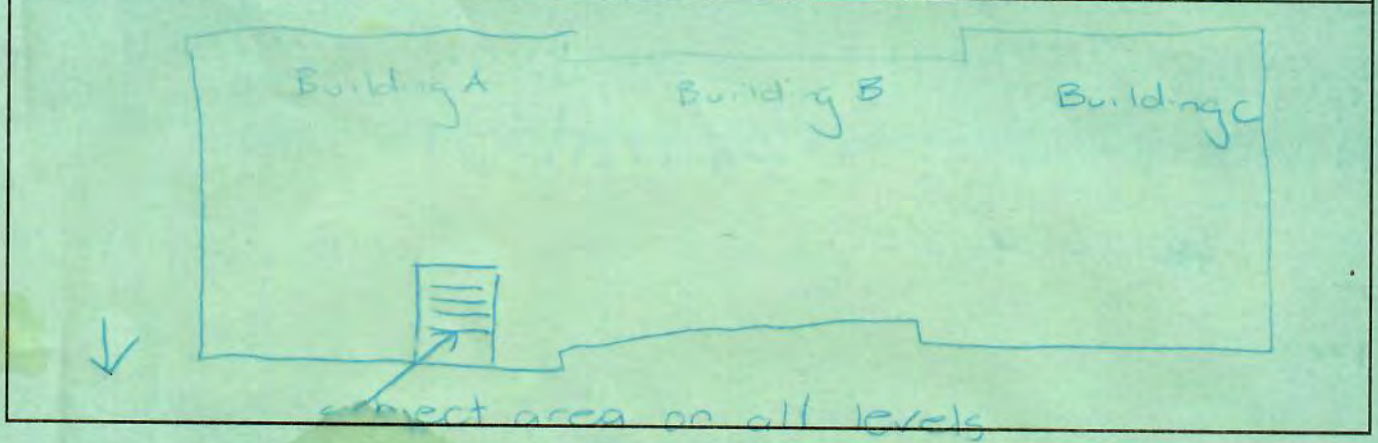
Address / Location: Newcastle courthouse, church street, Newcastle

Subject Area: Newcastle courthouse, internal, building A, Northern stairs landings on all levels former location of asbestos containing tiles

Scope of removal works: Removal of vinyl floor tiles deemed to contain asbestos

Inspection details: Visual inspection of the subject area showed no signs of the former asbestos containing vfloor tiles

Drawing / Map



Limitations on visual clearance / areas not accessible / notes: Visual inspection is limited to the subject areas outside may contain asbestos

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew Deegan **Name:** Mark Bishop

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADE CONSULTING GROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006030

Onsite Visual Asbestos Clearance Certificate

Job Number: DRA-87-17254 **Date:** 18.02.20

Client / Contractor: Boundary Services

Client Contact: Mark Bishop **Client Contact Number:**

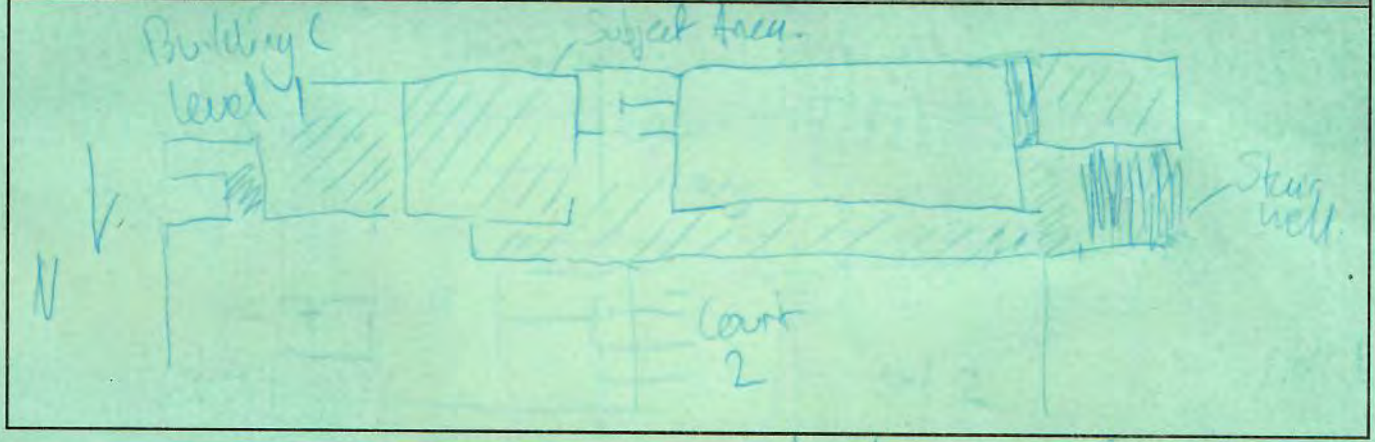
Address / Location: Old Newcastle Courthouse - Church St, Newcastle East NSW.

Subject Area: Building C, level 1, southern section throughout, floor surface.

Scope of removal works: Removal of bonded asbestos fibre vinyl tile from floor surface.

Inspection details: Inspection revealed that the bonded asbestos vinyl tile had been removed to a satisfactory standard.

Drawing / Map



Limitations on visual clearance / areas not accessible / notes: Visual inspection limited to floor surface only. areas adjacent to/below have not been inspected and are outside the scope of this clearance.

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew O'Connor **Name:** Steven Fleming

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADECONSULTINGGROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006029

Onsite Visual Asbestos Clearance Certificate

Job Number: D12D-82-17254 **Date:** 18-02-2020

Client / Contractor: Dowdery Services

Client Contact: Mark Bishop **Client Contact Number:**

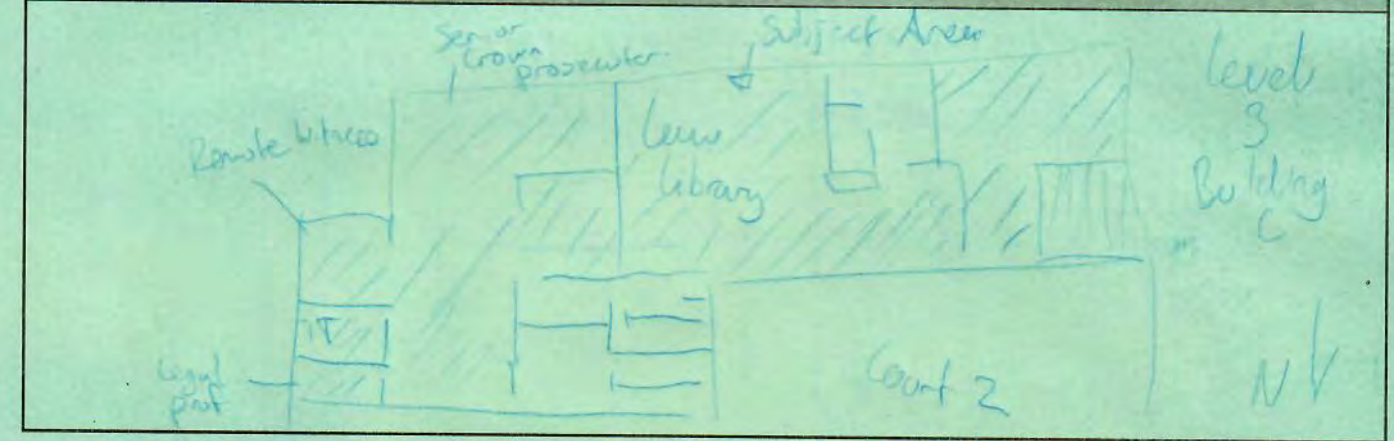
Address / Location: Old Newcastle Courthouse - Church St, Newcastle NSW

Subject Area: Building C, level 3, southern section throughout, floor surface.

Scope of removal works: Removal of bonded asbestos fibre cement vinyl tile.

Inspection details: Inspection revealed the subject area had been cleared of ACM to a satisfactory standard

Drawing / Map



Limitations on visual clearance / areas not accessible / notes: Visual inspection limited to floor surface of subject area only. areas adjacent to/below have not been inspected and are outside the scope of this clearance.

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew O'Connor **Name:** Steven Fox

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADE CONSULTING GROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006031

Onsite Visual Asbestos Clearance Certificate

Job Number: DRD-37-7254 **Date:** 18.02.20

Client / Contractor: Boundary Services

Client Contact: Mark Bishop. **Client Contact Number:**

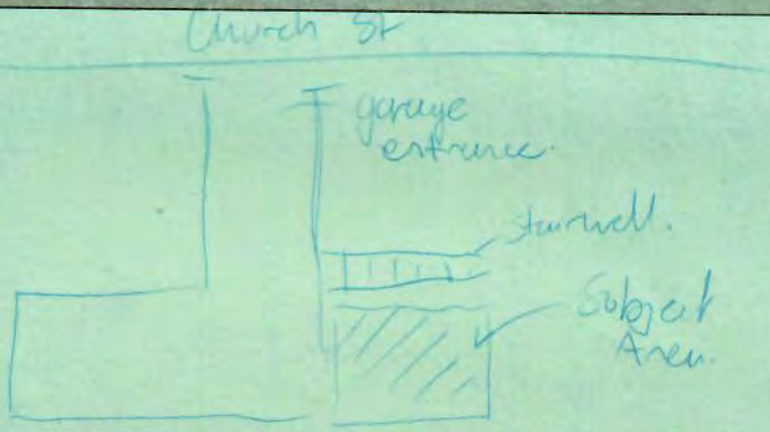
Address / Location: Old Newcastle Courthouse - Church Street, Newcastle NSW

Subject Area: Basement level cleaners room top of floor

Scope of removal works: Removal of bonded asbestos vinyl tile from subject area.

Inspection details: Visual inspection revealed the bonded asbestos vinyl tile had been removed to a satisfactory standard

Drawing / Map



Limitations on visual clearance / areas not accessible / notes: Visual inspection limited to floor of subject area only. Areas adjacent to / below have not been inspected and are outside the scope of this clearance.

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew Connor **Name:** Steven Fu

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADE CONSULTING GROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006137

Onsite Visual Asbestos Clearance Certificate

Job Number: DRD-87-17254 **Date:** 13.2.20

Client / Contractor: Drumdery services

Client Contact: Mark Bishop **Client Contact Number:**

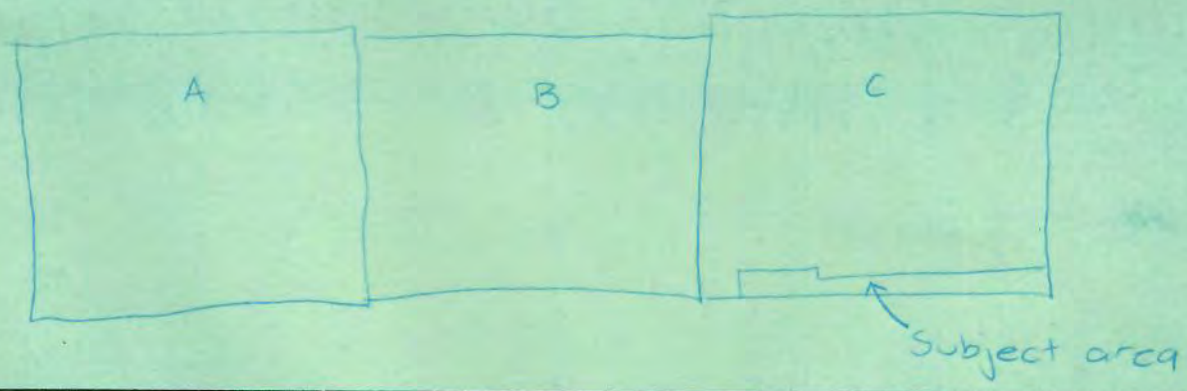
Address / Location: Newcastle Courthouse Church street East Newcastle

Subject Area: External, building C, level 1, Northern eaves former location of asbestos containing fibre cement

Scope of removal works: Removal of asbestos containing fibre cement from the subject area

Inspection details: Visual inspection of the subject area showed no signs of the asbestos containing fibre cement

Drawing / Map



Limitations on visual clearance / areas not accessible / notes: Areas outside of the subject area of the may contain asbestos

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew Deegan **Name:** Mark Bishop

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADE CONSULTING GROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006132

Onsite Visual Asbestos Clearance Certificate

Job Number: DRD-87-17254 **Date:** 13.02.2020

Client / Contractor: Drumderg services

Client Contact: Mark bishop **Client Contact Number:**

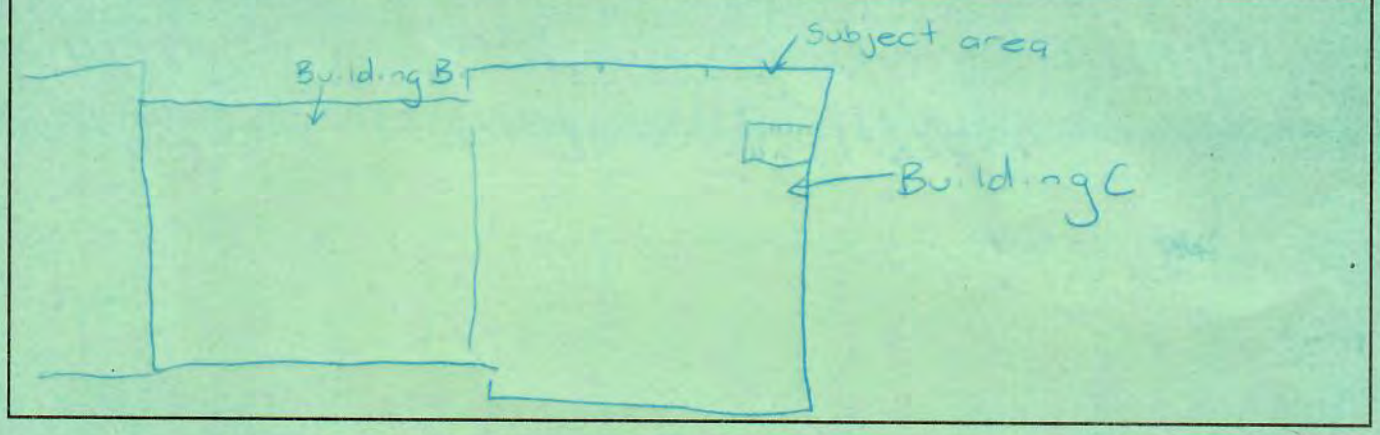
Address / Location: Newcastle courthouse, Church street, East Newcastle

Subject Area: Internal, Building C, Level 2, South west corner, Car Park, former location of asbestos containing infill panels

Scope of removal works: Removal of fibre cement infill panels

Inspection details: Visual inspection of the subject area showed no signs of the asbestos containing sheeting

Drawing / Map



Limitations on visual clearance / areas not accessible / notes: Visual inspection is limited to the subject area. Areas outside may contain asbestos

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew Deegan **Name:** Mark Bishop

Signature: **Signature:**

ADE REPRESENTATIVE CLIENT REPRESENTATIVE

ADE CONSULTING GROUP
SOLUTIONS THROUGH INNOVATION

Docket Number:
CLR 0006022

Onsite Visual Asbestos Clearance Certificate

Job Number: D20-02-17254 **Date:** 03.02.20

Client / Contractor: Laundry Services

Client Contact: Mark Bishop **Client Contact Number:** 0440 363 309

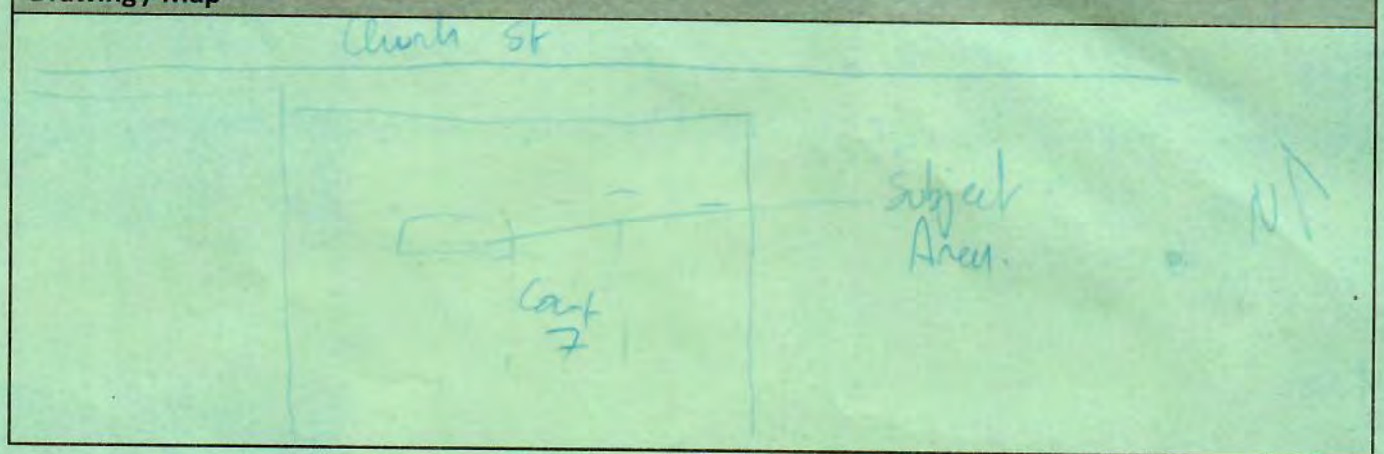
Address / Location: Old Newcastle Courthouse - Church Street Newcastle East NSW

Subject Area: Ground floor Block C bathroom adjacent courtroom 7 metal supports (walls only)

Scope of removal works: Removal of bonded ACM walls.

Inspection details: Inspection revealed the bonded ACM had been removed to a satisfactory standard.

Drawing / Map



Limitations on visual clearance / areas not accessible / notes: Visual inspection limited to surface of the metal supports identified within the subject area. Areas adjacent to the subject area have not been inspected and are outside the scope of this clearance.

Upon visual inspection of the subject area and surrounds, the asbestos containing materials have been (please circle) removed/encapsulated/sealed/made safe to a satisfactory standard. The subject area may be reoccupied safely, subject to the limitations and/or notes listed above.

Name: Matthew O'Connor **Name:** Stan Fan

Signature: **Signature:**

ADE REPRESENTATIVE

CLIENT REPRESENTATIVE

Asbestos Materials Clearance Report

9 Church Street, Newcastle NSW

Prepared for: Drumderg Services Pty Ltd

DRD-87-17407 / CLR1
v1 final
24th March 2020

ADE CONSULTING GROUP

Asbestos Materials Clearance Report

Prepared for:

Drumderg Services Pty Ltd

9 Church Street, Newcastle NSW

Version	Details	Date
v1 final	Written by Matthew Deegan	Tuesday 24th March 2020

Report No: DRD-87-17407 / CLR1 / v1 final

Date: Tuesday, 24th March 2020

Written By:

Matthew Deegan
Occupational Hygienist
B. Sci. (Biotechnology)
LAA number LAA001328

Reviewed By:

Cameron Mitchell
Project Manager
LAA number LAA001292

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ASBESTOS MATERIALS CLEARANCE REPORT

ADE Report No. DRD-87-17407 / CLR1 / v1 final

Date of Report:	24.03.2020
Date of Inspection:	13.02.2020
Project Address:	9 Church Street, Newcastle NSW
Removal Contractor:	Drumderg Services Pty Ltd
Client:	Drumderg Services Pty Ltd
Subject of Works:	Removal of asbestos containing fire doors.
Subject Area:	Internal, former location of fire doors throughout building A including PABX room, court chambers, store room, plant room, public space, boiler equipment room and access to all stairwells.

1. INTRODUCTION AND BACKGROUND

1.1 General

ADE Consulting Group Pty Ltd (ADE) was commissioned by Drumderg Services Pty Ltd (hereafter referred to as 'the client') to undertake an Asbestos Materials Clearance Inspection of the subject areas located at 9 Church Street, Newcastle NSW (refer to *Appendix I – Aerial Photograph*).

The visual inspection following the removal works within the subject area was carried out on the 13th February 2020 by SafeWork NSW Licensed Asbestos Assessor Matthew Deegan (LAA001328) representing ADE. This report represents the results of the inspection.

1.2 Scope

The scope of work involved the following:

- Completion of a Safety, Health & Environment Work Method Statement (SH&EWMS) prior to undertaking works;
- Visual inspection of the subject areas following removal works;
- Airborne asbestos monitoring during removal works;
- Analysis of samples by a National Association of Testing Authorities (NATA) accredited laboratory; and
- Preparation of an Asbestos Materials Clearance Inspection report outlining the site data and conclusions.

1.3 Legislative Requirements

The survey works, and production of this report have been undertaken in accordance with the requirements of:

- NSW Government. (2017). *Work Health and Safety Regulation 2017*;
- NSW Government. (2011). *Work Health and Safety Act 2011*;
- Safe Work Australia. (2019). *NSW Code of Practice: How to Manage and Control Asbestos in the Workplace;* and
- Safe Work Australia. (2019). *NSW Code of Practice: How to Safely Remove Asbestos.*

1.4 Whole Report

No one section or part of a section, of this report should be taken as giving an overall idea of this report. Each section must be read in conjunction with the whole of this report, including its appendices and attachments.

2. SITE INSPECTION DETAILS

2.1 Visual Inspection and Sampling

Visual inspection of the subject areas following the removal works revealed that the asbestos containing fire doors had been removed to a satisfactory standard.

The subject areas contained no visible Asbestos containing materials following the completion of the removal works.

Airborne asbestos monitoring undertaken during the removal works revealed that the concentration of airborne fibres was below the detection limit of 0.01 fibres / mL (refer to *Appendix III – Analytical Results;* ADE Report No. DRD-87-17254 / AAM1-AAM13).

2.2 Restrictions / Limitations

Please note that this inspection is limited to the specified subject areas stated within this report. Areas adjacent have not been inspected and are outside the scope of this report. Fire doors located between building A and building B are still intact and were not included in the inspection.

3. CONCLUSIONS

Based on the information presented in this report, it is the opinion of ADE that:

- Visual inspection of the subject areas following the removal works revealed that the asbestos containing fire doors had been removed to a satisfactory standard;
- At the time of inspection, the subject areas were considered **safe** regarding the asbestos hazard;
- Airborne asbestos monitoring undertaken during the removal works revealed that the concentration of airborne fibres was below the detection limit of the method;
- The site-specific asbestos register should be updated to document the ACM removed and reference this Asbestos Materials Clearance Inspection Report; and
- Please remain diligent and adhere to the restrictions within the body of this report and the limitations stated below.

4. LIMITATIONS

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only and has been based on information provided by the client. The advice herein relates only to this project and all results, conclusions and recommendations made should be reviewed by a competent and experienced person with experience in environmental investigations, before being used for any other purpose. ADE Consulting Group Pty Ltd (ADE) accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced or amended in any way without prior approval by the client or ADE and should not be relied upon by any other party, who should make their own independent enquiries.

This report does not provide a complete assessment of the environmental status of the site and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, ADE reserves the right to review the report in the context of the additional information.

ADE's professional opinions are based upon its professional judgment, experience, training and results from analytical data. In some cases, further testing and analysis may be required, thus producing different results and / or opinions. ADE has limited investigation to the scope agreed upon with its client.

ADE has used a degree of care and skill ordinarily exercised in similar investigations by reputable member of the Environmental Industry within Australia. No other warranty, expressed or implied, is made or intended.

APPENDIX I – AERIAL PHOTOGRAPH

revision	no.	description	drawn	approved	date
	A	FIRST ISSUE	MC	cm	12/11/19

0 6 12 18 24 30
SCALE 1:600 @A3 METRES

drawn	MC
approved	CM
date	18/02/19
scale	AS SHOWN
original size	A3

client: DRUMDERG SERVICE PTY LTD

project: NEWCASTLE COURTHOUSE
CHURCH STREET, NEWCASTLE, NSW

title: SITE LOCATION AND SITE LAYOUT PLAN

project no: DRD-87-17407 | figure no: FIGURE 1 | rev: A

ADE CONSULTING GROUP
Sydney Office
ADE Consulting Group Pty Ltd
Unit 6 / 7 Millennium Court, Silverwater, NSW 2128
www.ADE.group | info@ade.group | 1300 976 922

PLOT DATE: 12/11/2019 1:15:36 PM DWG FILE: W:\DRD - DRUMDERG SERVICES\DRD-82-16979 INS CHURCH STREET - NEWCASTLE 07.11.2019 CM\CAD\DRD-82-16979.DWG

APPENDIX II – PHOTOGRAPHS

Photograph 1. Representative photograph, subject area Building A, level one (1), chambers, former location of asbestos containing fire door 13.02.2020.

APPENDIX III – ANALYTICAL RESULTS

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.C.N. 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 29.01.2020
Reference: DRD-87-17254/ AAM1
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Courthouse, Church Street Newcastle, NSW
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
28.01.2020	Blank	-	0	-	-	-	-	-	-	-
28.01.2020	A1	1	1	2.00	2.00	2.00	0737	1622	525	<0.01
28.01.2020	A2	1	2	2.00	2.00	2.00	0741	1625	524	<0.01
28.01.2020	A3	1	3	2.00	2.00	2.00	0748	1619	511	<0.01
28.01.2020	A4	1	4	2.00	2.00	2.00	0750	1618	508	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

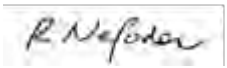
This document shall not be reproduced, except in full.

Monitoring Locations:
0 Blank
1 Newcastle Courthouse worksite, external, north east corner of site, adjacent site entry, attached to temporary fence 1.8m above ground level.
2 Newcastle Courthouse worksite, external, south west corner of site, sitting on air conditioning unit 1.6m above ground level.
3 Newcastle Courthouse worksite, internal, hallway outside of site office, sitting on table 1.2m above ground level.
4 Newcastle Courthouse worksite, internal, lunchroom, northern wall, sitting on hook, 1.8m above ground level.

Remarks:
Sample analysed as received.
The samples collection was undertaken by trained ADE Consulting Group staff.
Sydney Laboratory Services is responsible for the data.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

Signature

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.C.N. 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 30.01.2020
Reference: DRD-87-17254/ AAM2
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Courthouse, Church Street Newcastle, NSW
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
29.01.2020	Blank	-	0	-	-	-	-	-	-	-
29.01.2020	A5	1	1	2.00	2.00	2.00	0748	1654	546	<0.01
29.01.2020	A6	1	2	2.00	2.00	2.00	0751	1630	519	<0.01
29.01.2020	A7	1	3	2.00	2.00	2.00	0744	1650	546	<0.01
29.01.2020	A8	1	4	2.00	2.00	2.00	0742	1649	547	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

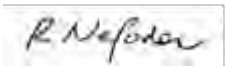
This document shall not be reproduced, except in full.

Monitoring Locations:
0 Blank
1 Newcastle Courthouse worksite, external, north east corner of site, adjacent site entry, attached to temporary fence 1.8m above ground level.
2 Newcastle Courthouse worksite, external, south west corner of site, sitting on air conditioning unit 1.6m above ground level.
3 Newcastle Courthouse worksite, internal, hallway outside of site office, sitting on table 1.2m above ground level.
4 Newcastle Courthouse worksite, internal, lunchroom, northern wall, sitting on hook, 1.8m above ground level.

Remarks:
Sample analysed as received.
The samples collection was undertaken by trained ADE Consulting Group staff.
Sydney Laboratory Services is responsible for the data.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

Signature

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 03.02.2020
Reference: DRD-87-17254/AAM3
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House(old), Church Street, Newcastle East, NSW
Sampler Name/Certificate ID: Matthew O'Connor/CON-020
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
30.01.2020	A9	1	1	2.00	2.00	2.00	0707	1714	607	<0.01
30.01.2020	A10	1	2	2.00	2.00	2.00	0712	1717	605	<0.01
30.01.2020	A11	1	3	2.00	2.00	2.00	0714	1721	601	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

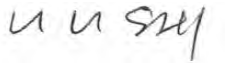
This document shall not be reproduced, except in full.

Monitoring Locations:
0 Blank
1 Old Newcastle Courthouse, northern perimeter, far western corner, attached temporary fencing, 1.5m above ground level.
2 Old Newcastle Courthouse, northern perimeter, approximately 10m east of access gate, 1.5m above ground level.
3 Old Newcastle Courthouse, northern perimeter, 3m west of access gate, 1.5m above ground level.

Remarks:
Sydney Laboratory Services is responsible for all the information in the report, except that provided by the customer. All sampling information included in the report has been provided by customer; ADE Consulting Group.
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Yue Hu

Signature

Approved Signatory:  Lili Shi

Signature

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 19.02.2020
Reference: DRD-87-17254/AAM16
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew O'Connor
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for EstimatingAirborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
18.02.2020	A66	1	1	2.00	2.00	2.00	0739	1525	466	<0.01
18.02.2020	A67	1	2	2.00	2.00	2.00	0705	1410	545	<0.01
18.02.2020	A68	1	3	2.00	2.00	2.00	0710	1412	542	<0.01
18.02.2020	A69	1	4	2.00	2.00	2.00	0711	1414	543	<0.01
18.02.2020	A70	1	5	2.00	2.00	2.00	0734	1513	459	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.8m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, internal, hallway adjacent office, attached to framework, 1.7m above ground level.
5 Newcastle Courthouse, external, south eastern corner, attached to boundary fence, 1.7m above ground level.

Remarks:

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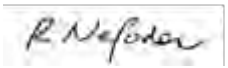
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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Silverwater NSW Australia 2128
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A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 04.02.2020
Reference: DRD-87-17254/AAM5
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name/Certificate ID: Matthew O'Connor/CON-020
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
03.02.2020	A15	1	1	2.00	2.00	2.00	1200	1658	298	<0.01
03.02.2020	A16	1	2	2.00	2.00	2.00	1203	1701	298	<0.01
03.02.2020	A17	1	3	2.00	2.00	2.00	1206	1657	291	<0.01
03.02.2020	A18	1	4	2.00	2.00	2.00	1215	1704	289	<0.01
03.02.2020	A19	1	5	2.00	2.00	2.00	1220	1707	282	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, roof, north eastern corner, top of facade, 1.2m above ground level.
2 Newcastle Courthouse, roof, south eastern corner, top of air conditioning unit 1.8m above ground level.
3 Newcastle Courthouse, roof, north western corner, top of façade, 1.2m above ground level.
4 Newcastle Courthouse, northern perimeter, north western corner, 5m east of western perimeter attached to temporary fence, 1.5m above ground level.
5 Newcastle Courthouse, eastern perimeter, adjacent police station, attached to metal fencing, 2.0m above ground level.

Remarks:

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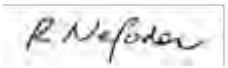
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 05.02.2020
Reference: DRD-87-17254/AAM6
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
04.02.2020	A20	1	1	2.00	2.00	2.00	0723	1607	524	<0.01
04.02.2020	A21	1	2	2.00	2.00	2.00	0728	1610	522	<0.01
04.02.2020	A22	1	3	2.00	2.00	2.00	0731	1612	521	<0.01
04.02.2020	A23	1	4	2.00	2.00	2.00	0735	1617	522	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, southern boundary, top of air conditioning unit 1.8m above ground level.

Remarks:

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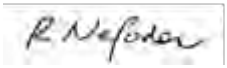
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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AIRBORNE ASBESTOS MONITORING REPORT

Date: 06.02.2020
Reference: DRD-87-17254/AAM7
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
05.02.2020	A24	1	1	2.00	2.00	2.00	0713	1611	538	<0.01
05.02.2020	A25	1	2	2.00	2.00	2.00	0715	1612	538	<0.01
05.02.2020	A26	1	3	2.00	2.00	2.00	0720	1620	540	<0.01
05.02.2020	A27	1	4	2.00	2.00	2.00	0720	1617	537	<0.01
05.02.2020	A28	1	5	2.00	2.00	2.00	0726	1608	522	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, eastern boundary, sitting on boundary fence, 1.2m above ground level.
5 Newcastle Courthouse, internal, hallway adjacent office, sitting on table, 1m above ground room.

Remarks:

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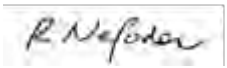
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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AIRBORNE ASBESTOS MONITORING REPORT

Date: 07.02.2020
Reference: DRD-87-17254/AAM8
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
06.02.2020	A29	1	1	2.00	2.00	2.00	0715	1635	560	<0.01
06.02.2020	A30	1	2	2.00	2.00	2.00	0711	1627	556	<0.01
06.02.2020	A31	1	3	2.00	2.00	2.00	0725	1649	564	<0.01
06.02.2020	A32	1	4	2.00	2.00	2.00	0726	1649	563	<0.01
06.02.2020	A33	1	5	2.00	2.00	2.00	0717	1636	559	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, eastern boundary, sitting on boundary fence, 1.2m above ground level.
5 Newcastle Courthouse, internal, hallway adjacent office, sitting on table, 1m above ground room.

Remarks:

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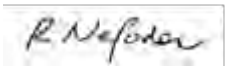
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 12.02.2020
Reference: DRD-87-17254/AAM9
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
07.02.2020	A34	1	1	2.00	2.00	2.00	0729	1630	541	<0.01
07.02.2020	A35	1	2	2.00	2.00	2.00	0732	1630	538	<0.01
07.02.2020	A36	1	3	2.00	2.00	2.00	0732	1630	538	<0.01
07.02.2020	A37	1	4	2.00	2.00	2.00	0723	1630	547	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, eastern boundary, sitting on boundary fence, 1.2m above ground level.
4 Newcastle Courthouse, internal, hallway adjacent office, sitting on table, 1m above ground room.

Remarks:

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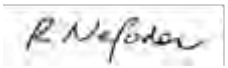
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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AIRBORNE ASBESTOS MONITORING REPORT

Date: 12.02.2020
Reference: DRD-87-17254/AAM10
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
10.02.2020	A38	1	1	2.00	2.00	2.00	0723	1640	557	<0.01
10.02.2020	A39	1	2	2.00	2.00	2.00	0725	1638	553	<0.01
10.02.2020	A40	1	3	2.00	2.00	2.00	0727	1646	559	<0.01
10.02.2020	A41	1	4	2.00	2.00	2.00	0729	1646	557	<0.01
10.02.2020	A42	1	5	2.00	2.00	2.00	0721	1642	561	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, eastern boundary, sitting on boundary fence, 1.2m above ground level.
5 Newcastle Courthouse, internal, hallway adjacent office, sitting on table, 1m above ground room.

Remarks:

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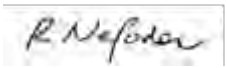
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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Phone: (02) 9648 6669

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AIRBORNE ASBESTOS MONITORING REPORT

Date: 12.02.2020
Reference: DRD-87-17254/AAM11
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
11.02.2020	A43	1	1	2.00	2.00	2.00	0729	1627	538	<0.01
11.02.2020	A44	1	2	2.00	2.00	2.00	0730	1625	535	<0.01
11.02.2020	A45	1	3	2.00	2.00	2.00	0733	1631	538	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.

Remarks:

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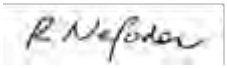
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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Phone: (02) 9648 6669

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AIRBORNE ASBESTOS MONITORING REPORT

Date: 18.02.2020
Reference: DRD-87-17254/AAM12
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House(old), Church Street, Newcastle East, NSW
Sampler Name/Certificate ID: Matthew O'Connor/CON-020
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
12.02.2020	A46	1	1	2.00	2.00	2.00	0724	1625	541	N/A*
12.02.2020	A47	1	2	2.00	2.00	2.00	0726	1623	537	N/A*
12.02.2020	A48	1	3	2.00	2.00	2.00	0730	1631	541	N/A*
12.02.2020	A49	1	4	2.00	2.00	2.00	0731	1636	545	<0.01
12.02.2020	A50	1	5	2.00	2.00	2.00	0720	1628	548	N/A*

*Air filter overloaded with dust.

Sample Type:

1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:

0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, eastern boundary, sitting on boundary fence, 1.2m above ground level.
5 Newcastle Courthouse, internal, hallway adjacent office, sitting on table, 1m above ground room.

Remarks:

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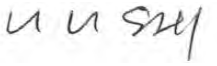
Sample analysed as received.

Approved Counter: Yue Hu

Signature

Approved Signatory:  Lili Shi

Signature

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Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 18.02.2020
Reference: DRD-87-17254/AAM13
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House(old), Church Street, Newcastle East, NSW
Sampler Name/Certificate ID: Matthew O'Connor/CON-020
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	
13.02.2020	A51	1	1	2.00	2.00	2.00	0732	1624	532	<0.01
13.02.2020	A52	1	2	2.00	2.00	2.00	0734	1621	527	<0.01
13.02.2020	A53	1	3	2.00	2.00	2.00	0736	1631	535	<0.01
13.02.2020	A54	1	4	2.00	2.00	2.00	0738	1633	535	<0.01
13.02.2020	A55	1	5	2.00	2.00	2.00	0728	1628	540	N/A*

*Air filter overloaded with dust.

Sample Type:

1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:

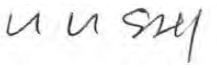
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, eastern boundary, sitting on boundary fence, 1.2m above ground level.
5 Newcastle Courthouse, internal, hallway adjacent office, sitting on table, 1m above ground room.

Remarks:

Sydney Laboratory Services is responsible for all the information in the report, except that provided by the customer. All sampling information included in the report has been provided by customer; ADE Consulting Group.
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Yue Hu

Signature

Approved Signatory:  Lili Shi

Signature

Asbestos Materials Clearance Report

9 Church Street, Newcastle NSW

Prepared for: Drumderg Services Pty Ltd

DRD-87-17407 / CLR2
v1 final
24th March 2020

ADE CONSULTING GROUP

Asbestos Materials Clearance Report

Prepared for:

Drumderg Services Pty Ltd

9 Church Street, Newcastle NSW

Version	Details	Date
v1 final	Written by Matthew Deegan	Tuesday 24th March 2020

Report No: DRD-87-17407 / CLR2 / v1 final

Date: Tuesday, 24th March 2020

Written By:

Matthew Deegan
Occupational Hygienist
B. Sci. (Biotechnology)
LAA number LAA001328

Reviewed By:

Cameron Mitchell
Project Manager
LAA number LAA001292

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ASBESTOS MATERIALS CLEARANCE REPORT

ADE Report No. DRD-87-17407 / CLR2 / v1 final

Date of Report:	24.03.2020
Date of Inspection:	13.02.2020
Project Address:	9 Church Street, Newcastle NSW
Removal Contractor:	Drumderg Services Pty Ltd
Client:	Drumderg Services Pty Ltd
Subject of Works:	Removal of asbestos containing vinyl tiles.
Subject Areas:	**Subject Area A: -** Internal, building A, level one (1), PABX room, floor, former location of asbestos containing vinyl tiles; and **Subject Area B:** Internal, building A, level one (1), plant room, floor, former location of asbestos containing vinyl tiles.

1. INTRODUCTION AND BACKGROUND

1.1 General

ADE Consulting Group Pty Ltd (ADE) was commissioned by Drumderg Services Pty Ltd (hereafter referred to as 'the client') to undertake an Asbestos Materials Clearance Inspection of the subject areas located at 9 Church Street, Newcastle NSW (refer to *Appendix I – Aerial Photograph*).

The visual inspection following the removal works within the subject areas was carried out on the 13th of February 2020 by SafeWork NSW Licensed Asbestos Assessor Matthew Deegan (LAA001328) representing ADE. This report represents the results of the inspection.

1.2 Scope

The scope of work involved the following:

- Completion of a Safety, Health & Environment Work Method Statement (SH&EWMS) prior to undertaking works;
- Visual inspection of the subject areas following removal works;
- Airborne asbestos monitoring during removal works;
- Analysis of samples by a National Association of Testing Authorities (NATA) accredited laboratory; and
- Preparation of an Asbestos Materials Clearance Inspection report outlining the site data and conclusions.

1.3 Legislative Requirements

The survey works, and production of this report have been undertaken in accordance with the requirements of:

- NSW Government. (2017). *Work Health and Safety Regulation 2017*;
- NSW Government. (2011). *Work Health and Safety Act 2011*;
- Safe Work Australia. (2019). *NSW Code of Practice: How to Manage and Control Asbestos in the Workplace;* and
- Safe Work Australia. (2019). *NSW Code of Practice: How to Safely Remove Asbestos.*

1.4 Whole Report

No one section or part of a section, of this report should be taken as giving an overall idea of this report. Each section must be read in conjunction with the whole of this report, including its appendices and attachments.

2. SITE INSPECTION DETAILS

2.1 Visual Inspection and Sampling

Visual inspection of the subject areas following the removal works revealed that the asbestos containing vinyl tiles had been removed to a satisfactory standard.

The subject areas contained no visible Asbestos containing materials following the completion of the removal works.

Airborne asbestos monitoring undertaken during the removal works revealed that the concentration of airborne fibres was below the detection limit of 0.01 fibres / mL (refer to *Appendix III – Analytical Results;* ADE Report No. DRD-87-17254 / AAM1-AAM13).

2.2 Restrictions / Limitations

Please note that this inspection is limited to the specified subject areas stated within this report. Areas adjacent have not been inspected and are outside the scope of this report. Removal of plant room and PABX equipment involved the destruction of the room floor resulting in no physical remnants of the subject area.

3. CONCLUSIONS

Based on the information presented in this report, it is the opinion of ADE that:

- Visual inspection of the subject areas following the removal works revealed that the asbestos containing vinyl tiles had been removed to a satisfactory standard;
- At the time of inspection, the subject areas were considered **safe** regarding the asbestos hazard;
- Airborne asbestos monitoring undertaken during the removal works revealed that the concentration of airborne fibres was below the detection limit of the method;
- The site-specific asbestos register should be updated to document the ACM removed and reference this Asbestos Materials Clearance Inspection Report; and
- Please remain diligent and adhere to the restrictions within the body of this report and the limitations stated below.

4. LIMITATIONS

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only and has been based on information provided by the client. The advice herein relates only to this project and all results, conclusions and recommendations made should be reviewed by a competent and experienced person with experience in environmental investigations, before being used for any other purpose. ADE Consulting Group Pty Ltd (ADE) accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced or amended in any way without prior approval by the client or ADE and should not be relied upon by any other party, who should make their own independent enquiries.

This report does not provide a complete assessment of the environmental status of the site and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, ADE reserves the right to review the report in the context of the additional information.

ADE's professional opinions are based upon its professional judgment, experience, training and results from analytical data. In some cases, further testing and analysis may be required, thus producing different results and / or opinions. ADE has limited investigation to the scope agreed upon with its client.

ADE has used a degree of care and skill ordinarily exercised in similar investigations by reputable member of the Environmental Industry within Australia. No other warranty, expressed or implied, is made or intended.

APPENDIX I – AERIAL PHOTOGRAPH

revision	no.	description	drawn	approved	date
	A	FIRST ISSUE	MC	cm	12/11/19

0 6 12 18 24 30
SCALE 1:600 @A3 METRES

drawn	MC
approved	CM
date	18/02/19
scale	AS SHOWN
original size	A3

client: DRUMDERG SERVICE PTY LTD

project: NEWCASTLE COURTHOUSE
CHURCH STREET, NEWCASTLE, NSW

title: SITE LOCATION AND SITE LAYOUT PLAN

project no: DRD-87-17407 | figure no: FIGURE 1 | rev: A

ADE CONSULTING GROUP
Sydney Office
ADE Consulting Group Pty Ltd
Unit 6 / 7 Millennium Court, Silverwater, NSW 2128
www.ADE.group | info@ade.group | 1300 976 922

PLOT DATE: 12/11/2019 1:15:36 PM DWG FILE: W:\DRD - DRUMDERG SERVICES\DRD-82-16979 INS CHURCH STREET - NEWCASTLE 07.11.2019 CM\CAD\DRD-82-16979.DWG

APPENDIX II – PHOTOGRAPHS

Photograph 1. Subject area B, Building A, level one (1), plant room, former location of asbestos containing floor tiles.

APPENDIX III – ANALYTICAL RESULTS

Sydney Laboratory Services

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4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.C.N. 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 29.01.2020
Reference: DRD-87-17254/ AAM1
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Courthouse, Church Street Newcastle, NSW
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
28.01.2020	Blank	-	0	-	-	-	-	-	-	-
28.01.2020	A1	1	1	2.00	2.00	2.00	0737	1622	525	<0.01
28.01.2020	A2	1	2	2.00	2.00	2.00	0741	1625	524	<0.01
28.01.2020	A3	1	3	2.00	2.00	2.00	0748	1619	511	<0.01
28.01.2020	A4	1	4	2.00	2.00	2.00	0750	1618	508	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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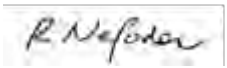
Monitoring Locations:
0 Blank
1 Newcastle Courthouse worksite, external, north east corner of site, adjacent site entry, attached to temporary fence 1.8m above ground level.
2 Newcastle Courthouse worksite, external, south west corner of site, sitting on air conditioning unit 1.6m above ground level.
3 Newcastle Courthouse worksite, internal, hallway outside of site office, sitting on table 1.2m above ground level.
4 Newcastle Courthouse worksite, internal, lunchroom, northern wall, sitting on hook, 1.8m above ground level.

Remarks:
Sample analysed as received.
The samples collection was undertaken by trained ADE Consulting Group staff.
Sydney Laboratory Services is responsible for the data.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

Signature

Sydney Laboratory Services

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Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.C.N. 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 30.01.2020
Reference: DRD-87-17254/ AAM2
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Courthouse, Church Street Newcastle, NSW
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
29.01.2020	Blank	-	0	-	-	-	-	-	-	-
29.01.2020	A5	1	1	2.00	2.00	2.00	0748	1654	546	<0.01
29.01.2020	A6	1	2	2.00	2.00	2.00	0751	1630	519	<0.01
29.01.2020	A7	1	3	2.00	2.00	2.00	0744	1650	546	<0.01
29.01.2020	A8	1	4	2.00	2.00	2.00	0742	1649	547	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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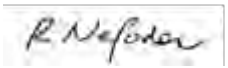
Monitoring Locations:
0 Blank
1 Newcastle Courthouse worksite, external, north east corner of site, adjacent site entry, attached to temporary fence 1.8m above ground level.
2 Newcastle Courthouse worksite, external, south west corner of site, sitting on air conditioning unit 1.6m above ground level.
3 Newcastle Courthouse worksite, internal, hallway outside of site office, sitting on table 1.2m above ground level.
4 Newcastle Courthouse worksite, internal, lunchroom, northern wall, sitting on hook, 1.8m above ground level.

Remarks:
Sample analysed as received.
The samples collection was undertaken by trained ADE Consulting Group staff.
Sydney Laboratory Services is responsible for the data.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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AIRBORNE ASBESTOS MONITORING REPORT

Date: 03.02.2020
Reference: DRD-87-17254/AAM3
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House(old), Church Street, Newcastle East, NSW
Sampler Name/Certificate ID: Matthew O'Connor/CON-020
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
30.01.2020	A9	1	1	2.00	2.00	2.00	0707	1714	607	<0.01
30.01.2020	A10	1	2	2.00	2.00	2.00	0712	1717	605	<0.01
30.01.2020	A11	1	3	2.00	2.00	2.00	0714	1721	601	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Old Newcastle Courthouse, northern perimeter, far western corner, attached temporary fencing, 1.5m above ground level.
2 Old Newcastle Courthouse, northern perimeter, approximately 10m east of access gate, 1.5m above ground level.
3 Old Newcastle Courthouse, northern perimeter, 3m west of access gate, 1.5m above ground level.

Remarks:
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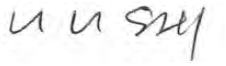
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Yue Hu

Signature

Approved Signatory:  Lili Shi

Signature

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4/10-11 Millennium Ct
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Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 19.02.2020
Reference: DRD-87-17254/AAM16
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew O'Connor
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for EstimatingAirborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
18.02.2020	A66	1	1	2.00	2.00	2.00	0739	1525	466	<0.01
18.02.2020	A67	1	2	2.00	2.00	2.00	0705	1410	545	<0.01
18.02.2020	A68	1	3	2.00	2.00	2.00	0710	1412	542	<0.01
18.02.2020	A69	1	4	2.00	2.00	2.00	0711	1414	543	<0.01
18.02.2020	A70	1	5	2.00	2.00	2.00	0734	1513	459	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.8m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, internal, hallway adjacent office, attached to framework, 1.7m above ground level.
5 Newcastle Courthouse, external, south eastern corner, attached to boundary fence, 1.7m above ground level.

Remarks:

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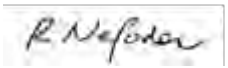
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

Signature

Sydney Laboratory Services

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4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 04.02.2020
Reference: DRD-87-17254/AAM5
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name/Certificate ID: Matthew O'Connor/CON-020
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
03.02.2020	A15	1	1	2.00	2.00	2.00	1200	1658	298	<0.01
03.02.2020	A16	1	2	2.00	2.00	2.00	1203	1701	298	<0.01
03.02.2020	A17	1	3	2.00	2.00	2.00	1206	1657	291	<0.01
03.02.2020	A18	1	4	2.00	2.00	2.00	1215	1704	289	<0.01
03.02.2020	A19	1	5	2.00	2.00	2.00	1220	1707	282	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Monitoring Locations:
0 Blank
1 Newcastle Courthouse, roof, north eastern corner, top of facade, 1.2m above ground level.
2 Newcastle Courthouse, roof, south eastern corner, top of air conditioning unit 1.8m above ground level.
3 Newcastle Courthouse, roof, north western corner, top of façade, 1.2m above ground level.
4 Newcastle Courthouse, northern perimeter, north western corner, 5m east of western perimeter attached to temporary fence, 1.5m above ground level.
5 Newcastle Courthouse, eastern perimeter, adjacent police station, attached to metal fencing, 2.0m above ground level.

Remarks:

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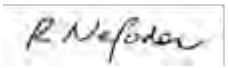
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

Signature

Sydney Laboratory Services

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4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 05.02.2020
Reference: DRD-87-17254/AAM6
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
04.02.2020	A20	1	1	2.00	2.00	2.00	0723	1607	524	<0.01
04.02.2020	A21	1	2	2.00	2.00	2.00	0728	1610	522	<0.01
04.02.2020	A22	1	3	2.00	2.00	2.00	0731	1612	521	<0.01
04.02.2020	A23	1	4	2.00	2.00	2.00	0735	1617	522	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

This document shall not be reproduced, except in full.

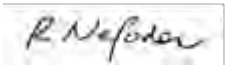
Monitoring Locations:
0 Blank
1 Newcastle Courthouse, external, northern perimeter, adjacent entry door, attached temporary fencing, 1.7m above ground level.
2 Newcastle Courthouse, external, north western perimeter, attached temporary fencing, 1.7m above ground level.
3 Newcastle Courthouse, external, north eastern perimeter, adjacent vehicle entrance gate, attached temporary fencing, 1.7m above ground level.
4 Newcastle Courthouse, external, southern boundary, top of air conditioning unit 1.8m above ground level.

Remarks:

Sydney Laboratory Services is responsible for all the information in the report, except that provided by the customer. All sampling information included in the report has been provided by customer; ADE Consulting Group.
Information provided by ADE Consulting Group can affect the validity of the results.
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

Signature

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 06.02.2020
Reference: DRD-87-17254/AAM7
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
05.02.2020	A24	1	1	2.00	2.00	2.00	0713	1611	538	<0.01
05.02.2020	A25	1	2	2.00	2.00	2.00	0715	1612	538	<0.01
05.02.2020	A26	1	3	2.00	2.00	2.00	0720	1620	540	<0.01
05.02.2020	A27	1	4	2.00	2.00	2.00	0720	1617	537	<0.01
05.02.2020	A28	1	5	2.00	2.00	2.00	0726	1608	522	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Remarks:

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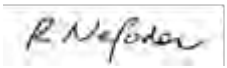
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

Signature

Sydney Laboratory Services

A division of A. D. Envirotech Australia Pty Ltd
4/10-11 Millennium Ct
Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 07.02.2020
Reference: DRD-87-17254/AAM8
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
06.02.2020	A29	1	1	2.00	2.00	2.00	0715	1635	560	<0.01
06.02.2020	A30	1	2	2.00	2.00	2.00	0711	1627	556	<0.01
06.02.2020	A31	1	3	2.00	2.00	2.00	0725	1649	564	<0.01
06.02.2020	A32	1	4	2.00	2.00	2.00	0726	1649	563	<0.01
06.02.2020	A33	1	5	2.00	2.00	2.00	0717	1636	559	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Sample analysed as received.

Approved Counter: Matthew Deegan

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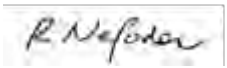
Approved Signatory:  Ross Nefodov

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Silverwater NSW Australia 2128
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A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 12.02.2020
Reference: DRD-87-17254/AAM9
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
07.02.2020	A34	1	1	2.00	2.00	2.00	0729	1630	541	<0.01
07.02.2020	A35	1	2	2.00	2.00	2.00	0732	1630	538	<0.01
07.02.2020	A36	1	3	2.00	2.00	2.00	0732	1630	538	<0.01
07.02.2020	A37	1	4	2.00	2.00	2.00	0723	1630	547	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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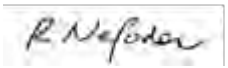
Sample analysed as received.

Approved Counter: Matthew Deegan

Signature

Approved Signatory:  Ross Nefodov

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Silverwater NSW Australia 2128
Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 12.02.2020
Reference: DRD-87-17254/AAM10
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
10.02.2020	A38	1	1	2.00	2.00	2.00	0723	1640	557	<0.01
10.02.2020	A39	1	2	2.00	2.00	2.00	0725	1638	553	<0.01
10.02.2020	A40	1	3	2.00	2.00	2.00	0727	1646	559	<0.01
10.02.2020	A41	1	4	2.00	2.00	2.00	0729	1646	557	<0.01
10.02.2020	A42	1	5	2.00	2.00	2.00	0721	1642	561	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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Sample analysed as received.

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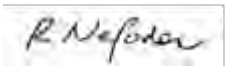
Approved Signatory:  Ross Nefodov

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A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 12.02.2020
Reference: DRD-87-17254/AAM11
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House, Church Street, Newcastle East, NSW
Sampler Name: Matthew Deegan
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
11.02.2020	A43	1	1	2.00	2.00	2.00	0729	1627	538	<0.01
11.02.2020	A44	1	2	2.00	2.00	2.00	0730	1625	535	<0.01
11.02.2020	A45	1	3	2.00	2.00	2.00	0733	1631	538	<0.01

Sample Type:
1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

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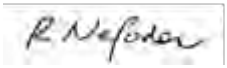
Approved Signatory:  Ross Nefodov

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AIRBORNE ASBESTOS MONITORING REPORT

Date: 18.02.2020
Reference: DRD-87-17254/AAM12
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House(old), Church Street, Newcastle East, NSW
Sampler Name/Certificate ID: Matthew O'Connor/CON-020
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	-
12.02.2020	A46	1	1	2.00	2.00	2.00	0724	1625	541	N/A*
12.02.2020	A47	1	2	2.00	2.00	2.00	0726	1623	537	N/A*
12.02.2020	A48	1	3	2.00	2.00	2.00	0730	1631	541	N/A*
12.02.2020	A49	1	4	2.00	2.00	2.00	0731	1636	545	<0.01
12.02.2020	A50	1	5	2.00	2.00	2.00	0720	1628	548	N/A*

*Air filter overloaded with dust.

Sample Type:

1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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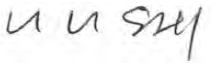
Sample analysed as received.

Approved Counter: Yue Hu

Signature

Approved Signatory:  Lili Shi

Signature

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Phone: (02) 9648 6669

A.B.N. 52 093 452 950

AIRBORNE ASBESTOS MONITORING REPORT

Date: 18.02.2020
Reference: DRD-87-17254/AAM13
Client: Drumderg Services
Removal Contractor: Drumderg Services
Job Location: Newcastle Court House(old), Church Street, Newcastle East, NSW
Sampler Name/Certificate ID: Matthew O'Connor/CON-020
Analytical Method: AAM based on Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]

Date	Sample Code	Sample Type	Monitor Location	Airflow, L/min			Time			Concentration, fibres/mL
				On	Off	Aver.	On Hr	Off Hr	Total min	
	Blank	-	0	-	-	-	-	-	-	
13.02.2020	A51	1	1	2.00	2.00	2.00	0732	1624	532	<0.01
13.02.2020	A52	1	2	2.00	2.00	2.00	0734	1621	527	<0.01
13.02.2020	A53	1	3	2.00	2.00	2.00	0736	1631	535	<0.01
13.02.2020	A54	1	4	2.00	2.00	2.00	0738	1633	535	<0.01
13.02.2020	A55	1	5	2.00	2.00	2.00	0728	1628	540	N/A*

*Air filter overloaded with dust.

Sample Type:

1 Removal Monitoring
4 Clearance Monitoring
5 Background Monitoring

Accreditation No.14664.

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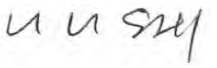
Approved Signatory:  Lili Shi

Signature

Appendix C

Laboratory Test Results

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 231798

Client Details

Client	Douglas Partners Newcastle
Attention	Chris Bozinovski
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**91667.02, Newcastle**
Number of Samples	2 material, 2 SOIL
Date samples received	28/11/2019
Date completed instructions received	28/11/2019

Analysis Details

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

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

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

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

Report Details

Date results requested by	05/12/2019
Date of Issue	03/12/2019

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

Results Approved By
Diego Bigolin, Team Leader, Inorganics
Dragana Tomas, Senior Chemist
Loren Bardwell, Senior Chemist
Lucy Zhu, Senior Asbestos Analyst
Steven Luong, Organics Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		231798-4
Your Reference	UNITS	MS4
Depth		0.2
Date Sampled		19/11/2019
Type of sample		SOIL
Date extracted	-	29/11/2019
Date analysed	-	30/11/2019
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<3
Surrogate aaa-Trifluorotoluene	%	122

svTRH (C10-C40) in Soil		
Our Reference		231798-4
Your Reference	UNITS	MS4
Depth		0.2
Date Sampled		19/11/2019
Type of sample		SOIL
Date extracted	-	29/11/2019
Date analysed	-	30/11/2019
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	240
TRH C_{29} - C_{36}	mg/kg	130
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	300
TRH >C_{34} -C_{40}	mg/kg	110
Total +ve TRH (>C10-C40)	mg/kg	410
Surrogate o-Terphenyl	%	91

PAHs in Soil		
Our Reference		231798-4
Your Reference	UNITS	MS4
Depth		0.2
Date Sampled		19/11/2019
Type of sample		SOIL
Date extracted	-	29/11/2019
Date analysed	-	29/11/2019
Naphthalene	mg/kg	0.4
Acenaphthylene	mg/kg	0.2
Acenaphthene	mg/kg	5.7
Fluorene	mg/kg	1.5
Phenanthrene	mg/kg	20
Anthracene	mg/kg	4.2
Fluoranthene	mg/kg	20
Pyrene	mg/kg	17
Benzo(a)anthracene	mg/kg	8.5
Chrysene	mg/kg	7.1
Benzo(b,j+k)fluoranthene	mg/kg	8.5
Benzo(a)pyrene	mg/kg	4.6
Indeno(1,2,3-c,d)pyrene	mg/kg	2.4
Dibenzo(a,h)anthracene	mg/kg	0.5
Benzo(g,h,i)perylene	mg/kg	2.6
Total +ve PAH's	mg/kg	100
Benzo(a)pyrene TEQ calc (zero)	mg/kg	7.1
Benzo(a)pyrene TEQ calc(half)	mg/kg	7.1
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	7.1
Surrogate p-Terphenyl-d14	%	84

Acid Extractable metals in soil		
Our Reference		231798-4
Your Reference	UNITS	MS4
Depth		0.2
Date Sampled		19/11/2019
Type of sample		SOIL
Date prepared	-	29/11/2019
Date analysed	-	29/11/2019
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	24
Copper	mg/kg	23
Lead	mg/kg	4
Mercury	mg/kg	<0.1
Nickel	mg/kg	18
Zinc	mg/kg	34

Misc Inorg - Soil		
Our Reference		231798-3
Your Reference	UNITS	MS4
Depth		0.02
Date Sampled		19/11/2019
Type of sample		SOIL
Date prepared	-	02/12/2019
Date analysed	-	02/12/2019
Presence of Coal Tar*	-	Absent

Moisture		
Our Reference		231798-4
Your Reference	UNITS	MS4
Depth		0.2
Date Sampled		19/11/2019
Type of sample		SOIL
Date prepared	-	29/11/2019
Date analysed	-	02/12/2019
Moisture	%	8.1

Asbestos ID - soils		
Our Reference		231798-4
Your Reference	UNITS	MS4
Depth		0.2
Date Sampled		19/11/2019
Type of sample		SOIL
Date analysed	-	02/12/2019
Sample mass tested	g	Approx. 35g
Sample Description	-	Brown sandy soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected

Asbestos ID - materials			
Our Reference		231798-1	231798-2
Your Reference	UNITS	F1	F2
Depth		-	-
Date Sampled		22/11/2019	22/11/2019
Type of sample		material	material
Date analysed	-	29/11/2019	29/11/2019
Mass / Dimension of Sample	-	90x60x4mm	30x20x4mm
Sample Description	-	Grey fibre cement material	Grey quartz cement material
Asbestos ID in materials	-	Chrysotile asbestos detected	No asbestos detected
Trace Analysis	-	Not Tested	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-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
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-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/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.

Method ID	Methodology Summary
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.
RTA T542	Determination of Phenol in core samples as per RTA test method T542. This procedure gives and indication of whether a sample of asphalt has been made with coal tar. The coal tar method gives an approximate result with a high degree of uncertainty.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	[NT]
Date extracted	-			29/11/2019	[NT]	[NT]	[NT]	[NT]	29/11/2019	[NT]
Date analysed	-			30/11/2019	[NT]	[NT]	[NT]	[NT]	30/11/2019	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	96	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	96	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	82	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	93	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	103	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	129	[NT]	[NT]	[NT]	[NT]	132	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	[NT]
Date extracted	-			29/11/2019	[NT]	[NT]	[NT]	[NT]	29/11/2019	[NT]
Date analysed	-			30/11/2019	[NT]	[NT]	[NT]	[NT]	30/11/2019	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	130	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	109	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	108	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	130	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	109	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	108	[NT]
Surrogate o-Terphenyl	%		Org-003	106	[NT]	[NT]	[NT]	[NT]	112	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	[NT]
Date extracted	-			29/11/2019	[NT]	[NT]	[NT]	[NT]	29/11/2019	[NT]
Date analysed	-			29/11/2019	[NT]	[NT]	[NT]	[NT]	29/11/2019	[NT]
Naphthalene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	126	[NT]
Acenaphthylene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	116	[NT]
Phenanthrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	120	[NT]
Pyrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	124	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	118	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	<0.05	[NT]	[NT]	[NT]	[NT]	112	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	87	[NT]	[NT]	[NT]	[NT]	97	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	[NT]
Date prepared	-			29/11/2019	[NT]	[NT]	[NT]	[NT]	29/11/2019	[NT]
Date analysed	-			29/11/2019	[NT]	[NT]	[NT]	[NT]	29/11/2019	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	100	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	100	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	103	[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: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

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: Sample 231798-4 was sub-sampled from a jar provided by the client.

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CERTIFICATE OF ANALYSIS 231798-A

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew. Blackert, Chris Bozinovski
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**91667.02, Newcastle**
Number of Samples	2 material, 2 SOIL
Date samples received	28/11/2019
Date completed instructions received	04/12/2019

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	12/12/2019
Date of Issue	12/12/2019

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Results Approved By
Josh Williams, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

PAHs in TCLP (USEPA 1311)		
Our Reference		231798-A-4
Your Reference	UNITS	MS4
Depth		0.2
Date Sampled		19/11/2019
Type of sample		SOIL
pH of soil for fluid# determ.	pH units	9.8
pH of soil TCLP (after HCl)	pH units	1.8
Extraction fluid used	-	1
pH of final Leachate	pH units	5.5
Date extracted	-	06/12/2019
Date analysed	-	12/12/2019
Naphthalene in TCLP	mg/L	0.006
Acenaphthylene in TCLP	mg/L	0.001
Acenaphthene in TCLP	mg/L	0.010
Fluorene in TCLP	mg/L	0.009
Phenanthrene in TCLP	mg/L	0.019
Anthracene in TCLP	mg/L	0.005
Fluoranthene in TCLP	mg/L	0.006
Pyrene in TCLP	mg/L	0.006
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Total +ve PAH's	mg/L	0.064
Surrogate p-Terphenyl-d14	%	92

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. Please note that the mass used may be scaled down from the default based on sample mass available.
Org-012/017	Leachates are extracted with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			06/12/2019	[NT]	[NT]	[NT]	[NT]	06/12/2019	[NT]
Date analysed	-			12/12/2019	[NT]	[NT]	[NT]	[NT]	12/12/2019	[NT]
Naphthalene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	128	[NT]
Acenaphthylene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	99	[NT]
Phenanthrene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	108	[NT]
Anthracene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	107	[NT]
Pyrene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	114	[NT]
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	124	[NT]
Benzo(bjk)fluoranthene in TCLP	mg/L	0.002	Org-012/017	<0.002	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	86	[NT]
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	76	[NT]	[NT]	[NT]	[NT]	91	[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: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

PAHs in TCLP USEPA 1311 - The samples were received outside of the recommended Technical Holding Time (THT), however, the analysis has proceeded as requested.

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www.envirolab.com.au

CERTIFICATE OF ANALYSIS 233090

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew. Blackert
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**91667.02, Newcastle**
Number of Samples	7 Soil
Date samples received	13/12/2019
Date completed instructions received	13/12/2019

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	20/12/2019
Date of Issue	19/12/2019

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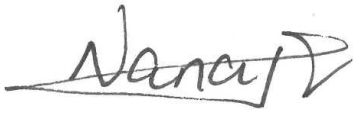
Results Approved By
Josh Williams, Senior Chemist
Loren Bardwell, Senior Chemist
Nick Sarlamis, Inorganics Supervisor
Steven Luong, Organics Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

VOCs in soil						
Our Reference		233090-1	233090-2	233090-3	233090-4	233090-5
Your Reference	UNITS	201/0.9-1.2	201/7.9	202/4.8	202/7.0	203/0.5
Depth		0.9-1.2	7.9	4.8	7.0	0.5
Date Sampled		12/12/2019	12/12/2019	11/12/2019	11/12/2019	11/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Dichlorodifluoromethane	mg/kg	<1	<1	<1	<1	<1
Chloromethane	mg/kg	<1	<1	<1	<1	<1
Vinyl Chloride	mg/kg	<1	<1	<1	<1	<1
Bromomethane	mg/kg	<1	<1	<1	<1	<1
Chloroethane	mg/kg	<1	<1	<1	<1	<1
Trichlorofluoromethane	mg/kg	<1	<1	<1	<1	<1
1,1-Dichloroethene	mg/kg	<1	<1	<1	<1	<1
trans-1,2-dichloroethene	mg/kg	<1	<1	<1	<1	<1
1,1-dichloroethane	mg/kg	<1	<1	<1	<1	<1
cis-1,2-dichloroethene	mg/kg	<1	<1	<1	<1	<1
bromochloromethane	mg/kg	<1	<1	<1	<1	<1
chloroform	mg/kg	<1	<1	<1	<1	<1
2,2-dichloropropane	mg/kg	<1	<1	<1	<1	<1
1,2-dichloroethane	mg/kg	<1	<1	<1	<1	<1
1,1,1-trichloroethane	mg/kg	<1	<1	<1	<1	<1
1,1-dichloropropene	mg/kg	<1	<1	<1	<1	<1
Cyclohexane	mg/kg	<1	<1	<1	<1	<1
carbon tetrachloride	mg/kg	<1	<1	<1	<1	<1
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
dibromomethane	mg/kg	<1	<1	<1	<1	<1
1,2-dichloropropane	mg/kg	<1	<1	<1	<1	<1
trichloroethene	mg/kg	<1	<1	<1	<1	<1
bromodichloromethane	mg/kg	<1	<1	<1	<1	<1
trans-1,3-dichloropropene	mg/kg	<1	<1	<1	<1	<1
cis-1,3-dichloropropene	mg/kg	<1	<1	<1	<1	<1
1,1,2-trichloroethane	mg/kg	<1	<1	<1	<1	<1
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-dichloropropane	mg/kg	<1	<1	<1	<1	<1
dibromochloromethane	mg/kg	<1	<1	<1	<1	<1
1,2-dibromoethane	mg/kg	<1	<1	<1	<1	<1
tetrachloroethene	mg/kg	<1	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	mg/kg	<1	<1	<1	<1	<1
chlorobenzene	mg/kg	<1	<1	<1	<1	<1

VOCs in soil						
Our Reference		233090-1	233090-2	233090-3	233090-4	233090-5
Your Reference	UNITS	201/0.9-1.2	201/7.9	202/4.8	202/7.0	203/0.5
Depth		0.9-1.2	7.9	4.8	7.0	0.5
Date Sampled		12/12/2019	12/12/2019	11/12/2019	11/12/2019	11/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
bromoform	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
styrene	mg/kg	<1	<1	<1	<1	<1
1,1,2,2-tetrachloroethane	mg/kg	<1	<1	<1	<1	<1
o-Xylene	mg/kg	<1	<1	<1	<1	<1
1,2,3-trichloropropane	mg/kg	<1	<1	<1	<1	<1
isopropylbenzene	mg/kg	<1	<1	<1	<1	<1
bromobenzene	mg/kg	<1	<1	<1	<1	<1
n-propyl benzene	mg/kg	<1	<1	<1	<1	<1
2-chlorotoluene	mg/kg	<1	<1	<1	<1	<1
4-chlorotoluene	mg/kg	<1	<1	<1	<1	<1
1,3,5-trimethyl benzene	mg/kg	<1	<1	<1	<1	<1
tert-butyl benzene	mg/kg	<1	<1	<1	<1	<1
1,2,4-trimethyl benzene	mg/kg	<1	<1	<1	<1	<1
1,3-dichlorobenzene	mg/kg	<1	<1	<1	<1	<1
sec-butyl benzene	mg/kg	<1	<1	<1	<1	<1
1,4-dichlorobenzene	mg/kg	<1	<1	<1	<1	<1
4-isopropyl toluene	mg/kg	<1	<1	<1	<1	<1
1,2-dichlorobenzene	mg/kg	<1	<1	<1	<1	<1
n-butyl benzene	mg/kg	<1	<1	<1	<1	<1
1,2-dibromo-3-chloropropane	mg/kg	<1	<1	<1	<1	<1
1,2,4-trichlorobenzene	mg/kg	<1	<1	<1	<1	<1
hexachlorobutadiene	mg/kg	<1	<1	<1	<1	<1
1,2,3-trichlorobenzene	mg/kg	<1	<1	<1	<1	<1
Surrogate Dibromofluorometha	%	101	101	102	103	103
Surrogate aaa-Trifluorotoluene	%	133	128	122	134	130
Surrogate Toluene-d_8	%	100	101	100	100	99
Surrogate 4-Bromofluorobenzene	%	95	96	93	91	93

VOCs in soil		
Our Reference		233090-6
Your Reference	UNITS	D3
Depth		-
Date Sampled		11/12/2019
Type of sample		Soil
Date extracted	-	16/12/2019
Date analysed	-	17/12/2019
Dichlorodifluoromethane	mg/kg	<1
Chloromethane	mg/kg	<1
Vinyl Chloride	mg/kg	<1
Bromomethane	mg/kg	<1
Chloroethane	mg/kg	<1
Trichlorofluoromethane	mg/kg	<1
1,1-Dichloroethene	mg/kg	<1
trans-1,2-dichloroethene	mg/kg	<1
1,1-dichloroethane	mg/kg	<1
cis-1,2-dichloroethene	mg/kg	<1
bromochloromethane	mg/kg	<1
chloroform	mg/kg	<1
2,2-dichloropropane	mg/kg	<1
1,2-dichloroethane	mg/kg	<1
1,1,1-trichloroethane	mg/kg	<1
1,1-dichloropropene	mg/kg	<1
Cyclohexane	mg/kg	<1
carbon tetrachloride	mg/kg	<1
Benzene	mg/kg	<0.2
dibromomethane	mg/kg	<1
1,2-dichloropropane	mg/kg	<1
trichloroethene	mg/kg	<1
bromodichloromethane	mg/kg	<1
trans-1,3-dichloropropene	mg/kg	<1
cis-1,3-dichloropropene	mg/kg	<1
1,1,2-trichloroethane	mg/kg	<1
Toluene	mg/kg	<0.5
1,3-dichloropropane	mg/kg	<1
dibromochloromethane	mg/kg	<1
1,2-dibromoethane	mg/kg	<1
tetrachloroethene	mg/kg	<1
1,1,1,2-tetrachloroethane	mg/kg	<1
chlorobenzene	mg/kg	<1

VOCs in soil		
Our Reference		233090-6
Your Reference	UNITS	D3
Depth		-
Date Sampled		11/12/2019
Type of sample		Soil
Ethylbenzene	mg/kg	<1
bromoform	mg/kg	<1
m+p-xylene	mg/kg	<2
styrene	mg/kg	<1
1,1,2,2-tetrachloroethane	mg/kg	<1
o-Xylene	mg/kg	<1
1,2,3-trichloropropane	mg/kg	<1
isopropylbenzene	mg/kg	<1
bromobenzene	mg/kg	<1
n-propyl benzene	mg/kg	<1
2-chlorotoluene	mg/kg	<1
4-chlorotoluene	mg/kg	<1
1,3,5-trimethyl benzene	mg/kg	<1
tert-butyl benzene	mg/kg	<1
1,2,4-trimethyl benzene	mg/kg	<1
1,3-dichlorobenzene	mg/kg	<1
sec-butyl benzene	mg/kg	<1
1,4-dichlorobenzene	mg/kg	<1
4-isopropyl toluene	mg/kg	<1
1,2-dichlorobenzene	mg/kg	<1
n-butyl benzene	mg/kg	<1
1,2-dibromo-3-chloropropane	mg/kg	<1
1,2,4-trichlorobenzene	mg/kg	<1
hexachlorobutadiene	mg/kg	<1
1,2,3-trichlorobenzene	mg/kg	<1
Surrogate Dibromofluorometha	%	103
Surrogate aaa-Trifluorotoluene	%	120
Surrogate Toluene-d_8	%	99
Surrogate 4-Bromofluorobenzene	%	91

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		233090-1	233090-2	233090-3	233090-4	233090-5
Your Reference	UNITS	201/0.9-1.2	201/7.9	202/4.8	202/7.0	203/0.5
Depth		0.9-1.2	7.9	4.8	7.0	0.5
Date Sampled		12/12/2019	12/12/2019	11/12/2019	11/12/2019	11/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
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	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	133	128	122	134	130

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		233090-6
Your Reference	UNITS	D3
Depth		-
Date Sampled		11/12/2019
Type of sample		Soil
Date extracted	-	16/12/2019
Date analysed	-	17/12/2019
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<3
Surrogate aaa-Trifluorotoluene	%	120

svTRH (C10-C40) in Soil						
Our Reference		233090-1	233090-2	233090-3	233090-4	233090-5
Your Reference	UNITS	201/0.9-1.2	201/7.9	202/4.8	202/7.0	203/0.5
Depth		0.9-1.2	7.9	4.8	7.0	0.5
Date Sampled		12/12/2019	12/12/2019	11/12/2019	11/12/2019	11/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
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	%	73	74	89	75	76

svTRH (C10-C40) in Soil		
Our Reference		233090-6
Your Reference	UNITS	D3
Depth		-
Date Sampled		11/12/2019
Type of sample		Soil
Date extracted	-	16/12/2019
Date analysed	-	17/12/2019
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	210
TRH C_{29} - C_{36}	mg/kg	110
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	290
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	290
Surrogate o-Terphenyl	%	78

PAHs in Soil						
Our Reference		233090-1	233090-2	233090-3	233090-4	233090-5
Your Reference	UNITS	201/0.9-1.2	201/7.9	202/4.8	202/7.0	203/0.5
Depth		0.9-1.2	7.9	4.8	7.0	0.5
Date Sampled		12/12/2019	12/12/2019	11/12/2019	11/12/2019	11/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
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	0.3	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	6.1	<0.1	<0.1	1.5
Anthracene	mg/kg	<0.1	0.8	<0.1	<0.1	0.3
Fluoranthene	mg/kg	<0.1	9.0	<0.1	<0.1	3.9
Pyrene	mg/kg	<0.1	9.0	<0.1	<0.1	3.7
Benzo(a)anthracene	mg/kg	<0.1	2.7	<0.1	<0.1	2.0
Chrysene	mg/kg	<0.1	2.1	<0.1	<0.1	1.6
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	4.2	<0.2	<0.2	3.0
Benzo(a)pyrene	mg/kg	<0.05	3.0	<0.05	<0.05	1.8
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	1.6	<0.1	<0.1	0.9
Dibenzo(a,h)anthracene	mg/kg	<0.1	0.3	<0.1	<0.1	0.2
Benzo(g,h,i)perylene	mg/kg	<0.1	2.3	<0.1	<0.1	1.1
Total +ve PAH's	mg/kg	<0.05	42	<0.05	<0.05	20
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	4.2	<0.5	<0.5	2.7
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	4.2	<0.5	<0.5	2.7
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	4.2	<0.5	<0.5	2.7
Surrogate p-Terphenyl-d14	%	93	105	99	98	103

PAHs in Soil		
Our Reference		233090-6
Your Reference	UNITS	D3
Depth		-
Date Sampled		11/12/2019
Type of sample		Soil
Date extracted	-	16/12/2019
Date analysed	-	17/12/2019
Naphthalene	mg/kg	0.4
Acenaphthylene	mg/kg	0.8
Acenaphthene	mg/kg	0.1
Fluorene	mg/kg	0.8
Phenanthrene	mg/kg	10
Anthracene	mg/kg	2.2
Fluoranthene	mg/kg	13
Pyrene	mg/kg	13
Benzo(a)anthracene	mg/kg	8.0
Chrysene	mg/kg	5.5
Benzo(b,j+k)fluoranthene	mg/kg	10
Benzo(a)pyrene	mg/kg	6.4
Indeno(1,2,3-c,d)pyrene	mg/kg	2.7
Dibenzo(a,h)anthracene	mg/kg	1.2
Benzo(g,h,i)perylene	mg/kg	3.0
Total +ve PAH's	mg/kg	77
Benzo(a)pyrene TEQ calc (zero)	mg/kg	9.8
Benzo(a)pyrene TEQ calc(half)	mg/kg	9.8
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	9.8
Surrogate p-Terphenyl-d14	%	108

Organochlorine Pesticides in soil				
Our Reference		233090-1	233090-5	233090-6
Your Reference	UNITS	201/0.9-1.2	203/0.5	D3
Depth		0.9-1.2	0.5	-
Date Sampled		12/12/2019	11/12/2019	11/12/2019
Type of sample		Soil	Soil	Soil
Date extracted	-	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	17/12/2019	17/12/2019	17/12/2019
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	94	97	102

Organophosphorus Pesticides in Soil				
Our Reference		233090-1	233090-5	233090-6
Your Reference	UNITS	201/0.9-1.2	203/0.5	D3
Depth		0.9-1.2	0.5	-
Date Sampled		12/12/2019	11/12/2019	11/12/2019
Type of sample		Soil	Soil	Soil
Date extracted	-	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	17/12/2019	17/12/2019	17/12/2019
Dichlorvos	mg/kg	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	94	97	102

PCBs in Soil				
Our Reference		233090-1	233090-5	233090-6
Your Reference	UNITS	201/0.9-1.2	203/0.5	D3
Depth		0.9-1.2	0.5	-
Date Sampled		12/12/2019	11/12/2019	11/12/2019
Type of sample		Soil	Soil	Soil
Date extracted	-	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	17/12/2019	17/12/2019	17/12/2019
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	94	97	102

Misc Soil - Inorg				
Our Reference		233090-1	233090-5	233090-6
Your Reference	UNITS	201/0.9-1.2	203/0.5	D3
Depth		0.9-1.2	0.5	-
Date Sampled		12/12/2019	11/12/2019	11/12/2019
Type of sample		Soil	Soil	Soil
Date prepared	-	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	16/12/2019	16/12/2019	16/12/2019
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5

Acid Extractable metals in soil						
Our Reference		233090-1	233090-2	233090-3	233090-4	233090-5
Your Reference	UNITS	201/0.9-1.2	201/7.9	202/4.8	202/7.0	203/0.5
Depth		0.9-1.2	7.9	4.8	7.0	0.5
Date Sampled		12/12/2019	12/12/2019	11/12/2019	11/12/2019	11/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Arsenic	mg/kg	<4	5	10	<4	24
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	4	9	12	11	7
Copper	mg/kg	7	17	27	41	29
Lead	mg/kg	6	16	9	12	100
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Nickel	mg/kg	3	9	1	8	5
Zinc	mg/kg	15	120	12	49	170
Manganese	mg/kg	60	81	15	43	64
Iron	mg/kg	4,900	15,000	28,000	27,000	11,000
Aluminium	mg/kg	5,000	7,000	9,000	8,900	7,000
Selenium	mg/kg	<3	<2	<3	<3	<2
Tin	mg/kg	<1	<1	<1	<1	6
Antimony	mg/kg	<7	<7	<7	<7	<7
Magnesium	mg/kg	1,500	1,700	820	1,700	510
Cobalt	mg/kg	1	4	<1	2	1
Boron	mg/kg	<5	<3	<3	<3	<3

Acid Extractable metals in soil		
Our Reference		233090-6
Your Reference	UNITS	D3
Depth		-
Date Sampled		11/12/2019
Type of sample		Soil
Date prepared	-	16/12/2019
Date analysed	-	17/12/2019
Arsenic	mg/kg	14
Cadmium	mg/kg	2
Chromium	mg/kg	10
Copper	mg/kg	46
Lead	mg/kg	240
Mercury	mg/kg	0.2
Nickel	mg/kg	8
Zinc	mg/kg	500
Manganese	mg/kg	130
Iron	mg/kg	11,000
Aluminium	mg/kg	6,400
Selenium	mg/kg	<2
Tin	mg/kg	6
Antimony	mg/kg	<7
Magnesium	mg/kg	920
Cobalt	mg/kg	3
Boron	mg/kg	<3

Moisture						
Our Reference		233090-1	233090-2	233090-3	233090-4	233090-5
Your Reference	UNITS	201/0.9-1.2	201/7.9	202/4.8	202/7.0	203/0.5
Depth		0.9-1.2	7.9	4.8	7.0	0.5
Date Sampled		12/12/2019	12/12/2019	11/12/2019	11/12/2019	11/12/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	16/12/2019	16/12/2019	16/12/2019	16/12/2019	16/12/2019
Date analysed	-	17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Moisture	%	11	16	17	12	8.2

Moisture		
Our Reference		233090-6
Your Reference	UNITS	D3
Depth		-
Date Sampled		11/12/2019
Type of sample		Soil
Date prepared	-	16/12/2019
Date analysed	-	17/12/2019
Moisture	%	8.1

Coal Tar		
Our Reference		233090-7
Your Reference	UNITS	203/0-0.05
Depth		0-0.05
Date Sampled		11/12/2019
Type of sample		Soil
Date prepared	-	18/12/2019
Date analysed	-	18/12/2019
Presence of Coal Tar*	-	Absent

Method ID	Methodology Summary
AT-008	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
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-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-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.
Org-012/017	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS and/or GC-MS/MS. 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.

Method ID	Methodology Summary
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/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.
RTA T542	Determination of Phenol in core samples as per RTA test method T542. This procedure gives and indication of whether a sample of asphalt has been made with coal tar. The coal tar method gives an approximate result with a high degree of uncertainty.

QUALITY CONTROL: VOCs in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	233090-2
Date extracted	-			16/12/2019	1	16/12/2019	16/12/2019		16/12/2019	16/12/2019
Date analysed	-			17/12/2019	1	17/12/2019	17/12/2019		17/12/2019	17/12/2019
Dichlorodifluoromethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Chloromethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Vinyl Chloride	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Bromomethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Chloroethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Trichlorofluoromethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,1-Dichloroethene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
trans-1,2-dichloroethene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,1-dichloroethane	mg/kg	1	Org-014	<1	1	<1	<1	0	133	130
cis-1,2-dichloroethene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
bromochloromethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
chloroform	mg/kg	1	Org-014	<1	1	<1	<1	0	125	122
2,2-dichloropropane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,2-dichloroethane	mg/kg	1	Org-014	<1	1	<1	<1	0	122	139
1,1,1-trichloroethane	mg/kg	1	Org-014	<1	1	<1	<1	0	130	126
1,1-dichloropropene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Cyclohexane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
carbon tetrachloride	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-014	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
dibromomethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,2-dichloropropane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
trichloroethene	mg/kg	1	Org-014	<1	1	<1	<1	0	135	130
bromodichloromethane	mg/kg	1	Org-014	<1	1	<1	<1	0	130	115
trans-1,3-dichloropropene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
cis-1,3-dichloropropene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,1,2-trichloroethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-014	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,3-dichloropropane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
dibromochloromethane	mg/kg	1	Org-014	<1	1	<1	<1	0	126	108
1,2-dibromoethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
tetrachloroethene	mg/kg	1	Org-014	<1	1	<1	<1	0	121	137
1,1,1,2-tetrachloroethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
chlorobenzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
bromoform	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-014	<2	1	<2	<2	0	[NT]	[NT]
styrene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,1,2,2-tetrachloroethane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]

QUALITY CONTROL: VOCs in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	233090-2
o-Xylene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,2,3-trichloropropane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
isopropylbenzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
bromobenzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
n-propyl benzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
2-chlorotoluene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
4-chlorotoluene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,3,5-trimethyl benzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
tert-butyl benzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,2,4-trimethyl benzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,3-dichlorobenzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
sec-butyl benzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,4-dichlorobenzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
4-isopropyl toluene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,2-dichlorobenzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
n-butyl benzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,2-dibromo-3-chloropropane	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,2,4-trichlorobenzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
hexachlorobutadiene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
1,2,3-trichlorobenzene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluorometha	%		Org-014	100	1	101	102	1	99	100
Surrogate aaa-Trifluorotoluene	%		Org-014	131	1	133	112	17	130	122
Surrogate Toluene-d_8	%		Org-014	100	1	100	103	3	102	100
Surrogate 4-Bromofluorobenzene	%		Org-014	101	1	95	96	1	105	107

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	233090-2
Date extracted	-			16/12/2019	1	16/12/2019	16/12/2019		16/12/2019	16/12/2019
Date analysed	-			17/12/2019	1	17/12/2019	17/12/2019		17/12/2019	17/12/2019
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	74	72
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	74	72
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	68	66
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	72	69
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	74	73
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	77	77
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	73	73
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	131	1	133	112	17	130	122

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	233090-2
Date extracted	-			16/12/2019	1	16/12/2019	16/12/2019		16/12/2019	16/12/2019
Date analysed	-			16/12/2019	1	16/12/2019	16/12/2019		16/12/2019	16/12/2019
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	102	125
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	87	106
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	77	81
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	102	125
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	87	106
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	77	81
Surrogate o-Terphenyl	%		Org-003	76	1	73	73	0	87	74

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	233090-2
Date extracted	-			16/12/2019	1	16/12/2019	16/12/2019		16/12/2019	16/12/2019
Date analysed	-			17/12/2019	1	17/12/2019	17/12/2019		17/12/2019	17/12/2019
Naphthalene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	96	86
Acenaphthylene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	92	74
Phenanthrene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	0.1	0	98	#
Anthracene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	0.1	0	90	#
Pyrene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	0.1	0	92	#
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	74	#
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	<0.05	1	<0.05	<0.05	0	90	#
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	95	1	93	91	2	98	96

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			16/12/2019	1	16/12/2019	16/12/2019		16/12/2019	[NT]
Date analysed	-			17/12/2019	1	17/12/2019	17/12/2019		17/12/2019	[NT]
alpha-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	136	[NT]
HCB	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	128	[NT]
gamma-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	116	[NT]
delta-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	130	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	120	[NT]
gamma-Chlordane	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	126	[NT]
Dieldrin	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	138	[NT]
Endrin	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	118	[NT]
Endosulfan II	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	120	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	128	[NT]
Methoxychlor	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	97	1	94	92	2	98	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			16/12/2019	1	16/12/2019	16/12/2019		16/12/2019	[NT]
Date analysed	-			17/12/2019	1	17/12/2019	17/12/2019		17/12/2019	[NT]
Dichlorvos	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	98	[NT]
Dimethoate	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	84	[NT]
Fenitrothion	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	82	[NT]
Malathion	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	83	[NT]
Chlorpyriphos	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	86	[NT]
Parathion	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	82	[NT]
Bromophos-ethyl	mg/kg	0.1	AT-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	78	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	97	1	94	92	2	98	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			16/12/2019	1	16/12/2019	16/12/2019		16/12/2019	[NT]
Date analysed	-			17/12/2019	1	17/12/2019	17/12/2019		17/12/2019	[NT]
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	94	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-006	97	1	94	92	2	98	[NT]

QUALITY CONTROL: Misc Soil - Inorg					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
Date analysed	-			16/12/2019	[NT]	[NT]	[NT]	[NT]	16/12/2019	[NT]
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	[NT]	[NT]	[NT]	[NT]	102	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	233090-2
Date prepared	-			16/12/2019	1	16/12/2019	16/12/2019		16/12/2019	16/12/2019
Date analysed	-			17/12/2019	1	17/12/2019	17/12/2019		17/12/2019	17/12/2019
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	119	112
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	114	102
Chromium	mg/kg	1	Metals-020	<1	1	4	5	22	115	111
Copper	mg/kg	1	Metals-020	<1	1	7	7	0	113	119
Lead	mg/kg	1	Metals-020	<1	1	6	5	18	114	108
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	107	98
Nickel	mg/kg	1	Metals-020	<1	1	3	4	29	114	103
Zinc	mg/kg	1	Metals-020	<1	1	15	21	33	118	#
Manganese	mg/kg	1	Metals-020	<1	1	60	48	22	114	103
Iron	mg/kg	10	Metals-020	<10	1	4900	7000	35	115	##
Aluminium	mg/kg	10	Metals-020	<10	1	5000	5300	6	114	##
Selenium	mg/kg	2	Metals-020	<2	1	<3	<3	0	111	105
Tin	mg/kg	1	Metals-020	<1	1	<1	<1	0	113	103
Antimony	mg/kg	7	Metals-020	<7	1	<7	<7	0	111	93
Magnesium	mg/kg	10	Metals-020	<10	1	1500	1600	6	115	96
Cobalt	mg/kg	1	Metals-020	<1	1	1	2	67	112	100
Boron	mg/kg	3	Metals-020	<3	1	<5	<5	0	114	72

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: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Acid extractable metals in soil :
- # Percent recovery is not possible to report due to the inhomogeneous nature of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.
-## 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.
-The PQL has been raised for sample 233090-1 due to the sample matrix requiring dilution.
-The PQL has been raised for Se due to interferences from analytes (other than those being tested) in sample/s 233090-3 and 233090-4.

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CERTIFICATE OF ANALYSIS 233090-A

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew. Blackert, Chris Bozinovski, Dana Wilson
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**91667.02, Newcastle**
Number of Samples	7 Soil
Date samples received	13/12/2019
Date completed instructions received	06/01/2020

Analysis Details

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

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

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

Report Details

Date results requested by	06/01/2020
Date of Issue	30/12/2019

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

Results Approved By
Loren Bardwell, Senior Chemist
Steven Luong, Organics Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

Metals in TCLP USEPA1311		
Our Reference		233090-A-5
Your Reference	UNITS	203/0.5
Depth		0.5
Date Sampled		11/12/2019
Type of sample		Soil
Date extracted	-	23/12/2019
Date analysed	-	23/12/2019
pH of soil for fluid# determ.	pH units	8.1
pH of soil TCLP (after HCl)	pH units	1.8
Extraction fluid used	-	1
pH of final Leachate	pH units	5.0
Lead in TCLP	mg/L	0.03

PAHs in TCLP (USEPA 1311)		
Our Reference		233090-A-5
Your Reference	UNITS	203/0.5
Depth		0.5
Date Sampled		11/12/2019
Type of sample		Soil
Date extracted	-	23/12/2019
Date analysed	-	24/12/2019
Naphthalene in TCLP	mg/L	<0.001
Acenaphthylene in TCLP	mg/L	<0.001
Acenaphthene in TCLP	mg/L	<0.001
Fluorene in TCLP	mg/L	<0.001
Phenanthrene in TCLP	mg/L	<0.001
Anthracene in TCLP	mg/L	<0.001
Fluoranthene in TCLP	mg/L	<0.001
Pyrene in TCLP	mg/L	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Total +ve PAH's	mg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	92

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. Please note that the mass used may be scaled down from the default based on sample mass available.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Org-012/017	Leachates are extracted with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.

QUALITY CONTROL: Metals in TCLP USEPA1311						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			23/12/2019	[NT]	[NT]	[NT]	[NT]	23/12/2019	[NT]
Date analysed	-			23/12/2019	[NT]	[NT]	[NT]	[NT]	23/12/2019	[NT]
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	[NT]	[NT]	[NT]	[NT]	94	[NT]

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			23/12/2019	[NT]	[NT]	[NT]	[NT]	23/12/2019	[NT]
Date analysed	-			24/12/2019	[NT]	[NT]	[NT]	[NT]	24/12/2019	[NT]
Naphthalene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	122	[NT]
Acenaphthylene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	114	[NT]
Phenanthrene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	126	[NT]
Anthracene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	112	[NT]
Pyrene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	110	[NT]
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	82	[NT]
Benzo(bjk)fluoranthene in TCLP	mg/L	0.002	Org-012/017	<0.002	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	98	[NT]
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	85	[NT]	[NT]	[NT]	[NT]	96	[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
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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: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

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CERTIFICATE OF ANALYSIS 234001

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew. Blackert, Paulo Sebastian
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**91667.02**
Number of Samples	6 Water
Date samples received	08/01/2020
Date completed instructions received	08/01/2020

Analysis Details

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

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

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

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

Report Details

Date results requested by	15/01/2020
Date of Issue	14/01/2020

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Results Approved By
Diego Bigolin, Team Leader, Inorganics
Josh Williams, Senior Chemist
Loren Bardwell, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

VOCs in water					
Our Reference		234001-1	234001-2	234001-3	234001-4
Your Reference	UNITS	201	202	203	DW1
Date Sampled		07/01/2020	07/01/2020	07/01/2020	07/01/2020
Type of sample		Water	Water	Water	Water
Date extracted	-	09/01/2020	09/01/2020	09/01/2020	09/01/2020
Date analysed	-	09/01/2020	09/01/2020	09/01/2020	09/01/2020
Dichlorodifluoromethane	µg/L	<10	<10	<10	<100
Chloromethane	µg/L	<10	<10	<10	<100
Vinyl Chloride	µg/L	<10	<10	<10	<100
Bromomethane	µg/L	<10	<10	<10	<100
Chloroethane	µg/L	<10	<10	<10	<100
Trichlorofluoromethane	µg/L	<10	<10	<10	<100
1,1-Dichloroethene	µg/L	<1	<1	<1	<10
Trans-1,2-dichloroethene	µg/L	<1	<1	<1	<10
1,1-dichloroethane	µg/L	<1	<1	<1	<10
Cis-1,2-dichloroethene	µg/L	<1	<1	<1	<10
Bromochloromethane	µg/L	<1	<1	<1	<10
Chloroform	µg/L	<1	<1	<1	<10
2,2-dichloropropane	µg/L	<1	<1	<1	<10
1,2-dichloroethane	µg/L	<1	<1	<1	<10
1,1,1-trichloroethane	µg/L	<1	<1	<1	<10
1,1-dichloropropene	µg/L	<1	<1	<1	<10
Cyclohexane	µg/L	<1	<1	<1	<10
Carbon tetrachloride	µg/L	<1	<1	<1	<10
Benzene	µg/L	<1	<1	<1	<10
Dibromomethane	µg/L	<1	<1	<1	<10
1,2-dichloropropane	µg/L	<1	<1	<1	<10
Trichloroethene	µg/L	<1	<1	<1	<10
Bromodichloromethane	µg/L	<1	<1	<1	<10
trans-1,3-dichloropropene	µg/L	<1	<1	<1	<10
cis-1,3-dichloropropene	µg/L	<1	<1	<1	<10
1,1,2-trichloroethane	µg/L	<1	<1	<1	<10
Toluene	µg/L	<1	<1	<1	<10
1,3-dichloropropane	µg/L	<1	<1	<1	<10
Dibromochloromethane	µg/L	<1	<1	<1	<10
1,2-dibromoethane	µg/L	<1	<1	<1	<10
Tetrachloroethene	µg/L	<1	<1	<1	<10
1,1,1,2-tetrachloroethane	µg/L	<1	<1	<1	<10
Chlorobenzene	µg/L	<1	<1	<1	<10
Ethylbenzene	µg/L	<1	<1	<1	<10

VOCs in water					
Our Reference		234001-1	234001-2	234001-3	234001-4
Your Reference	UNITS	201	202	203	DW1
Date Sampled		07/01/2020	07/01/2020	07/01/2020	07/01/2020
Type of sample		Water	Water	Water	Water
Bromoform	µg/L	<1	<1	<1	<10
m+p-xylene	µg/L	<2	<2	<2	<20
Styrene	µg/L	<1	<1	<1	<10
1,1,2,2-tetrachloroethane	µg/L	<1	<1	<1	<10
o-xylene	µg/L	<1	<1	<1	<10
1,2,3-trichloropropane	µg/L	<1	<1	<1	<10
Isopropylbenzene	µg/L	<1	<1	<1	<10
Bromobenzene	µg/L	<1	<1	<1	<10
n-propyl benzene	µg/L	<1	<1	<1	<10
2-chlorotoluene	µg/L	<1	<1	<1	<10
4-chlorotoluene	µg/L	<1	<1	<1	<10
1,3,5-trimethyl benzene	µg/L	<1	<1	<1	<10
Tert-butyl benzene	µg/L	<1	<1	<1	<10
1,2,4-trimethyl benzene	µg/L	<1	<1	<1	<10
1,3-dichlorobenzene	µg/L	<1	<1	<1	<10
Sec-butyl benzene	µg/L	<1	<1	<1	<10
1,4-dichlorobenzene	µg/L	<1	<1	<1	<10
4-isopropyl toluene	µg/L	<1	<1	<1	<10
1,2-dichlorobenzene	µg/L	<1	<1	<1	<10
n-butyl benzene	µg/L	<1	<1	<1	<10
1,2-dibromo-3-chloropropane	µg/L	<1	<1	<1	<10
1,2,4-trichlorobenzene	µg/L	<1	<1	<1	<10
Hexachlorobutadiene	µg/L	<1	<1	<1	<10
1,2,3-trichlorobenzene	µg/L	<1	<1	<1	<10
Surrogate Dibromofluoromethane	%	108	108	104	107
Surrogate toluene-d8	%	98	98	98	99
Surrogate 4-BFB	%	100	101	101	100

vTRH(C6-C10)/BTEXN in Water						
Our Reference		234001-1	234001-2	234001-3	234001-4	234001-5
Your Reference	UNITS	201	202	203	DW1	TB1
Date Sampled		07/01/2020	07/01/2020	07/01/2020	07/01/2020	07/01/2020
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	09/01/2020	09/01/2020	09/01/2020	09/01/2020	09/01/2020
Date analysed	-	09/01/2020	09/01/2020	09/01/2020	09/01/2020	09/01/2020
TRH C_6 - C_9	µg/L	<10	<10	<10	<100	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10	<100	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10	<10	[NA]
Benzene	µg/L	<1	<1	<1	<10	<1
Toluene	µg/L	<1	<1	<1	<10	<1
Ethylbenzene	µg/L	<1	<1	<1	<10	<1
m+p-xylene	µg/L	<2	<2	<2	<20	<2
o-xylene	µg/L	<1	<1	<1	<10	<1
Naphthalene	µg/L	<1	<1	<1	<10	[NA]
Surrogate Dibromofluoromethane	%	108	108	104	107	105
Surrogate toluene-d8	%	98	98	98	99	98
Surrogate 4-BFB	%	100	101	101	100	100

vTRH(C6-C10)/BTEXN in Water		
Our Reference		234001-6
Your Reference	UNITS	TS1
Date Sampled		07/01/2020
Type of sample		Water
Date extracted	-	09/01/2020
Date analysed	-	09/01/2020
Benzene	µg/L	113%
Toluene	µg/L	109%
Ethylbenzene	µg/L	103%
m+p-xylene	µg/L	98%
o-xylene	µg/L	104%
Surrogate Dibromofluoromethane	%	106
Surrogate toluene-d8	%	102
Surrogate 4-BFB	%	100

svTRH (C10-C40) in Water					
Our Reference		234001-1	234001-2	234001-3	234001-4
Your Reference	UNITS	201	202	203	DW1
Date Sampled		07/01/2020	07/01/2020	07/01/2020	07/01/2020
Type of sample		Water	Water	Water	Water
Date extracted	-	09/01/2020	09/01/2020	09/01/2020	09/01/2020
Date analysed	-	10/01/2020	10/01/2020	10/01/2020	10/01/2020
TRH C_{10} - C_{14}	µg/L	<50	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100
Surrogate o-Terphenyl	%	70	67	73	72

PAHs in Water - Low Level					
Our Reference		234001-1	234001-2	234001-3	234001-4
Your Reference	UNITS	201	202	203	DW1
Date Sampled		07/01/2020	07/01/2020	07/01/2020	07/01/2020
Type of sample		Water	Water	Water	Water
Date extracted	-	09/01/2020	09/01/2020	09/01/2020	09/01/2020
Date analysed	-	09/01/2020	09/01/2020	09/01/2020	09/01/2020
Naphthalene	µg/L	<0.2	<0.2	<0.2	<0.2
Acenaphthylene	µg/L	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	107	93	86	84

HM in water - dissolved					
Our Reference		234001-1	234001-2	234001-3	234001-4
Your Reference	UNITS	201	202	203	DW1
Date Sampled		07/01/2020	07/01/2020	07/01/2020	07/01/2020
Type of sample		Water	Water	Water	Water
Date prepared	-	09/01/2020	09/01/2020	09/01/2020	09/01/2020
Date analysed	-	09/01/2020	09/01/2020	09/01/2020	09/01/2020
Arsenic-Dissolved	µg/L	<1	<1	<1	<1
Cadmium-Dissolved	µg/L	<0.1	<0.1	0.1	0.1
Chromium-Dissolved	µg/L	<1	<1	<1	<1
Copper-Dissolved	µg/L	<1	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	6	16	12	11
Zinc-Dissolved	µg/L	16	17	51	44

Total Phenolics in Water					
Our Reference		234001-1	234001-2	234001-3	234001-4
Your Reference	UNITS	201	202	203	DW1
Date Sampled		07/01/2020	07/01/2020	07/01/2020	07/01/2020
Type of sample		Water	Water	Water	Water
Date extracted	-	10/01/2020	10/01/2020	10/01/2020	10/01/2020
Date analysed	-	10/01/2020	10/01/2020	10/01/2020	10/01/2020
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05	<0.05

Method ID	Methodology Summary
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
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-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-013	Water samples are analysed directly 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.

QUALITY CONTROL: VOCs in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			09/01/2020	[NT]	[NT]	[NT]	[NT]	09/01/2020	[NT]
Date analysed	-			09/01/2020	[NT]	[NT]	[NT]	[NT]	09/01/2020	[NT]
Dichlorodifluoromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromomethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroform	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
2,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	91	[NT]
1,1,1-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
1,1-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Cyclohexane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromomethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Bromodichloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	90	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Toluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	81	[NT]
1,2-dibromoethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromoform	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
m+p-xylene	µg/L	2	Org-013	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Styrene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: VOCs in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
o-xylene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Isopropylbenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-propyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3,5-trimethyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tert-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trimethyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Sec-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-isopropyl toluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-013	106	[NT]	[NT]	[NT]	[NT]	102	[NT]
Surrogate toluene-d8	%		Org-013	98	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate 4-BFB	%		Org-013	101	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			09/01/2020	[NT]	[NT]	[NT]	[NT]	09/01/2020	[NT]
Date analysed	-			09/01/2020	[NT]	[NT]	[NT]	[NT]	09/01/2020	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	93	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	93	[NT]
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	90	[NT]
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	93	[NT]
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	91	[NT]
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	106	[NT]	[NT]	[NT]	[NT]	102	[NT]
Surrogate toluene-d8	%		Org-016	98	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate 4-BFB	%		Org-016	101	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			09/01/2020	[NT]	[NT]	[NT]	[NT]	09/01/2020	[NT]
Date analysed	-			10/01/2020	[NT]	[NT]	[NT]	[NT]	10/01/2020	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	114	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	111	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	107	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	114	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	111	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	107	[NT]
Surrogate o-Terphenyl	%		Org-003	75	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: PAHs in Water - Low Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			09/01/2020	[NT]	[NT]	[NT]	[NT]	09/01/2020	[NT]
Date analysed	-			09/01/2020	[NT]	[NT]	[NT]	[NT]	09/01/2020	[NT]
Naphthalene	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	110	[NT]
Acenaphthylene	µg/L	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	µg/L	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Phenanthrene	µg/L	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	116	[NT]
Anthracene	µg/L	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Pyrene	µg/L	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	120	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	126	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	89	[NT]	[NT]	[NT]	[NT]	94	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			09/01/2020	1	09/01/2020	09/01/2020		09/01/2020	[NT]
Date analysed	-			09/01/2020	1	09/01/2020	09/01/2020		09/01/2020	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	96	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	94	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	101	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	105	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	103	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	[NT]		106	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	6	6	0	100	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	16	15	6	95	[NT]

QUALITY CONTROL: Total Phenolics in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			10/01/2020	[NT]	[NT]	[NT]	[NT]	10/01/2020	[NT]
Date analysed	-			10/01/2020	[NT]	[NT]	[NT]	[NT]	10/01/2020	[NT]
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	[NT]	[NT]	[NT]	[NT]	96	[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: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

VOCs in water - The PQL for 234001-4 has been raised due to the sample matrix thereby requiring a dilution.

vTRH & BTEXN in Water NEPM - The PQL for 234001-4 has been raised due to the sample matrix thereby requiring a dilution.

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CERTIFICATE OF ANALYSIS 238190

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew Blackert, Chris Bozinovski, Jason Lambert
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**91667.02, Newcastle**
Number of Samples	4 Material, 16 Soil
Date samples received	05/03/2020
Date completed instructions received	05/03/2020

Analysis Details

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

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

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

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

Report Details

Date results requested by	12/03/2020
Date of Issue	11/03/2020

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu, Wonnie Condos
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Diego Bigolin, Team Leader, Inorganics
Josh Williams, Senior Chemist
Ken Nguyen, Reporting Supervisor
Lucy Zhu, Asbestos Supervisor
Ridwan Wijaya, Lab Team Leader

Authorised By

Nancy Zhang, Laboratory Manager

VOCs in soil		
Our Reference		238190-13
Your Reference	UNITS	302/0.3
Date Sampled		03/03/2020
Type of sample		Soil
Date extracted	-	09/03/2020
Date analysed	-	09/03/2020
Dichlorodifluoromethane	mg/kg	<1
Chloromethane	mg/kg	<1
Vinyl Chloride	mg/kg	<1
Bromomethane	mg/kg	<1
Chloroethane	mg/kg	<1
Trichlorofluoromethane	mg/kg	<1
1,1-Dichloroethene	mg/kg	<1
trans-1,2-dichloroethene	mg/kg	<1
1,1-dichloroethane	mg/kg	<1
cis-1,2-dichloroethene	mg/kg	<1
bromochloromethane	mg/kg	<1
chloroform	mg/kg	<1
2,2-dichloropropane	mg/kg	<1
1,2-dichloroethane	mg/kg	<1
1,1,1-trichloroethane	mg/kg	<1
1,1-dichloropropene	mg/kg	<1
Cyclohexane	mg/kg	<1
carbon tetrachloride	mg/kg	<1
Benzene	mg/kg	<0.2
dibromomethane	mg/kg	<1
1,2-dichloropropane	mg/kg	<1
trichloroethene	mg/kg	<1
bromodichloromethane	mg/kg	<1
trans-1,3-dichloropropene	mg/kg	<1
cis-1,3-dichloropropene	mg/kg	<1
1,1,2-trichloroethane	mg/kg	<1
Toluene	mg/kg	<0.5
1,3-dichloropropane	mg/kg	<1
dibromochloromethane	mg/kg	<1
1,2-dibromoethane	mg/kg	<1
tetrachloroethene	mg/kg	<1
1,1,1,2-tetrachloroethane	mg/kg	<1
chlorobenzene	mg/kg	<1
Ethylbenzene	mg/kg	<1

VOCs in soil		
Our Reference		238190-13
Your Reference	UNITS	302/0.3
Date Sampled		03/03/2020
Type of sample		Soil
bromoform	mg/kg	<1
m+p-xylene	mg/kg	<2
styrene	mg/kg	<1
1,1,2,2-tetrachloroethane	mg/kg	<1
o-Xylene	mg/kg	<1
1,2,3-trichloropropane	mg/kg	<1
isopropylbenzene	mg/kg	<1
bromobenzene	mg/kg	<1
n-propyl benzene	mg/kg	<1
2-chlorotoluene	mg/kg	<1
4-chlorotoluene	mg/kg	<1
1,3,5-trimethyl benzene	mg/kg	<1
tert-butyl benzene	mg/kg	<1
1,2,4-trimethyl benzene	mg/kg	<1
1,3-dichlorobenzene	mg/kg	<1
sec-butyl benzene	mg/kg	<1
1,4-dichlorobenzene	mg/kg	<1
4-isopropyl toluene	mg/kg	<1
1,2-dichlorobenzene	mg/kg	<1
n-butyl benzene	mg/kg	<1
1,2-dibromo-3-chloropropane	mg/kg	<1
1,2,4-trichlorobenzene	mg/kg	<1
hexachlorobutadiene	mg/kg	<1
1,2,3-trichlorobenzene	mg/kg	<1
Surrogate Dibromofluorometha	%	105
Surrogate aaa-Trifluorotoluene	%	105
Surrogate Toluene-d_8	%	105
Surrogate 4-Bromofluorobenzene	%	98

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		238190-7	238190-8	238190-10	238190-13	238190-14
Your Reference	UNITS	TS2	TB2	301/0.2	302/0.3	303/0.2
Date Sampled		03/03/2020	03/03/2020	03/03/2020	03/03/2020	03/03/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/03/2020	09/03/2020	09/03/2020	09/03/2020	09/03/2020
Date analysed	-	09/03/2020	09/03/2020	09/03/2020	09/03/2020	09/03/2020
TRH C_6 - C_9	mg/kg	[NA]	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	[NA]	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	[NA]	[NA]	<25	<25	<25
Benzene	mg/kg	113%	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	109%	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	109%	<1	<1	<1	<1
m+p-xylene	mg/kg	110%	<2	<2	<2	<2
o-Xylene	mg/kg	113%	<1	<1	<1	<1
naphthalene	mg/kg	[NA]	[NA]	<1	<1	<1
Total +ve Xylenes	mg/kg	[NA]	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	80	98	91	105	102

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		238190-15	238190-16	238190-17	238190-18	238190-19
Your Reference	UNITS	304/0.2	306/0.5	308/0.1	309/0.3	310/0.2
Date Sampled		03/03/2020	03/03/2020	03/03/2020	03/03/2020	03/03/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/03/2020	09/03/2020	09/03/2020	09/03/2020	09/03/2020
Date analysed	-	09/03/2020	09/03/2020	09/03/2020	09/03/2020	09/03/2020
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	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	90	65	103	71	93

svTRH (C10-C40) in Soil						
Our Reference		238190-10	238190-13	238190-14	238190-15	238190-16
Your Reference	UNITS	301/0.2	302/0.3	303/0.2	304/0.2	306/0.5
Date Sampled		03/03/2020	03/03/2020	03/03/2020	03/03/2020	03/03/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/03/2020	09/03/2020	09/03/2020	09/03/2020	09/03/2020
Date analysed	-	10/03/2020	10/03/2020	10/03/2020	10/03/2020	10/03/2020
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	120	<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	190	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	190	<50	<50	<50	<50
Surrogate o-Terphenyl	%	90	101	101	89	103

svTRH (C10-C40) in Soil				
Our Reference		238190-17	238190-18	238190-19
Your Reference	UNITS	308/0.1	309/0.3	310/0.2
Date Sampled		03/03/2020	03/03/2020	03/03/2020
Type of sample		Soil	Soil	Soil
Date extracted	-	09/03/2020	09/03/2020	09/03/2020
Date analysed	-	10/03/2020	10/03/2020	10/03/2020
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50
Surrogate o-Terphenyl	%	93	99	88

PAHs in Soil						
Our Reference		238190-9	238190-10	238190-11	238190-12	238190-13
Your Reference	UNITS	301/0.05	301/0.2	301/0.4	301/0.7	302/0.3
Date Sampled		03/03/2020	03/03/2020	03/03/2020	03/03/2020	03/03/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/03/2020	09/03/2020	09/03/2020	09/03/2020	09/03/2020
Date analysed	-	09/03/2020	09/03/2020	09/03/2020	09/03/2020	09/03/2020
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.3	0.6	0.2	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	0.4	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	1.9	4.0	1	<0.1	0.5
Anthracene	mg/kg	0.3	0.7	0.2	<0.1	0.1
Fluoranthene	mg/kg	4.1	7.4	2.1	0.1	0.8
Pyrene	mg/kg	3.7	6.4	1.8	<0.1	0.8
Benzo(a)anthracene	mg/kg	1.9	3.5	1.3	<0.1	0.4
Chrysene	mg/kg	1.9	3.2	1.2	<0.1	0.4
Benzo(b,j+k)fluoranthene	mg/kg	3.6	5.6	2	<0.2	0.7
Benzo(a)pyrene	mg/kg	2.1	3.2	1.1	<0.05	0.4
Indeno(1,2,3-c,d)pyrene	mg/kg	1.3	1.7	0.5	<0.1	0.2
Dibenzo(a,h)anthracene	mg/kg	0.3	0.4	0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	1.3	1.7	0.5	<0.1	0.2
Total +ve PAH's	mg/kg	23	39	12	0.1	4.4
Benzo(a)pyrene TEQ calc (zero)	mg/kg	3.0	4.8	1.7	<0.5	0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	3.0	4.8	1.7	<0.5	0.6
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	3.0	4.8	1.7	<0.5	0.6
Surrogate p-Terphenyl-d14	%	100	104	104	104	100

PAHs in Soil						
Our Reference		238190-14	238190-15	238190-16	238190-17	238190-18
Your Reference	UNITS	303/0.2	304/0.2	306/0.5	308/0.1	309/0.3
Date Sampled		03/03/2020	03/03/2020	03/03/2020	03/03/2020	03/03/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/03/2020	09/03/2020	09/03/2020	09/03/2020	09/03/2020
Date analysed	-	09/03/2020	09/03/2020	09/03/2020	09/03/2020	09/03/2020
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	0.6	0.2	<0.1	0.6	0.4
Anthracene	mg/kg	0.2	<0.1	<0.1	0.1	0.1
Fluoranthene	mg/kg	1.3	0.4	<0.1	1.7	1
Pyrene	mg/kg	1.0	0.4	<0.1	1.5	0.8
Benzo(a)anthracene	mg/kg	0.7	0.2	<0.1	0.6	0.5
Chrysene	mg/kg	0.6	0.2	<0.1	0.5	0.4
Benzo(b,j+k)fluoranthene	mg/kg	1	0.3	<0.2	0.9	0.7
Benzo(a)pyrene	mg/kg	0.54	0.2	<0.05	0.5	0.4
Indeno(1,2,3-c,d)pyrene	mg/kg	0.2	<0.1	<0.1	0.3	0.2
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.2	<0.1	<0.1	0.3	0.2
Total +ve PAH's	mg/kg	6.4	1.8	<0.05	7.0	4.8
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.7	<0.5	<0.5	0.7	0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.8	<0.5	<0.5	0.7	0.6
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.8	<0.5	<0.5	0.8	0.6
Surrogate p-Terphenyl-d14	%	104	102	103	104	104

PAHs in Soil			
Our Reference		238190-19	238190-20
Your Reference	UNITS	310/0.2	D3
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
Date extracted	-	09/03/2020	09/03/2020
Date analysed	-	09/03/2020	09/03/2020
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	0.2
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.9
Anthracene	mg/kg	<0.1	0.2
Fluoranthene	mg/kg	<0.1	1.9
Pyrene	mg/kg	<0.1	1.6
Benzo(a)anthracene	mg/kg	<0.1	1.2
Chrysene	mg/kg	<0.1	1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	2
Benzo(a)pyrene	mg/kg	<0.05	0.88
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.4
Dibenzo(a,h)anthracene	mg/kg	<0.1	0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.4
Total +ve PAH's	mg/kg	<0.05	10
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	1.3
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	1.3
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	1.3
Surrogate p-Terphenyl-d14	%	102	103

Organochlorine Pesticides in soil		
Our Reference		238190-13
Your Reference	UNITS	302/0.3
Date Sampled		03/03/2020
Type of sample		Soil
Date extracted	-	09/03/2020
Date analysed	-	09/03/2020
alpha-BHC	mg/kg	<0.1
HCB	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	107

Organophosphorus Pesticides in Soil		
Our Reference		238190-13
Your Reference	UNITS	302/0.3
Date Sampled		03/03/2020
Type of sample		Soil
Date extracted	-	09/03/2020
Date analysed	-	09/03/2020
Dichlorvos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Parathion	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Ethion	mg/kg	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1
Surrogate TCMX	%	107

PCBs in Soil		
Our Reference		238190-13
Your Reference	UNITS	302/0.3
Date Sampled		03/03/2020
Type of sample		Soil
Date extracted	-	09/03/2020
Date analysed	-	09/03/2020
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCMX	%	107

Misc Soil - Inorg		
Our Reference		238190-13
Your Reference	UNITS	302/0.3
Date Sampled		03/03/2020
Type of sample		Soil
Date prepared	-	9/03/2020
Date analysed	-	9/03/2020
Total Phenolics (as Phenol)	mg/kg	<5

Acid Extractable metals in soil						
Our Reference	UNITS	238190-9	238190-10	238190-11	238190-12	238190-13
Your Reference		301/0.05	301/0.2	301/0.4	301/0.7	302/0.3
Date Sampled		03/03/2020	03/03/2020	03/03/2020	03/03/2020	03/03/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	09/03/2020	09/03/2020	09/03/2020	09/03/2020	09/03/2020
Date analysed	-	09/03/2020	09/03/2020	09/03/2020	09/03/2020	09/03/2020
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	1	1	<0.4	<0.4	<0.4
Chromium	mg/kg	21	15	7	2	4
Copper	mg/kg	170	140	26	8	15
Lead	mg/kg	770	670	190	14	75
Zinc	mg/kg	620	470	110	14	89
Mercury	mg/kg	0.3	0.4	1.4	<0.1	<0.1
Nickel	mg/kg	10	9	5	1	4
Manganese	mg/kg	260	290	60	19	140
Iron	mg/kg	8,500	8,700	6,000	2,700	8,400
Aluminium	mg/kg	5,000	5,400	3,300	1,400	3,400
Selenium	mg/kg	<2	<2	<2	<2	<2
Tin	mg/kg	3	3	1	<1	1
Antimony	mg/kg	<7	<7	<7	<7	<7
Magnesium	mg/kg	1,500	1,200	610	270	310
Cobalt	mg/kg	4	5	1	<1	2
Boron	mg/kg	5	<3	<3	<3	<3

Acid Extractable metals in soil						
Our Reference		238190-14	238190-15	238190-16	238190-17	238190-18
Your Reference	UNITS	303/0.2	304/0.2	306/0.5	308/0.1	309/0.3
Date Sampled		03/03/2020	03/03/2020	03/03/2020	03/03/2020	03/03/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	09/03/2020	09/03/2020	09/03/2020	09/03/2020	09/03/2020
Date analysed	-	09/03/2020	09/03/2020	09/03/2020	09/03/2020	09/03/2020
Arsenic	mg/kg	5	<4	10	<4	7
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	12	4	23	11	9
Copper	mg/kg	10	15	3	30	18
Lead	mg/kg	68	44	10	19	50
Zinc	mg/kg	50	46	4	58	85
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	5	3	2	6	13
Manganese	mg/kg	130	53	6	270	500
Iron	mg/kg	14,000	4,600	36,000	7,800	17,000
Aluminium	mg/kg	11,000	2,600	18,000	5,700	5,800
Selenium	mg/kg	<2	<2	<4	<2	<2
Tin	mg/kg	1	<1	<1	<1	<1
Antimony	mg/kg	<7	<7	<7	<7	<7
Magnesium	mg/kg	410	260	780	1,800	1,700
Cobalt	mg/kg	2	2	<1	3	11
Boron	mg/kg	<3	<3	<3	4	<3

Acid Extractable metals in soil				
Our Reference		238190-19	238190-20	238190-21
Your Reference	UNITS	310/0.2	D3	302/0.3 - [TRIPLICATE]
Date Sampled		03/03/2020	03/03/2020	03/03/2020
Type of sample		Soil	Soil	Soil
Date prepared	-	09/03/2020	09/03/2020	09/03/2020
Date analysed	-	09/03/2020	09/03/2020	09/03/2020
Arsenic	mg/kg	5	<4	5
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	15	5	4
Copper	mg/kg	<1	16	44
Lead	mg/kg	5	54	110
Zinc	mg/kg	2	39	170
Mercury	mg/kg	<0.1	0.3	<0.1
Nickel	mg/kg	<1	3	8
Manganese	mg/kg	3	34	220
Iron	mg/kg	17,000	5,500	10,000
Aluminium	mg/kg	9,400	2,700	4,100
Selenium	mg/kg	<2	<2	<2
Tin	mg/kg	<1	<1	3
Antimony	mg/kg	<7	<7	<7
Magnesium	mg/kg	380	490	530
Cobalt	mg/kg	<1	1	5
Boron	mg/kg	<3	<3	<3

Moisture						
Our Reference		238190-9	238190-10	238190-11	238190-12	238190-13
Your Reference	UNITS	301/0.05	301/0.2	301/0.4	301/0.7	302/0.3
Date Sampled		03/03/2020	03/03/2020	03/03/2020	03/03/2020	03/03/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/03/2020	9/03/2020	9/03/2020	9/03/2020	9/03/2020
Date analysed	-	10/03/2020	10/03/2020	10/03/2020	10/03/2020	10/03/2020
Moisture	%	20	13	7.7	5.4	8.0

Moisture						
Our Reference		238190-14	238190-15	238190-16	238190-17	238190-18
Your Reference	UNITS	303/0.2	304/0.2	306/0.5	308/0.1	309/0.3
Date Sampled		03/03/2020	03/03/2020	03/03/2020	03/03/2020	03/03/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/03/2020	9/03/2020	9/03/2020	9/03/2020	9/03/2020
Date analysed	-	10/03/2020	10/03/2020	10/03/2020	10/03/2020	10/03/2020
Moisture	%	6.5	6.7	22	8.8	6.5

Moisture			
Our Reference		238190-19	238190-20
Your Reference	UNITS	310/0.2	D3
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
Date prepared	-	9/03/2020	9/03/2020
Date analysed	-	10/03/2020	10/03/2020
Moisture	%	13	8.1

Asbestos ID - soils						
Our Reference		238190-3	238190-5	238190-10	238190-13	238190-15
Your Reference	UNITS	307/F1S	307/F2S	301/0.2	302/0.3	304/0.2
Date Sampled		03/03/2020	03/03/2020	03/03/2020	03/03/2020	03/03/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	10/03/2020	10/03/2020	10/03/2020	10/03/2020	10/03/2020
Sample mass tested	g	Approx. 35g	Approx. 40g	Approx. 35g	Approx. 40g	Approx. 40g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Asbestos comments	-	NO	NO	NO	NO	NO
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils			
Our Reference		238190-17	238190-18
Your Reference	UNITS	308/0.1	309/0.3
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
Date analysed	-	10/03/2020	10/03/2020
Sample mass tested	g	Approx. 35g	Approx. 35g
Sample Description	-	Brown fine-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Asbestos comments	-	NO	NO
Trace Analysis	-	No asbestos detected	No asbestos detected

Asbestos ID - materials					
Our Reference	UNITS	238190-1	238190-2	238190-4	238190-6
Your Reference		302/F1	307/F1	307/F2	310/F1
Date Sampled		03/03/2020	03/03/2020	03/03/2020	03/03/2020
Type of sample		Material	Material	Material	Material
Date analysed	-	10/03/2020	10/03/2020	10/03/2020	10/03/2020
Mass / Dimension of Sample	-	40x30x4mm	80x50x2mm	90x70x4mm	60x40x5mm
Sample Description	-	Beige fibre cement material	Beige fibrous material and paint	Beige fibre cement material	Beige fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Amosite asbestos detected	No asbestos detected Synthetic mineral fibres detected	Chrysotile asbestos detected Organic fibres detected	Chrysotile asbestos detected Organic fibres detected
Trace Analysis	-	[NT]	No asbestos detected	[NT]	[NT]

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.
AT-008	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
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-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-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.
Org-012/017	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS and/or GC-MS/MS. 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.

Method ID	Methodology Summary
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/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: VOCs in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			09/03/2020	13	09/03/2020	09/03/2020		09/03/2020	[NT]
Date analysed	-			09/03/2020	13	09/03/2020	09/03/2020		09/03/2020	[NT]
Dichlorodifluoromethane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
Chloromethane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
Vinyl Chloride	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
Bromomethane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
Chloroethane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
Trichlorofluoromethane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,1-Dichloroethene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
trans-1,2-dichloroethene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,1-dichloroethane	mg/kg	1	Org-014	<1	13	<1	<1	0	72	[NT]
cis-1,2-dichloroethene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
bromochloromethane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
chloroform	mg/kg	1	Org-014	<1	13	<1	<1	0	86	[NT]
2,2-dichloropropane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,2-dichloroethane	mg/kg	1	Org-014	<1	13	<1	<1	0	85	[NT]
1,1,1-trichloroethane	mg/kg	1	Org-014	<1	13	<1	<1	0	76	[NT]
1,1-dichloropropene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
Cyclohexane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
carbon tetrachloride	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-014	<0.2	13	<0.2	<0.2	0	[NT]	[NT]
dibromomethane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,2-dichloropropane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
trichloroethene	mg/kg	1	Org-014	<1	13	<1	<1	0	78	[NT]
bromodichloromethane	mg/kg	1	Org-014	<1	13	<1	<1	0	96	[NT]
trans-1,3-dichloropropene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
cis-1,3-dichloropropene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,1,2-trichloroethane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-014	<0.5	13	<0.5	<0.5	0	[NT]	[NT]
1,3-dichloropropane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
dibromochloromethane	mg/kg	1	Org-014	<1	13	<1	<1	0	90	[NT]
1,2-dibromoethane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
tetrachloroethene	mg/kg	1	Org-014	<1	13	<1	<1	0	87	[NT]
1,1,1,2-tetrachloroethane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
chlorobenzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
bromoform	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-014	<2	13	<2	<2	0	[NT]	[NT]
styrene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,1,2,2-tetrachloroethane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]

QUALITY CONTROL: VOCs in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
o-Xylene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,2,3-trichloropropane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
isopropylbenzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
bromobenzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
n-propyl benzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
2-chlorotoluene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
4-chlorotoluene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,3,5-trimethyl benzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
tert-butyl benzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,2,4-trimethyl benzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,3-dichlorobenzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
sec-butyl benzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,4-dichlorobenzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
4-isopropyl toluene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,2-dichlorobenzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
n-butyl benzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,2-dibromo-3-chloropropane	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,2,4-trichlorobenzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
hexachlorobutadiene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
1,2,3-trichlorobenzene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluorometha	%		Org-014	101	13	105	103	2	100	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-014	89	13	105	93	12	90	[NT]
Surrogate Toluene-d_8	%		Org-014	104	13	105	105	0	102	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-014	97	13	98	99	1	96	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			09/03/2020	13	09/03/2020	09/03/2020		09/03/2020	[NT]
Date analysed	-			09/03/2020	13	09/03/2020	09/03/2020		09/03/2020	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	13	<25	<25	0	90	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	13	<25	<25	0	90	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	13	<0.2	<0.2	0	76	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	13	<0.5	<0.5	0	90	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	13	<1	<1	0	94	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	13	<2	<2	0	96	[NT]
o-Xylene	mg/kg	1	Org-016	<1	13	<1	<1	0	94	[NT]
naphthalene	mg/kg	1	Org-014	<1	13	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	89	13	105	93	12	90	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			09/03/2020	13	09/03/2020	09/03/2020		09/03/2020	[NT]
Date analysed	-			10/03/2020	13	10/03/2020	10/03/2020		10/03/2020	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	13	<50	<50	0	84	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	13	<100	<100	0	65	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	13	<100	<100	0	77	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	13	<50	<50	0	84	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	13	<100	<100	0	65	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	13	<100	<100	0	77	[NT]
Surrogate o-Terphenyl	%		Org-003	104	13	101	88	14	100	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			09/03/2020	9	09/03/2020	09/03/2020		09/03/2020	[NT]
Date analysed	-			09/03/2020	9	09/03/2020	09/03/2020		09/03/2020	[NT]
Naphthalene	mg/kg	0.1	Org-012/017	<0.1	9	<0.1	<0.1	0	110	[NT]
Acenaphthylene	mg/kg	0.1	Org-012/017	<0.1	9	0.3	0.3	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	<0.1	9	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	<0.1	9	<0.1	0.2	67	122	[NT]
Phenanthrene	mg/kg	0.1	Org-012/017	<0.1	9	1.9	2.0	5	118	[NT]
Anthracene	mg/kg	0.1	Org-012/017	<0.1	9	0.3	0.4	29	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	<0.1	9	4.1	4.4	7	112	[NT]
Pyrene	mg/kg	0.1	Org-012/017	<0.1	9	3.7	3.9	5	104	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	<0.1	9	1.9	2.0	5	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	<0.1	9	1.9	2.0	5	94	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	<0.2	9	3.6	3.8	5	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	<0.05	9	2.1	2.2	5	102	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	<0.1	9	1.3	1.3	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	<0.1	9	0.3	0.3	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	<0.1	9	1.3	1.3	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	103	9	100	104	4	104	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	13	09/03/2020	09/03/2020		[NT]	[NT]
Date analysed	-			[NT]	13	09/03/2020	09/03/2020		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012/017	[NT]	13	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012/017	[NT]	13	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	[NT]	13	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	[NT]	13	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012/017	[NT]	13	0.5	0.8	46	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012/017	[NT]	13	0.1	0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	[NT]	13	0.8	1.3	48	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012/017	[NT]	13	0.8	1.3	48	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	[NT]	13	0.4	0.6	40	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	[NT]	13	0.4	0.5	22	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	[NT]	13	0.7	0.9	25	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	[NT]	13	0.4	0.53	28	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	[NT]	13	0.2	0.4	67	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	[NT]	13	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	[NT]	13	0.2	0.4	67	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	[NT]	13	100	105	5	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			09/03/2020	13	09/03/2020	09/03/2020		09/03/2020	[NT]
Date analysed	-			09/03/2020	13	09/03/2020	09/03/2020		09/03/2020	[NT]
alpha-BHC	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	110	[NT]
HCB	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	112	[NT]
gamma-BHC	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	94	[NT]
delta-BHC	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	126	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	120	[NT]
gamma-Chlordane	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	118	[NT]
Dieldrin	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	126	[NT]
Endrin	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	116	[NT]
Endosulfan II	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	108	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	82	[NT]
Methoxychlor	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	106	13	107	104	3	104	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			09/03/2020	13	09/03/2020	09/03/2020		09/03/2020	[NT]
Date analysed	-			09/03/2020	13	09/03/2020	09/03/2020		09/03/2020	[NT]
Dichlorvos	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	72	[NT]
Dimethoate	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	82	[NT]
Fenitrothion	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	72	[NT]
Malathion	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	76	[NT]
Chlorpyriphos	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	92	[NT]
Parathion	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	82	[NT]
Bromophos-ethyl	mg/kg	0.1	AT-008	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	88	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-012/017	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	106	13	107	104	3	104	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			09/03/2020	13	09/03/2020	09/03/2020		09/03/2020	[NT]
Date analysed	-			09/03/2020	13	09/03/2020	09/03/2020		09/03/2020	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	13	<0.1	<0.1	0	110	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	13	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-006	106	13	107	104	3	104	[NT]

QUALITY CONTROL: Misc Soil - Inorg					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date prepared	-			09/03/2020	[NT]	[NT]	[NT]	[NT]	09/03/2020	[NT]
Date analysed	-			09/03/2020	[NT]	[NT]	[NT]	[NT]	09/03/2020	[NT]
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date prepared	-			09/03/2020	9	09/03/2020	09/03/2020		09/03/2020	[NT]
Date analysed	-			09/03/2020	9	09/03/2020	09/03/2020		09/03/2020	[NT]
Arsenic	mg/kg	4	Metals-020	<4	9	<4	<4	0	109	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	9	1	1	0	102	[NT]
Chromium	mg/kg	1	Metals-020	<1	9	21	21	0	118	[NT]
Copper	mg/kg	1	Metals-020	<1	9	170	150	12	112	[NT]
Lead	mg/kg	1	Metals-020	<1	9	770	800	4	111	[NT]
Zinc	mg/kg	1	Metals-020	<1	9	620	550	12	111	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	9	0.3	0.3	0	99	[NT]
Nickel	mg/kg	1	Metals-020	<1	9	10	10	0	106	[NT]
Manganese	mg/kg	1	Metals-020	<1	9	260	280	7	102	[NT]
Iron	mg/kg	10	Metals-020	<10	9	8500	8300	2	118	[NT]
Aluminium	mg/kg	10	Metals-020	<10	9	5000	5300	6	104	[NT]
Selenium	mg/kg	2	Metals-020	<2	9	<2	<2	0	99	[NT]
Tin	mg/kg	1	Metals-020	<1	9	3	4	29	101	[NT]
Antimony	mg/kg	7	Metals-020	<7	9	<7	<7	0	98	[NT]
Magnesium	mg/kg	10	Metals-020	<10	9	1500	1400	7	105	[NT]
Cobalt	mg/kg	1	Metals-020	<1	9	4	5	22	104	[NT]
Boron	mg/kg	3	Metals-020	<3	9	5	4	22	94	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	13	09/03/2020	09/03/2020		[NT]	[NT]
Date analysed	-			[NT]	13	09/03/2020	09/03/2020		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	13	<4	5	22	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	13	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	13	4	4	0	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	13	15	50	108	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	13	75	36	70	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	13	89	78	13	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	13	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	13	4	10	86	[NT]	[NT]
Manganese	mg/kg	1	Metals-020	[NT]	13	140	280	67	[NT]	[NT]
Iron	mg/kg	10	Metals-020	[NT]	13	8400	14000	50	[NT]	[NT]
Aluminium	mg/kg	10	Metals-020	[NT]	13	3400	3900	14	[NT]	[NT]
Selenium	mg/kg	2	Metals-020	[NT]	13	<2	<2	0	[NT]	[NT]
Tin	mg/kg	1	Metals-020	[NT]	13	1	4	120	[NT]	[NT]
Antimony	mg/kg	7	Metals-020	[NT]	13	<7	<7	0	[NT]	[NT]
Magnesium	mg/kg	10	Metals-020	[NT]	13	310	540	54	[NT]	[NT]
Cobalt	mg/kg	1	Metals-020	[NT]	13	2	8	120	[NT]	[NT]
Boron	mg/kg	3	Metals-020	[NT]	13	<3	<3	0	[NT]	[NT]

Result Definitions

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

Quality Control Definitions

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

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

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Acid Extractable Metals in Soil:
-The laboratory RPD acceptance criteria has been exceeded for 238190-13 for Cu,Pb,Ni,Mn,Fe and Mg. Therefore a triplicate result has been issued as laboratory sample number 238190-21.
-The PQL has been raised due to interferences from analytes (other than those being tested) in sample 238190-16.

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 238190-10, 13, 15, 17, 18 were sub-sampled from jars provided by the client.

Asbestos: Excessive sample volume was provided for asbestos analysis. A portion of the supplied sample was sub-sampled according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g (50mL) of sample in its own container as per AS4964-2004.
Note: Samples 238190-3, 5 were sub-sampled from bags provided by the client.

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CERTIFICATE OF ANALYSIS 238190-A

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew. Blackert
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**91667.02, Newcastle**
Number of Samples	4 Material, 17 Soil
Date samples received	05/03/2020
Date completed instructions received	10/03/2020

Analysis Details

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

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

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

Report Details

Date results requested by	17/03/2020
Date of Issue	13/03/2020

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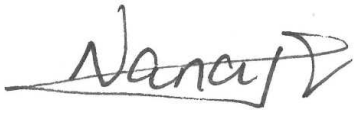
Results Approved By
Jaimie Loa-Kum-Cheung, Metals Supervisor
Josh Williams, Senior Chemist
Ridwan Wijaya, Lab Team Leader
Steven Luong, Organics Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		238190-A-21
Your Reference	UNITS	309/0.5
Date Sampled		03/03/2020
Type of sample		Soil
Date extracted	-	11/03/2020
Date analysed	-	11/03/2020
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<3
Surrogate aaa-Trifluorotoluene	%	97

svTRH (C10-C40) in Soil		
Our Reference		238190-A-21
Your Reference	UNITS	309/0.5
Date Sampled		03/03/2020
Type of sample		Soil
Date extracted	-	11/03/2020
Date analysed	-	11/03/2020
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	130
TRH C_{29} - C_{36}	mg/kg	130
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	220
TRH >C_{34} -C_{40}	mg/kg	150
Total +ve TRH (>C10-C40)	mg/kg	360
Surrogate o-Terphenyl	%	102

PAHs in Soil		
Our Reference		238190-A-21
Your Reference	UNITS	309/0.5
Date Sampled		03/03/2020
Type of sample		Soil
Date extracted	-	11/03/2020
Date analysed	-	11/03/2020
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	0.3
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	0.3
Phenanthrene	mg/kg	2.6
Anthracene	mg/kg	0.5
Fluoranthene	mg/kg	5.0
Pyrene	mg/kg	4.4
Benzo(a)anthracene	mg/kg	2.4
Chrysene	mg/kg	2.1
Benzo(b,j+k)fluoranthene	mg/kg	3.5
Benzo(a)pyrene	mg/kg	2.2
Indeno(1,2,3-c,d)pyrene	mg/kg	1.0
Dibenzo(a,h)anthracene	mg/kg	0.2
Benzo(g,h,i)perylene	mg/kg	1.0
Total +ve PAH's	mg/kg	25
Benzo(a)pyrene TEQ calc (zero)	mg/kg	3.1
Benzo(a)pyrene TEQ calc(half)	mg/kg	3.1
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	3.1
Surrogate p-Terphenyl-d14	%	103

Acid Extractable metals in soil		
Our Reference		238190-A-21
Your Reference	UNITS	309/0.5
Date Sampled		03/03/2020
Type of sample		Soil
Date prepared	-	12/03/2020
Date analysed	-	12/03/2020
Arsenic	mg/kg	6
Cadmium	mg/kg	<0.4
Chromium	mg/kg	12
Copper	mg/kg	360
Lead	mg/kg	180
Zinc	mg/kg	280
Mercury	mg/kg	0.2
Nickel	mg/kg	11
Manganese	mg/kg	1,100
Iron	mg/kg	13,000
Aluminium	mg/kg	9,500
Selenium	mg/kg	<2
Tin	mg/kg	3
Antimony	mg/kg	<7
Magnesium	mg/kg	2,100
Cobalt	mg/kg	15
Boron	mg/kg	4

Moisture		
Our Reference		238190-A-21
Your Reference	UNITS	309/0.5
Date Sampled		03/03/2020
Type of sample		Soil
Date prepared	-	11/03/2020
Date analysed	-	12/03/2020
Moisture	%	9.4

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
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-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/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.

Method ID	Methodology Summary
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-1	[NT]
Date extracted	-			11/03/2020	[NT]	[NT]	[NT]	[NT]	11/03/2020	[NT]
Date analysed	-			11/03/2020	[NT]	[NT]	[NT]	[NT]	11/03/2020	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	78	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	78	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	76	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	80	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	72	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	80	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	74	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	103	[NT]	[NT]	[NT]	[NT]	92	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			11/03/2020	[NT]	[NT]	[NT]	[NT]	11/03/2020	[NT]
Date analysed	-			11/03/2020	[NT]	[NT]	[NT]	[NT]	11/03/2020	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	121	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	80	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	121	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	80	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
Surrogate o-Terphenyl	%		Org-003	114	[NT]	[NT]	[NT]	[NT]	116	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			11/03/2020	[NT]	[NT]	[NT]	[NT]	11/03/2020	[NT]
Date analysed	-			11/03/2020	[NT]	[NT]	[NT]	[NT]	11/03/2020	[NT]
Naphthalene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	82	[NT]
Acenaphthylene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Phenanthrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	82	[NT]
Pyrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	<0.05	[NT]	[NT]	[NT]	[NT]	80	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	108	[NT]	[NT]	[NT]	[NT]	103	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			12/03/2020	[NT]	[NT]	[NT]	[NT]	12/03/2020	[NT]
Date analysed	-			12/03/2020	[NT]	[NT]	[NT]	[NT]	12/03/2020	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	110	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	101	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	117	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	117	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Manganese	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Iron	mg/kg	10	Metals-020	<10	[NT]	[NT]	[NT]	[NT]	116	[NT]
Aluminium	mg/kg	10	Metals-020	<10	[NT]	[NT]	[NT]	[NT]	100	[NT]
Selenium	mg/kg	2	Metals-020	<2	[NT]	[NT]	[NT]	[NT]	104	[NT]
Tin	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Antimony	mg/kg	7	Metals-020	<7	[NT]	[NT]	[NT]	[NT]	99	[NT]
Magnesium	mg/kg	10	Metals-020	<10	[NT]	[NT]	[NT]	[NT]	101	[NT]
Cobalt	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Boron	mg/kg	3	Metals-020	<3	[NT]	[NT]	[NT]	[NT]	97	[NT]

Result Definitions

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

Quality Control Definitions

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

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

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

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CERTIFICATE OF ANALYSIS 238190-B

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew. Blackert
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**91667.02, Newcastle**
Number of Samples	4 Material, 16 Soil
Date samples received	05/03/2020
Date completed instructions received	12/03/2020

Analysis Details

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

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

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

Report Details

Date results requested by	13/03/2020
Date of Issue	13/03/2020

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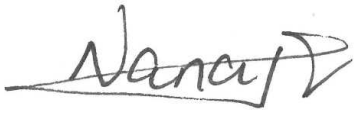
Results Approved By
Jaimie Loa-Kum-Cheung, Metals Supervisor
Josh Williams, Senior Chemist
Loren Bardwell, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

PAHs in TCLP (USEPA 1311)		
Our Reference		238190-B-9
Your Reference	UNITS	301/0.05
Date Sampled		03/03/2020
Type of sample		Soil
Date extracted	-	13/03/2020
Date analysed	-	13/03/2020
Naphthalene in TCLP	mg/L	<0.001
Acenaphthylene in TCLP	mg/L	<0.001
Acenaphthene in TCLP	mg/L	<0.001
Fluorene in TCLP	mg/L	<0.001
Phenanthrene in TCLP	mg/L	<0.001
Anthracene in TCLP	mg/L	<0.001
Fluoranthene in TCLP	mg/L	<0.001
Pyrene in TCLP	mg/L	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Total +ve PAH's	mg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	100

Metals in TCLP USEPA1311		
Our Reference		238190-B-9
Your Reference	UNITS	301/0.05
Date Sampled		03/03/2020
Type of sample		Soil
Date extracted	-	13/03/2020
Date analysed	-	13/03/2020
pH of soil for fluid# determ.	pH units	7.4
pH of soil TCLP (after HCl)	pH units	1.7
Extraction fluid used	-	1
pH of final Leachate	pH units	5.0
Lead in TCLP	mg/L	0.08

PAHs in water leach		
Our Reference		238190-B-9
Your Reference	UNITS	301/0.05
Date Sampled		03/03/2020
Type of sample		Soil
Date extracted	-	13/03/2020
Date analysed	-	13/03/2020
Naphthalene in ASLP	mg/L	<0.001
Acenaphthylene in ASLP	mg/L	<0.001
Acenaphthene in ASLP	mg/L	<0.001
Fluorene in ASLP	mg/L	<0.001
Phenanthrene in ASLP	mg/L	<0.001
Anthracene in ASLP	mg/L	<0.001
Fluoranthene in ASLP	mg/L	<0.001
Pyrene in ASLP	mg/L	<0.001
Benzo(a)anthracene in ASLP	mg/L	<0.001
Chrysene in ASLP	mg/L	<0.001
Benzo(bjk)fluoranthene in ASLP	mg/L	<0.002
Benzo(a)pyrene in ASLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - ASLP	mg/L	<0.001
Dibenzo(a,h)anthracene in ASLP	mg/L	<0.001
Benzo(g,h,i)perylene in ASLP	mg/L	<0.001
Surrogate p-Terphenyl-d_{14}	%	92

Metals-ASLP Neutral (ICP-MS)		
Our Reference		238190-B-9
Your Reference	UNITS	301/0.05
Date Sampled		03/03/2020
Type of sample		Soil
Date extracted	-	13/03/2020
Date analysed	-	13/03/2020
pH of final Leachate	pH units	7.0
Lead in ASLP	µg/L	41

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. Please note that the mass used may be scaled down from the default based on sample mass available.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-022	Determination of various metals by ICP-MS following leaching using neutralised deionised water by AS 4439.3 - 1997.
Org-012/017	Leachates are extracted with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.
Org-012/017 ASLP	ASLP Leachates are extracted with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Date analysed	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Naphthalene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	124	[NT]
Acenaphthylene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	118	[NT]
Phenanthrene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	110	[NT]
Anthracene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	104	[NT]
Pyrene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	108	[NT]
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	118	[NT]
Benzo(bjk)fluoranthene in TCLP	mg/L	0.002	Org-012/017	<0.002	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	90	[NT]
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012/017	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	95	[NT]	[NT]	[NT]	[NT]	112	[NT]

QUALITY CONTROL: Metals in TCLP USEPA1311						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Date analysed	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	[NT]	[NT]	[NT]	[NT]	101	[NT]

QUALITY CONTROL: PAHs in water leach						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Date analysed	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Naphthalene in ASLP	mg/L	0.001	Org-012/017 ASLP	<0.001	[NT]	[NT]	[NT]	[NT]	124	[NT]
Acenaphthylene in ASLP	mg/L	0.001	Org-012/017 ASLP	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene in ASLP	mg/L	0.001	Org-012/017 ASLP	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene in ASLP	mg/L	0.001	Org-012/017 ASLP	<0.001	[NT]	[NT]	[NT]	[NT]	118	[NT]
Phenanthrene in ASLP	mg/L	0.001	Org-012/017 ASLP	<0.001	[NT]	[NT]	[NT]	[NT]	110	[NT]
Anthracene in ASLP	mg/L	0.001	Org-012/017 ASLP	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene in ASLP	mg/L	0.001	Org-012/017 ASLP	<0.001	[NT]	[NT]	[NT]	[NT]	104	[NT]
Pyrene in ASLP	mg/L	0.001	Org-012/017 ASLP	<0.001	[NT]	[NT]	[NT]	[NT]	108	[NT]
Benzo(a)anthracene in ASLP	mg/L	0.001	Org-012/017 ASLP	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene in ASLP	mg/L	0.001	Org-012/017 ASLP	<0.001	[NT]	[NT]	[NT]	[NT]	118	[NT]
Benzo(bjk)fluoranthene in ASLP	mg/L	0.002	Org-012/017 ASLP	<0.002	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene in ASLP	mg/L	0.001	Org-012/017 ASLP	<0.001	[NT]	[NT]	[NT]	[NT]	90	[NT]
Indeno(1,2,3-c,d)pyrene - ASLP	mg/L	0.001	Org-012/017 ASLP	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene in ASLP	mg/L	0.001	Org-012/017 ASLP	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene in ASLP	mg/L	0.001	Org-012/017 ASLP	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d_{14}	%		Org-012/017 ASLP	95	[NT]	[NT]	[NT]	[NT]	112	[NT]

QUALITY CONTROL: Metals-ASLP Neutral (ICP-MS)					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Date analysed	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Lead in ASLP	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]

Result Definitions

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

Quality Control Definitions

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

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

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

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CERTIFICATE OF ANALYSIS 238799

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew. Blackert, Chris Bozinovski
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**91667.02, Newcastle**
Number of Samples	2 Soil
Date samples received	13/03/2020
Date completed instructions received	13/03/2020

Analysis Details

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

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

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

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

Report Details

Date results requested by	13/03/2020
Date of Issue	13/03/2020

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

Results Approved By
Josh Williams, Senior Chemist
Loren Bardwell, Senior Chemist
Lucy Zhu, Asbestos Supervisor
Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

VOCs in soil			
Our Reference	UNITS	238799-1	238799-2
Your Reference		S1	S2
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
Date extracted	-	13/03/2020	13/03/2020
Date analysed	-	13/03/2020	13/03/2020
Dichlorodifluoromethane	mg/kg	<1	<1
Chloromethane	mg/kg	<1	<1
Vinyl Chloride	mg/kg	<1	<1
Bromomethane	mg/kg	<1	<1
Chloroethane	mg/kg	<1	<1
Trichlorofluoromethane	mg/kg	<1	<1
1,1-Dichloroethene	mg/kg	<1	<1
trans-1,2-dichloroethene	mg/kg	<1	<1
1,1-dichloroethane	mg/kg	<1	<1
cis-1,2-dichloroethene	mg/kg	<1	<1
bromochloromethane	mg/kg	<1	<1
chloroform	mg/kg	<1	<1
2,2-dichloropropane	mg/kg	<1	<1
1,2-dichloroethane	mg/kg	<1	<1
1,1,1-trichloroethane	mg/kg	<1	<1
1,1-dichloropropene	mg/kg	<1	<1
Cyclohexane	mg/kg	<1	<1
carbon tetrachloride	mg/kg	<1	<1
Benzene	mg/kg	<0.2	<0.2
dibromomethane	mg/kg	<1	<1
1,2-dichloropropane	mg/kg	<1	<1
trichloroethene	mg/kg	<1	<1
bromodichloromethane	mg/kg	<1	<1
trans-1,3-dichloropropene	mg/kg	<1	<1
cis-1,3-dichloropropene	mg/kg	<1	<1
1,1,2-trichloroethane	mg/kg	<1	<1
Toluene	mg/kg	<0.5	<0.5
1,3-dichloropropane	mg/kg	<1	<1
dibromochloromethane	mg/kg	<1	<1
1,2-dibromoethane	mg/kg	<1	<1
tetrachloroethene	mg/kg	<1	<1
1,1,1,2-tetrachloroethane	mg/kg	<1	<1
chlorobenzene	mg/kg	<1	<1
Ethylbenzene	mg/kg	<1	<1

VOCs in soil			
Our Reference		238799-1	238799-2
Your Reference	UNITS	S1	S2
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
bromoform	mg/kg	<1	<1
m+p-xylene	mg/kg	<2	<2
styrene	mg/kg	<1	<1
1,1,2,2-tetrachloroethane	mg/kg	<1	<1
o-Xylene	mg/kg	<1	<1
1,2,3-trichloropropane	mg/kg	<1	<1
isopropylbenzene	mg/kg	<1	<1
bromobenzene	mg/kg	<1	<1
n-propyl benzene	mg/kg	<1	<1
2-chlorotoluene	mg/kg	<1	<1
4-chlorotoluene	mg/kg	<1	<1
1,3,5-trimethyl benzene	mg/kg	<1	<1
tert-butyl benzene	mg/kg	<1	<1
1,2,4-trimethyl benzene	mg/kg	<1	<1
1,3-dichlorobenzene	mg/kg	<1	<1
sec-butyl benzene	mg/kg	<1	<1
1,4-dichlorobenzene	mg/kg	<1	<1
4-isopropyl toluene	mg/kg	<1	<1
1,2-dichlorobenzene	mg/kg	<1	<1
n-butyl benzene	mg/kg	<1	<1
1,2-dibromo-3-chloropropane	mg/kg	<1	<1
1,2,4-trichlorobenzene	mg/kg	<1	<1
hexachlorobutadiene	mg/kg	<1	<1
1,2,3-trichlorobenzene	mg/kg	<1	<1
Surrogate Dibromofluorometha	%	102	108
Surrogate aaa-Trifluorotoluene	%	97	108
Surrogate Toluene-d_8	%	91	92
Surrogate 4-Bromofluorobenzene	%	88	86

vTRH(C6-C10)/BTEXN in Soil			
Our Reference	UNITS	238799-1	238799-2
Your Reference		S1	S2
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
Date extracted	-	13/03/2020	13/03/2020
Date analysed	-	13/03/2020	13/03/2020
TRH C_6 - C_9	mg/kg	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25
Benzene	mg/kg	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1
m+p-xylene	mg/kg	<2	<2
o-Xylene	mg/kg	<1	<1
naphthalene	mg/kg	<1	<1
Total +ve Xylenes	mg/kg	<3	<3
Surrogate aaa-Trifluorotoluene	%	97	108

svTRH (C10-C40) in Soil			
Our Reference		238799-1	238799-2
Your Reference	UNITS	S1	S2
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
Date extracted	-	13/03/2020	13/03/2020
Date analysed	-	13/03/2020	13/03/2020
TRH C_{10} - C_{14}	mg/kg	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50
Surrogate o-Terphenyl	%	92	86

PAHs in Soil			
Our Reference		238799-1	238799-2
Your Reference	UNITS	S1	S2
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
Date extracted	-	13/03/2020	13/03/2020
Date analysed	-	13/03/2020	13/03/2020
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	0.1	0.1
Phenanthrene	mg/kg	1.2	1.0
Anthracene	mg/kg	0.3	0.4
Fluoranthene	mg/kg	1.6	1.5
Pyrene	mg/kg	1.4	1.2
Benzo(a)anthracene	mg/kg	0.6	0.6
Chrysene	mg/kg	0.6	0.5
Benzo(b,j+k)fluoranthene	mg/kg	0.9	0.7
Benzo(a)pyrene	mg/kg	0.53	0.4
Indeno(1,2,3-c,d)pyrene	mg/kg	0.3	0.2
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.3	0.3
Total +ve PAH's	mg/kg	8.0	6.9
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.7	0.6
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.8	0.6
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.8	0.7
Surrogate p-Terphenyl-d14	%	91	91

Organochlorine Pesticides in soil			
Our Reference		238799-1	238799-2
Your Reference	UNITS	S1	S2
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
Date extracted	-	13/03/2020	13/03/2020
Date analysed	-	13/03/2020	13/03/2020
alpha-BHC	mg/kg	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1
Surrogate TCMX	%	98	91

Organophosphorus Pesticides in Soil			
Our Reference		238799-1	238799-2
Your Reference	UNITS	S1	S2
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
Date extracted	-	13/03/2020	13/03/2020
Date analysed	-	13/03/2020	13/03/2020
Dichlorvos	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1
Surrogate TCMX	%	98	91

PCBs in Soil			
Our Reference		238799-1	238799-2
Your Reference	UNITS	S1	S2
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
Date extracted	-	13/03/2020	13/03/2020
Date analysed	-	13/03/2020	13/03/2020
Aroclor 1016	mg/kg	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1
Surrogate TCMX	%	98	91

Acid Extractable metals in soil			
Our Reference		238799-1	238799-2
Your Reference	UNITS	S1	S2
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
Date prepared	-	13/03/2020	13/03/2020
Date analysed	-	13/03/2020	13/03/2020
Arsenic	mg/kg	8	5
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	11	7
Copper	mg/kg	14	7
Lead	mg/kg	44	22
Mercury	mg/kg	0.2	0.1
Nickel	mg/kg	4	2
Zinc	mg/kg	58	31
Manganese	mg/kg	580	210
Iron	mg/kg	23,000	14,000
Aluminium	mg/kg	10,000	6,600
Selenium	mg/kg	<2	<2
Tin	mg/kg	3	1
Antimony	mg/kg	<7	<7
Magnesium	mg/kg	1,200	650
Cobalt	mg/kg	2	<1
Boron	mg/kg	<3	<3

Moisture			
Our Reference		238799-1	238799-2
Your Reference	UNITS	S1	S2
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
Date prepared	-	13/03/2020	13/03/2020
Date analysed	-	13/03/2020	13/03/2020
Moisture	%	19	17

Misc Soil - Inorg			
Our Reference		238799-1	238799-2
Your Reference	UNITS	S1	S2
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
Date prepared	-	13/03/2020	13/03/2020
Date analysed	-	13/03/2020	13/03/2020
Total Phenolics (as Phenol)	mg/kg	<5	<5

Asbestos ID - soils			
Our Reference		238799-1	238799-2
Your Reference	UNITS	S1	S2
Date Sampled		03/03/2020	03/03/2020
Type of sample		Soil	Soil
Date analysed	-	13/03/2020	13/03/2020
Sample mass tested	g	Approx. 30g	Approx. 25g
Sample Description	-	Brown clayey soil & rocks	Brown clayey soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Asbestos comments	-	NO	NO
Trace Analysis	-	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.
AT-008	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
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-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-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.
Org-012/017	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS and/or GC-MS/MS. 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.

Method ID	Methodology Summary
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/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: VOCs in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Date analysed	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Dichlorodifluoromethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloromethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Vinyl Chloride	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromomethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichlorofluoromethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-Dichloroethene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
trans-1,2-dichloroethene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-dichloroethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	85	[NT]
cis-1,2-dichloroethene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
bromochloromethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
chloroform	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
2,2-dichloropropane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloroethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
1,1,1-trichloroethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	85	[NT]
1,1-dichloropropene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Cyclohexane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
carbon tetrachloride	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzene	mg/kg	0.2	Org-014	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
dibromomethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloropropane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
trichloroethene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
bromodichloromethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	113	[NT]
trans-1,3-dichloropropene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
cis-1,3-dichloropropene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2-trichloroethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Toluene	mg/kg	0.5	Org-014	<0.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichloropropane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
dibromochloromethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
1,2-dibromoethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
tetrachloroethene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	90	[NT]
1,1,1,2-tetrachloroethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
chlorobenzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
bromoform	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-014	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
styrene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2,2-tetrachloroethane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: VOCs in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
o-Xylene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichloropropane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
isopropylbenzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
bromobenzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-propyl benzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-chlorotoluene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-chlorotoluene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3,5-trimethyl benzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
tert-butyl benzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trimethyl benzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichlorobenzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
sec-butyl benzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,4-dichlorobenzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-isopropyl toluene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichlorobenzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-butyl benzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dibromo-3-chloropropane	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trichlorobenzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
hexachlorobutadiene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichlorobenzene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluorometha	%		Org-014	103	[NT]	[NT]	[NT]	[NT]	103	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-014	102	[NT]	[NT]	[NT]	[NT]	107	[NT]
Surrogate Toluene-d_8	%		Org-014	93	[NT]	[NT]	[NT]	[NT]	90	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-014	85	[NT]	[NT]	[NT]	[NT]	93	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Date analysed	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	93	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	93	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	90	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	91	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	96	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	102	[NT]	[NT]	[NT]	[NT]	107	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Date analysed	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	84	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	76	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	84	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	76	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
Surrogate o-Terphenyl	%		Org-003	90	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Date analysed	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Naphthalene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	82	[NT]
Acenaphthylene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Phenanthrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	82	[NT]
Pyrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	78	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	<0.05	[NT]	[NT]	[NT]	[NT]	80	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	94	[NT]	[NT]	[NT]	[NT]	92	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Date analysed	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
alpha-BHC	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	122	[NT]
HCB	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	126	[NT]
gamma-BHC	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	118	[NT]
delta-BHC	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	126	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	126	[NT]
gamma-Chlordane	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	120	[NT]
Dieldrin	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	124	[NT]
Endrin	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	116	[NT]
Endosulfan II	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Methoxychlor	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	90	[NT]	[NT]	[NT]	[NT]	87	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Date analysed	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Dichlorvos	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Dimethoate	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Fenitrothion	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Malathion	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Chlorpyriphos	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Parathion	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	76	[NT]
Bromophos-ethyl	mg/kg	0.1	AT-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-012/017	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	90	[NT]	[NT]	[NT]	[NT]	87	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Date analysed	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-006	90	[NT]	[NT]	[NT]	[NT]	87	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Date analysed	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	105	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	100	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Manganese	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Iron	mg/kg	10	Metals-020	<10	[NT]	[NT]	[NT]	[NT]	115	[NT]
Aluminium	mg/kg	10	Metals-020	<10	[NT]	[NT]	[NT]	[NT]	104	[NT]
Selenium	mg/kg	2	Metals-020	<2	[NT]	[NT]	[NT]	[NT]	97	[NT]
Tin	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Antimony	mg/kg	7	Metals-020	<7	[NT]	[NT]	[NT]	[NT]	102	[NT]
Magnesium	mg/kg	10	Metals-020	<10	[NT]	[NT]	[NT]	[NT]	105	[NT]
Cobalt	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Boron	mg/kg	3	Metals-020	<3	[NT]	[NT]	[NT]	[NT]	102	[NT]

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Date analysed	-			13/03/2020	[NT]	[NT]	[NT]	[NT]	13/03/2020	[NT]
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	[NT]	[NT]	[NT]	[NT]	103	[NT]

Result Definitions

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

Quality Control Definitions

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

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

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

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: SampleslUCY1990 were sub-sampled from jars provided by the client.

Appendix D

Quality Assurance / Quality Control Report
Chain of Custody Sheets (Field and Despatch)
Sample Receipts
Calibration Records

Data Quality Assessment Report
Report on Detailed Site Investigation
Proposed Nihon University
9 Church Street, Newcastle

D1 Data Quality Objectives

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

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

The DQOs have been addressed within the report as shown in Table 1.

Table 1: Data Quality Objectives

Data Quality Objective	Report Section where Addressed
State the Problem	S1 Introduction
Identify the Decision	S1 Introduction (objective) S17 Discussion and Recommendations
Identify Inputs to the Decision	S1 Introduction S2 Site Information S9 Scope of Works S14 Site Assessment Criteria S10 Results of Investigation
Define the Boundary of the Assessment	S2 Site Identification and Description Site Drawings - Appendix E
Develop a Decision Rule	S14 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	S9,10 Field work and Analysis S14 Site Assessment Criteria QA/QC Procedures and Results – Sections 11, 12
Optimise the Design for Obtaining Data	S9 Scope of Works S9.1 Sample Location and Rationale QA/QC Procedures and Results – Sections 11, 12

D2 Field and Laboratory Quality Control

The field and laboratory quality control (QC) procedures and results are summarised in Tables 2 and 3. Reference should be made to the field work and analysis procedures in Sections 9 and 10 and the laboratory results certificates in Appendix C for further details.

Table 2: Field QC

Item	Frequency	Acceptance Criteria	Achievement
Intra-laboratory replicates	5% primary samples	RPD <30% inorganics), <50% (organics)	Yes[1]
Inter-laboratory replicates	5% primary samples	RPD <30% inorganics), <50% (organics)	Yes[2]
Trip Spikes	1 per field batch	60-140% recovery (organics) 70-130% recovery (inorganics)	No[3]
Trip Blanks	1 per field batch	<PQL	No[3]

Notes to Table 2:

1 Qualitative assessment of RPD results overall; refer Section 2.1
2 Qualitative assessment of RPD results overall; refer Section 2.2
3 Trip Spike / Trip Blank not analysed for soil bores

Table 3: Laboratory QC

Item	Frequency	Acceptance Criteria	Achievement
Analytical laboratories used	-	NATA accreditation	Yes
Holding times	-	In accordance with NEPC (2013) which references various Australian and international standards	Yes
Laboratory / Reagant Blanks	1 per lab batch	<PQL	Yes
Laboratory duplicates	10% primary samples	Laboratory specific [1]	Yes[2]
Matrix Spikes	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	Yes
Surrogate Spikes	organics by GC	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	Yes
Control Samples	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	Yes

Notes to Table 3:

1 Envirolab: <10xPQL – any RPD; >10xPQL – 20-50%RPD
ALS: <10xPQL – any RPD; 10-20xPQL – 0-50%RDP; >20xPQL – 0-20%RPD
2 Minor RPD exceedance limits were identified by the laboratory for several metals in one sample. Triplicate analysis was conducted and indicated results were generally commensurate with the primary and duplicate sample results. The elevated RPDs are likely to be attributed to the heterogeneity of the fill materials tested and are therefore considered to be acceptable.

A trip spike / trip blank was utilised in the field for soil sampling during drilling of bores, however, was inadvertently excluded from the laboratory analysis testing schedule. The trip spike / trip blank utilised during subsequent test pitting was found to be within the adopted acceptance limits. Given volatile hydrocarbons were not detected in the soil samples analysed and field work observations generally indicated the absence of gross volatile hydrocarbon impact, the absence of a trip spike / trip blank for soil bore analysis is not considered significant.

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

D2.1 Intra-Laboratory Replicates

Intra-laboratory replicates were analysed as an internal check of the reproducibility within the primary laboratory Envirolab Services and as a measure of consistency of sampling techniques. The comparative results of analysis between original and intra-laboratory replicate samples are summarised in Tables 4 (soil) and 5 (groundwater).

Note that, where both samples are below the PQL the difference and RPD has been given as zero. Where one sample is reported below the PQL, but a concentration is reported for the other, the PQL value has been used for calculation of the RPD for the less than PQL sample.

Table 4: Relative Percentage Difference Results – Intra-laboratory Replicates (Soil)

		SDG	OLAB 2019-12-13T00	LAB 2019-12-13T00	ENVIRO	ROLAB 2020-03-05T00	ROLAB 2020-03-05T00:0	ENVIRO
		Field ID	203/0.5	D3	RPD	301/0.4	D3	RPD
		Sampled Date/Time	11/12/2019	11/12/2019		3/03/2020	3/03/2020	
ChemName	Units	EQL						
Metals								
Aluminium	mg/kg	10 (Primary): 50 (Interlab)	7000.0	6400.0	9	3300.0	2700.0	20
Antimony	mg/kg	7 (Primary): 5 (Interlab)	<7.0	<7.0	0	<7.0	<7.0	0
Arsenic	mg/kg	4 (Primary): 5 (Interlab)	**24.0**	**14.0**	**53**	<4.0	<4.0	0
Boron	mg/kg	3 (Primary): 50 (Interlab)	<3.0	<3.0	0	<3.0	<3.0	0
Cadmium	mg/kg	0.4 (Primary): 1 (Interlab)	**<0.4**	**2.0**	**133**	<0.4	<0.4	0
Chromium (III+VI)	mg/kg	1 (Primary): 2 (Interlab)	7.0	10.0	35	7.0	5.0	33
Cobalt	mg/kg	1 (Primary): 2 (Interlab)	**1.0**	**3.0**	**100**	1.0	1.0	0
Copper	mg/kg	1 (Primary): 5 (Interlab)	29.0	46.0	45	26.0	16.0	48
Iron	mg/kg	10 (Primary): 50 (Interlab)	11000.0	11000.0	0	6000.0	5500.0	9
Lead	mg/kg	1 (Primary): 5 (Interlab)	**100.0**	**240.0**	**82**	**190.0**	**54.0**	**111**
Magnesium	mg/kg	10 (Primary): 50 (Interlab)	**510.0**	**920.0**	**57**	610.0	490.0	22
Manganese	mg/kg	1 (Primary): 5 (Interlab)	**64.0**	**130.0**	**68**	**60.0**	**34.0**	**55**
Mercury	mg/kg	0.1	0.2	0.2	0	**1.4**	**0.3**	**129**
Nickel	mg/kg	1 (Primary): 2 (Interlab)	5.0	8.0	46	5.0	3.0	50
Selenium	mg/kg	2 (Primary): 5 (Interlab)	<2.0	<2.0	0	<2.0	<2.0	0
Tin	mg/kg	1 (Primary): 5 (Interlab)	6.0	6.0	0	1.0	<1.0	0
Zinc	mg/kg	1 (Primary): 5 (Interlab)	**170.0**	**500.0**	**99**	**110.0**	**39.0**	**95**
TRH								
C10-C16	mg/kg	50	<50.0	<50.0	0			
C16-C34	mg/kg	100	**<100.0**	**290.0**	**97**			
C34-C40	mg/kg	100	<100.0	<100.0	0			
F2-NAPHTHALENE	mg/kg	50	<50.0	<50.0	0			
C6 - C9	mg/kg	25	<25.0	<25.0	0			
C10 - C14	mg/kg	50	<50.0	<50.0	0			
C15 - C28	mg/kg	100	**<100.0**	**210.0**	**71**			
C29-C36	mg/kg	100	<100.0	110.0	10			
C10 - C40 (Sum of total)	mg/kg	50	**<50.0**	**290.0**	**141**			
C6-C10 less BTEX (F1)	mg/kg	25	<25.0	<25.0	0			
C6-C10	mg/kg	25	<25.0	<25.0	0			
BTEX								
Benzene	mg/kg	0.2	<0.2	<0.2	0			
Benzene	mg/kg	0.2	<0.2	<0.2	0			
Ethylbenzene	mg/kg	1	<1.0	<1.0	0			
Ethylbenzene	mg/kg	1	<1.0	<1.0	0			
Toluene	mg/kg	0.5	<0.5	<0.5	0			
Toluene	mg/kg	0.5	<0.5	<0.5	0			
Xylene (m & p)	mg/kg	2	<2.0	<2.0	0			
Xylene (m & p)	mg/kg	2	<2.0	<2.0	0			
Xylene (o)	mg/kg	1	<1.0	<1.0	0			
Xylene (o)	mg/kg	1	<1.0	<1.0	0			
Xylene Total	mg/kg	3	<3.0	<3.0	0			
MAH								
1,2,4-trimethylbenzene	mg/kg	1	<1.0	<1.0	0			
1,3,5-trimethylbenzene	mg/kg	1	<1.0	<1.0	0			
Isopropylbenzene	mg/kg	1	<1.0	<1.0	0			
n-butylbenzene	mg/kg	1	<1.0	<1.0	0			
n-propylbenzene	mg/kg	1	<1.0	<1.0	0			
p-isopropyltoluene	mg/kg	1	<1.0	<1.0	0			
sec-butylbenzene	mg/kg	1	<1.0	<1.0	0			
Styrene	mg/kg	1	<1.0	<1.0	0			
tert-butylbenzene	mg/kg	1	<1.0	<1.0	0			
Chlorinated Hydrocarbons								
1,1,1,2-tetrachloroethane	mg/kg	1	<1.0	<1.0	0			
1,1,1-trichloroethane	mg/kg	1	<1.0	<1.0	0			
1,1,2,2-tetrachloroethane	mg/kg	1	<1.0	<1.0	0			
1,1,2-trichloroethane	mg/kg	1	<1.0	<1.0	0			
1,1-dichloroethane	mg/kg	1	<1.0	<1.0	0			
1,1-dichloroethene	mg/kg	1	<1.0	<1.0	0			
1,1-dichloropropene	mg/kg	1	<1.0	<1.0	0			
1,2,3-trichloropropane	mg/kg	1	<1.0	<1.0	0			
1,2-dibromo-3-chloropropane	mg/kg	1	<1.0	<1.0	0			
1,2-dichloroethane	mg/kg	1	<1.0	<1.0	0			
1,2-dichloropropane	mg/kg	1	<1.0	<1.0	0			
1,3-dichloropropane	mg/kg	1	<1.0	<1.0	0			
2,2-dichloropropane	mg/kg	1	<1.0	<1.0	0			
Bromochloromethane	mg/kg	1	<1.0	<1.0	0			
Bromodichloromethane	mg/kg	1	<1.0	<1.0	0			
Bromoform	mg/kg	1	<1.0	<1.0	0			
Carbon tetrachloride	mg/kg	1	<1.0	<1.0	0			
Chlorodibromomethane	mg/kg	1	<1.0	<1.0	0			
Chloroethane	mg/kg	1	<1.0	<1.0	0			
Chloroform	mg/kg	1	<1.0	<1.0	0			
Chloromethane	mg/kg	1	<1.0	<1.0	0			
cis-1,2-dichloroethene	mg/kg	1	<1.0	<1.0	0			
cis-1,3-dichloropropene	mg/kg	1	<1.0	<1.0	0			
Dibromomethane	mg/kg	1	<1.0	<1.0	0			
Hexachlorobutadiene	mg/kg	1	<1.0	<1.0	0			
Trichloroethene	mg/kg	1	<1.0	<1.0	0			
Tetrachloroethene	mg/kg	1	<1.0	<1.0	0			
trans-1,2-dichloroethene	mg/kg	1	<1.0	<1.0	0			
trans-1,3-dichloropropene	mg/kg	1	<1.0	<1.0	0			
Vinyl chloride	mg/kg	1	<1.0	<1.0	0			
Halogenated Hydrocarbons								
1,2-dibromoethane	mg/kg	1	<1.0	<1.0	0			
Bromomethane	mg/kg	1	<1.0	<1.0	0			
Dichlorodifluoromethane	mg/kg	1	<1.0	<1.0	0			
Trichlorofluoromethane	mg/kg	1	<1.0	<1.0	0			
Halogenated Benzenes								
1,2,3-trichlorobenzene	mg/kg	1	<1.0	<1.0	0			
1,2,4-trichlorobenzene	mg/kg	1	<1.0	<1.0	0			
1,2-dichlorobenzene	mg/kg	1	<1.0	<1.0	0			
1,3-dichlorobenzene	mg/kg	1	<1.0	<1.0	0			
1,4-dichlorobenzene	mg/kg	1	<1.0	<1.0	0			
2-chlorotoluene	mg/kg	1	<1.0	<1.0	0			
4-chlorotoluene	mg/kg	1	<1.0	<1.0	0			
Bromobenzene	mg/kg	1	<1.0	<1.0	0			
Chlorobenzene	mg/kg	1	<1.0	<1.0	0			
Hexachlorobenzene	mg/kg	0.1	<0.1	<0.1	0			
Solvents								
Cyclohexane	mg/kg	1	<1.0	<1.0	0			
PAH/Phenols								
Total Positive PAHs	mg/kg	0.05	**20.0**	**77.0**	**118**	12.0	10.0	18
Acenaphthene	mg/kg	0.1 (Primary): 0.5 (Interlab)	<0.1	0.1	0	<0.1	<0.1	0
Acenaphthylene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**0.1**	**0.8**	**156**	0.2	0.2	0
Anthracene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**0.3**	**2.2**	**152**	0.2	0.2	0
Benz(a)anthracene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**2.0**	**8.0**	**120**	1.3	1.2	8
Benzo(a) pyrene	mg/kg	0.05 (Primary): 0.5 (Interlab)	**1.8**	**6.4**	**112**	1.1	0.88	22
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.5	**2.7**	**9.8**	**114**	1.7	1.3	27
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.5	**2.7**	**9.8**	**114**	1.7	1.3	27
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.5	**2.7**	**9.8**	**114**	1.7	1.3	27
Benzo(b,j+k)fluoranthene	mg/kg	0.2	**3.0**	**10.0**	**108**	2.0	2.0	0
Benzo(g,h,i)perylene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**1.1**	**3.0**	**93**	0.5	0.4	22
Chrysene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**1.6**	**5.5**	**110**	1.2	1.0	18
Dibenz(a,h)anthracene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**0.2**	**1.2**	**143**	0.1	0.1	0
Fluoranthene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**3.9**	**13.0**	**108**	2.1	1.9	10
Fluorene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**<0.1**	**0.8**	**156**	<0.1	<0.1	0
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**0.9**	**2.7**	**100**	0.5	0.4	22
Naphthalene	mg/kg	1	<1.0	<1.0	0			
Naphthalene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**<0.1**	**0.4**	**120**	<0.1	<0.1	0
Phenanthrene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**1.5**	**10.0**	**148**	1.0	0.9	11
Phenolics Total	mg/kg	5	<5.0	<5.0	0			
Pyrene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**3.7**	**13.0**	**111**	1.8	1.6	12
Polychlorinated biphenyls								
PCBs (Sum of total)	mg/kg	0.1	<0.1	<0.1	0			
Arochlor 1016	mg/kg	0.1	<0.1	<0.1	0			
Arochlor 1221	mg/kg	0.1	<0.1	<0.1	0			
Arochlor 1232	mg/kg	0.1	<0.1	<0.1	0			
Arochlor 1242	mg/kg	0.1	<0.1	<0.1	0			
Arochlor 1248	mg/kg	0.1	<0.1	<0.1	0			
Arochlor 1254	mg/kg	0.1	<0.1	<0.1	0			
Arochlor 1260	mg/kg	0.1	<0.1	<0.1	0			
Organochlorine Pesticides								
4,4-DDE	mg/kg	0.1	<0.1	<0.1	0			
a-BHC	mg/kg	0.1	<0.1	<0.1	0			
Aldrin	mg/kg	0.1	<0.1	<0.1	0			
b-BHC	mg/kg	0.1	<0.1	<0.1	0			
Chlordane (cis)	mg/kg	0.1	<0.1	<0.1	0			
Chlordane (trans)	mg/kg	0.1	<0.1	<0.1	0			
d-BHC	mg/kg	0.1	<0.1	<0.1	0			
DDD	mg/kg	0.1	<0.1	<0.1	0			
DDT	mg/kg	0.1	<0.1	<0.1	0			
DDT+DDE+DDD	mg/kg	0.1	<0.1	<0.1	0			
Dieldrin	mg/kg	0.1	<0.1	<0.1	0			
Endosulfan I	mg/kg	0.1	<0.1	<0.1	0			
Endosulfan II	mg/kg	0.1	<0.1	<0.1	0			
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	0			
Endrin	mg/kg	0.1	<0.1	<0.1	0			
Endrin aldehyde	mg/kg	0.1	<0.1	<0.1	0			
g-BHC (Lindane)	mg/kg	0.1	<0.1	<0.1	0			
Heptachlor	mg/kg	0.1	<0.1	<0.1	0			
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	0			
Methoxychlor	mg/kg	0.1	<0.1	<0.1	0			
Organophosphorous Pesticides								
Azinophos methyl	mg/kg	0.1	<0.1	<0.1	0			
Bromophos-ethyl	mg/kg	0.1	<0.1	<0.1	0			
Chlorpyrifos	mg/kg	0.1	<0.1	<0.1	0			
Chlorpyrifos-methyl	mg/kg	0.1	<0.1	<0.1	0			
Diazinon	mg/kg	0.1	<0.1	<0.1	0			
Dichlorvos	mg/kg	0.1	<0.1	<0.1	0			
Dimethoate	mg/kg	0.1	<0.1	<0.1	0			
Ethion	mg/kg	0.1	<0.1	<0.1	0			
Fenitrothion	mg/kg	0.1	<0.1	<0.1	0			
Malathion	mg/kg	0.1	<0.1	<0.1	0			
Ronnel	mg/kg	0.1	<0.1	<0.1	0			
Pesticides								
Parathion	mg/kg	0.1	<0.1	<0.1	0			

Table 5: Relative Percentage Difference Results – Intra-laboratory Replicates (Groundwater)

		Lab Report Number	234001	234001	
		Field ID	203	DW1	RPD
		Sampled Date/Time	7/01/2020	7/01/2020	
ChemName	**Units**	**PQL**			
Metals					
Arsenic (Filtered)	mg/l	0.001	<0.001	<0.001	0
Cadmium (Filtered)	mg/l	0.0001	0.0001	0.0001	0
Chromium (III+VI) (Filtered)	mg/l	0.001	<0.001	<0.001	0
Copper (Filtered)	mg/l	0.001	<0.001	<0.001	0
Lead (Filtered)	mg/l	0.001	<0.001	<0.001	0
Mercury (Filtered)	mg/l	0.00005 (Primary): 0.0001 (Interlab)	<0.0001	<0.0001	0
Nickel (Filtered)	mg/l	0.001	0.012	0.011	9
Zinc (Filtered)	mg/l	0.001 (Primary): 0.005 (Interlab)	0.051	0.044	15
TPH					
C10-C16	mg/l	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0
C16-C34	mg/l	0.1	<0.1	<0.1	0
C34-C40	mg/l	0.1	<0.1	<0.1	0
F2-NAPHTHALENE	mg/l	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0
C6 - C9	mg/l	0.01 (Primary): 0.02 (Interlab)	<0.01	<0.1	0
C10 - C14	mg/l	0.05	<0.05	<0.05	0
C15 - C28	mg/l	0.1	<0.1	<0.1	0
C29-C36	mg/l	0.1 (Primary): 0.05 (Interlab)	<0.1	<0.1	0
C6-C10 less BTEX (F1)	mg/l	0.01 (Primary): 0.02 (Interlab)	<0.01	<0.01	0
C6-C10	mg/l	0.01 (Primary): 0.02 (Interlab)	<0.01	<0.1	0
BTEX					
Benzene	mg/l	0.001	<0.001	<0.01	0
Benzene	mg/l	0.001	<0.001	<0.01	0
Ethylbenzene	mg/l	0.001 (Primary): 0.002 (Interlab)	<0.001	<0.01	0
Ethylbenzene	mg/l	0.001 (Primary): 0.002 (Interlab)	<0.001	<0.01	0
Toluene	mg/l	0.001 (Primary): 0.002 (Interlab)	<0.001	<0.01	0
Toluene	mg/l	0.001 (Primary): 0.002 (Interlab)	<0.001	<0.01	0
Xylene (m & p)	mg/l	0.002	<0.002	<0.02	0
Xylene (m & p)	mg/l	0.002	<0.002	<0.02	0
Xylene (o)	mg/l	0.001 (Primary): 0.002 (Interlab)	<0.001	<0.01	0
Xylene (o)	mg/l	0.001 (Primary): 0.002 (Interlab)	<0.001	<0.01	0
MAH					
1,2,4-trimethylbenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,3,5-trimethylbenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Isopropylbenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
n-butylbenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
n-propylbenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
p-isopropyltoluene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
sec-butylbenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Styrene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
tert-butylbenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Chlorinated Hydrocarbons					
1,1,1,2-tetrachloroethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,1,1-trichloroethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,1,2,2-tetrachloroethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,1,2-trichloroethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,1-dichloroethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,1-dichloroethene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,1-dichloropropene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,2,3-trichloropropane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,2-dibromo-3-chloropropane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,2-dichloroethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,2-dichloropropane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,3-dichloropropane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
2,2-dichloropropane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Bromochloromethane	mg/l	0.001	<0.001	<0.01	0
Bromodichloromethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Bromoform	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Carbon tetrachloride	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Chlorodibromomethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Chloroethane	mg/l	0.01 (Primary): 0.05 (Interlab)	<0.01	<0.1	0
Chloroform	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Chloromethane	mg/l	0.01 (Primary): 0.05 (Interlab)	<0.01	<0.1	0
cis-1,2-dichloroethene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
cis-1,3-dichloropropene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Dibromomethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Hexachlorobutadiene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Trichloroethene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Tetrachloroethene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
trans-1,2-dichloroethene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
trans-1,3-dichloropropene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Vinyl chloride	mg/l	0.01 (Primary): 0.05 (Interlab)	<0.01	<0.1	0
Halogenated Hydrocarbons					
1,2-dibromoethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Bromomethane	mg/l	0.01 (Primary): 0.05 (Interlab)	<0.01	<0.1	0
Dichlorodifluoromethane	mg/l	0.01 (Primary): 0.05 (Interlab)	<0.01	<0.1	0
Trichlorofluoromethane	mg/l	0.01 (Primary): 0.05 (Interlab)	<0.01	<0.1	0
Halogenated Benzenes					
1,2,3-trichlorobenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,2,4-trichlorobenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,2-dichlorobenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,3-dichlorobenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
1,4-dichlorobenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
2-chlorotoluene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
4-chlorotoluene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Bromobenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Chlorobenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Solvents					
Cyclohexane	mg/l	0.001	<0.001	<0.01	0
PAH/Phenols					
Total Positive PAHs	mg/l	0.0001	<0.0001	<0.0001	0
Acenaphthene	mg/l	0.0001	<0.0001	<0.0001	0
Acenaphthylene	mg/l	0.0001	<0.0001	<0.0001	0
Anthracene	mg/l	0.0001	<0.0001	<0.0001	0
Benz(a)anthracene	mg/l	0.0001	<0.0001	<0.0001	0
Benzo(a) pyrene	mg/l	0.0001 (Primary): 0.00005 (Interlab)	<0.0001	<0.0001	0
Benzo(g,h,i)perylene	mg/l	0.0001	<0.0001	<0.0001	0
Chrysene	mg/l	0.0001	<0.0001	<0.0001	0
Dibenz(a,h)anthracene	mg/l	0.0001	<0.0001	<0.0001	0
Fluoranthene	mg/l	0.0001	<0.0001	<0.0001	0
Fluorene	mg/l	0.0001	<0.0001	<0.0001	0
Indeno(1,2,3-c,d)pyrene	mg/l	0.0001	<0.0001	<0.0001	0
Naphthalene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.01	0
Naphthalene	mg/l	0.0002 (Primary): 0.005 (Interlab)	<0.0002	<0.0002	0
Phenanthrene	mg/l	0.0001	<0.0001	<0.0001	0
Phenolics Total	mg/l	0.05	<0.05	<0.05	0
Pyrene	mg/l	0.0001	<0.0001	<0.0001	0

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

- The typically low actual differences in the concentrations of the replicate pairs where some RPD exceedances occurred. High RPD values reflect the small differences between two small numbers;
- The number of replicate pairs being collected from fill soils which were heterogeneous in nature;
- Soil replicates, rather than homogenised soil duplicates, were used to minimise the risk of possible volatile loss, hence greater variability can be expected;
- Some of the recorded concentrations being relatively close to the PQL. High RPD values reflect the low concentrations;
- The majority of RPDs within a replicate pair being within the acceptable limits; and
- All other QA/QC parameters met the DQIs.

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

D2.2 Inter-Laboratory Analysis

Inter-laboratory replicates were conducted as a check of the reproducibility of results between the primary laboratory Envirolab Services and the secondary laboratory ALS Environmental and as a measure of consistency of sampling techniques.

The comparative results of analysis between original and inter-laboratory replicate samples are summarised in Table 6 and Table 7.

Note that, where both samples are below PQL the difference and RPD has been given as zero. Where one sample is reported below PQL, but a concentration is reported for the other, the PQL value has been used for calculation of the RPD for the less than PQL sample.

Table 6: Relative Percentage Difference Results – Inter-laboratory Replicates (Soil)

		SDG	ROLAB 2020-03-05T00	SE-Sydney 06-Mar-20	
		Field ID	301/0.4	T2	RPD
		Sampled Date/Time	3/03/2020	3/03/2020	
ChemName	**Units**	**EQL**			
Metals					
Aluminium	mg/kg	10 (Primary): 50 (Interlab)	3300.0	3320.0	1
Antimony	mg/kg	7 (Primary): 5 (Interlab)	<7.0	<5.0	0
Arsenic	mg/kg	4 (Primary): 5 (Interlab)	<4.0	<5.0	0
Boron	mg/kg	3 (Primary): 50 (Interlab)	<3.0	<50.0	0
Cadmium	mg/kg	0.4 (Primary): 1 (Interlab)	<0.4	<1.0	0
Chromium (III+VI)	mg/kg	1 (Primary): 2 (Interlab)	7.0	7.0	0
Cobalt	mg/kg	1 (Primary): 2 (Interlab)	1.0	<2.0	0
Copper	mg/kg	1 (Primary): 5 (Interlab)	26.0	26.0	0
Iron	mg/kg	10 (Primary): 50 (Interlab)	6000.0	6660.0	10
Lead	mg/kg	1 (Primary): 5 (Interlab)	190.0	163.0	15
Magnesium	mg/kg	10 (Primary): 50 (Interlab)	610.0	500.0	20
Manganese	mg/kg	1 (Primary): 5 (Interlab)	60.0	56.0	7
Mercury	mg/kg	0.1	**1.4**	**0.3**	**129**
Nickel	mg/kg	1 (Primary): 2 (Interlab)	5.0	5.0	0
Selenium	mg/kg	2 (Primary): 5 (Interlab)	<2.0	<5.0	0
Tin	mg/kg	1 (Primary): 5 (Interlab)	1.0	<5.0	0
Zinc	mg/kg	1 (Primary): 5 (Interlab)	110.0	150.0	31
TRH					
C10-C16	mg/kg	50			
C16-C34	mg/kg	100			
C34-C40	mg/kg	100			
F2-NAPHTHALENE	mg/kg	50			
C6 - C9	mg/kg	25			
C10 - C14	mg/kg	50			
C15 - C28	mg/kg	100			
C29-C36	mg/kg	100			
C10 - C40 (Sum of total)	mg/kg	50			
C6-C10 less BTEX (F1)	mg/kg	25			
C6-C10	mg/kg	25			
BTEX					
Benzene	mg/kg	0.2			
Benzene	mg/kg	0.2			
Ethylbenzene	mg/kg	1			
Ethylbenzene	mg/kg	1			
Toluene	mg/kg	0.5			
Toluene	mg/kg	0.5			
Xylene (m & p)	mg/kg	2			
Xylene (m & p)	mg/kg	2			
Xylene (o)	mg/kg	1			
Xylene (o)	mg/kg	1			
Xylene Total	mg/kg	3			
MAH					
1,2,4-trimethylbenzene	mg/kg	1			
1,3,5-trimethylbenzene	mg/kg	1			
Isopropylbenzene	mg/kg	1			
n-butylbenzene	mg/kg	1			
n-propylbenzene	mg/kg	1			
p-isopropyltoluene	mg/kg	1			
sec-butylbenzene	mg/kg	1			
Styrene	mg/kg	1			
tert-butylbenzene	mg/kg	1			
Chlorinated Hydrocarbons					
1,1,1,2-tetrachloroethane	mg/kg	1			
1,1,1-trichloroethane	mg/kg	1			
1,1,2,2-tetrachloroethane	mg/kg	1			
1,1,2-trichloroethane	mg/kg	1			
1,1-dichloroethane	mg/kg	1			
1,1-dichloroethene	mg/kg	1			
1,1-dichloropropene	mg/kg	1			
1,2,3-trichloropropane	mg/kg	1			
1,2-dibromo-3-chloropropane	mg/kg	1			
1,2-dichloroethane	mg/kg	1			
1,2-dichloropropane	mg/kg	1			
1,3-dichloropropane	mg/kg	1			
2,2-dichloropropane	mg/kg	1			
Bromochloromethane	mg/kg	1			
Bromodichloromethane	mg/kg	1			
Bromoform	mg/kg	1			
Carbon tetrachloride	mg/kg	1			
Chlorodibromomethane	mg/kg	1			
Chloroethane	mg/kg	1			
Chloroform	mg/kg	1			
Chloromethane	mg/kg	1			
cis-1,2-dichloroethene	mg/kg	1			
cis-1,3-dichloropropene	mg/kg	1			
Dibromomethane	mg/kg	1			
Hexachlorobutadiene	mg/kg	1			
Trichloroethene	mg/kg	1			
Tetrachloroethene	mg/kg	1			
trans-1,2-dichloroethene	mg/kg	1			
trans-1,3-dichloropropene	mg/kg	1			
Vinyl chloride	mg/kg	1			
Halogenated Hydrocarbons					
1,2-dibromoethane	mg/kg	1			
Bromomethane	mg/kg	1			
Dichlorodifluoromethane	mg/kg	1			
Trichlorofluoromethane	mg/kg	1			
Halogenated Benzenes					
1,2,3-trichlorobenzene	mg/kg	1			
1,2,4-trichlorobenzene	mg/kg	1			
1,2-dichlorobenzene	mg/kg	1			
1,3-dichlorobenzene	mg/kg	1			
1,4-dichlorobenzene	mg/kg	1			
2-chlorotoluene	mg/kg	1			
4-chlorotoluene	mg/kg	1			
Bromobenzene	mg/kg	1			
Chlorobenzene	mg/kg	1			
Hexachlorobenzene	mg/kg	0.1			
Solvents					
Cyclohexane	mg/kg	1			
PAH/Phenols					
Total Positive PAHs	mg/kg	0.05	12.0		
Acenaphthene	mg/kg	0.1 (Primary): 0.5 (Interlab)	<0.1	<0.5	0
Acenaphthylene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**0.2**	**0.6**	**100**
Anthracene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**0.2**	**0.8**	**120**
Benz(a)anthracene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**1.3**	**2.1**	**47**
Benzo(a) pyrene	mg/kg	0.05 (Primary): 0.5 (Interlab)	**1.1**	**1.8**	**48**
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.5	**1.7**	**2.4**	**34**
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.5	**1.7**	**2.7**	**45**
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.5	**1.7**	**2.9**	**52**
Benzo(b,j+k)fluoranthene	mg/kg	0.2	2.0		
Benzo(g,h,i)perylene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**0.5**	**1.0**	**67**
Chrysene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**1.2**	**1.8**	**40**
Dibenz(a,h)anthracene	mg/kg	0.1 (Primary): 0.5 (Interlab)	0.1	<0.5	0
Fluoranthene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**2.1**	**4.6**	**75**
Fluorene	mg/kg	0.1 (Primary): 0.5 (Interlab)	<0.1	<0.5	0
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**0.5**	**0.9**	**57**
Naphthalene	mg/kg	1			
Naphthalene	mg/kg	0.1 (Primary): 0.5 (Interlab)	<0.1	<0.5	0
Phenanthrene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**1.0**	**2.3**	**79**
Phenolics Total	mg/kg	5			
Pyrene	mg/kg	0.1 (Primary): 0.5 (Interlab)	**1.8**	**4.0**	**76**
Polychlorinated biphenyls					
PCBs (Sum of total)	mg/kg	0.1			
Arochlor 1016	mg/kg	0.1			
Arochlor 1221	mg/kg	0.1			
Arochlor 1232	mg/kg	0.1			
Arochlor 1242	mg/kg	0.1			
Arochlor 1248	mg/kg	0.1			
Arochlor 1254	mg/kg	0.1			
Arochlor 1260	mg/kg	0.1			
Organochlorine Pesticides					
4,4-DDE	mg/kg	0.1			
a-BHC	mg/kg	0.1			
Aldrin	mg/kg	0.1			
b-BHC	mg/kg	0.1			
Chlordane (cis)	mg/kg	0.1			
Chlordane (trans)	mg/kg	0.1			
d-BHC	mg/kg	0.1			
DDD	mg/kg	0.1			
DDT	mg/kg	0.1			
DDT+DDE+DDD	mg/kg	0.1			
Dieldrin	mg/kg	0.1			
Endosulfan I	mg/kg	0.1			
Endosulfan II	mg/kg	0.1			
Endosulfan sulphate	mg/kg	0.1			
Endrin	mg/kg	0.1			
Endrin aldehyde	mg/kg	0.1			
g-BHC (Lindane)	mg/kg	0.1			
Heptachlor	mg/kg	0.1			
Heptachlor epoxide	mg/kg	0.1			
Methoxychlor	mg/kg	0.1			
Organophosphorous Pesticides					
Azinophos methyl	mg/kg	0.1			
Bromophos-ethyl	mg/kg	0.1			
Chlorpyrifos	mg/kg	0.1			
Chlorpyrifos-methyl	mg/kg	0.1			
Diazinon	mg/kg	0.1			
Dichlorvos	mg/kg	0.1			
Dimethoate	mg/kg	0.1			
Ethion	mg/kg	0.1			
Fenitrothion	mg/kg	0.1			
Malathion	mg/kg	0.1			
Ronnel	mg/kg	0.1			
Pesticides					
Parathion	mg/kg	0.1			

Table 7: Relative Percentage Difference Results – Inter-laboratory Replicates (Groundwater)

			Lab Report Number	234001	ES2000718	
			Field ID	203	TW1	RPD
			Sampled Date/Time	7/01/2020	7/01/2020	
ChemName		Units	PQL			
Metals						
	Arsenic (Filtered)	mg/l	0.001	<0.001	<0.001	0
	Cadmium (Filtered)	mg/l	0.0001	0.0001	0.0001	0
	Chromium (III+VI) (Filtered)	mg/l	0.001	<0.001	<0.001	0
	Copper (Filtered)	mg/l	0.001	<0.001	<0.001	0
	Lead (Filtered)	mg/l	0.001	<0.001	<0.001	0
	Mercury (Filtered)	mg/l	0.00005 (Primary): 0.0001 (Interlab)	<0.0001	<0.0001	0
	Nickel (Filtered)	mg/l	0.001	0.012	0.014	15
	Zinc (Filtered)	mg/l	0.001 (Primary): 0.005 (Interlab)	0.051	0.052	2
TPH						
	C10-C16	mg/l	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0
	C16-C34	mg/l	0.1	<0.1	<0.1	0
	C34-C40	mg/l	0.1	<0.1	<0.1	0
	F2-NAPHTHALENE	mg/l	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0
	C6 - C9	mg/l	0.01 (Primary): 0.02 (Interlab)	<0.01	<0.02	0
	C10 - C14	mg/l	0.05	<0.05	<0.05	0
	C15 - C28	mg/l	0.1	<0.1	<0.1	0
	C29-C36	mg/l	0.1 (Primary): 0.05 (Interlab)	<0.1	<0.05	0
	C6-C10 less BTEX (F1)	mg/l	0.01 (Primary): 0.02 (Interlab)	<0.01	<0.02	0
	C6-C10	mg/l	0.01 (Primary): 0.02 (Interlab)	<0.01	<0.02	0
BTEX						
	Benzene	mg/l	0.001	<0.001	<0.001	0
	Benzene	mg/l	0.001	<0.001	<0.001	0
	Ethylbenzene	mg/l	0.001 (Primary): 0.002 (Interlab)	<0.001	<0.002	0
	Ethylbenzene	mg/l	0.001 (Primary): 0.002 (Interlab)	<0.001	<0.002	0
	Toluene	mg/l	0.001 (Primary): 0.002 (Interlab)	<0.001	<0.002	0
	Toluene	mg/l	0.001 (Primary): 0.002 (Interlab)	<0.001	<0.002	0
	Xylene (m & p)	mg/l	0.002	<0.002	<0.002	0
	Xylene (m & p)	mg/l	0.002	<0.002	<0.002	0
	Xylene (o)	mg/l	0.001 (Primary): 0.002 (Interlab)	<0.001	<0.002	0
	Xylene (o)	mg/l	0.001 (Primary): 0.002 (Interlab)	<0.001	<0.002	0
MAH						
	1,2,4-trimethylbenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,3,5-trimethylbenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Isopropylbenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	n-butylbenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	n-propylbenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	p-isopropyltoluene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	sec-butylbenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Styrene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	tert-butylbenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
Chlorinated Hydrocarbons						
	1,1,1,2-tetrachloroethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,1,1-trichloroethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,1,2,2-tetrachloroethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,1,2-trichloroethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,1-dichloroethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,1-dichloroethene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,1-dichloropropene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,2,3-trichloropropane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,2-dibromo-3-chloropropane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,2-dichloroethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,2-dichloropropane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,3-dichloropropane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	2,2-dichloropropane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Bromochloromethane	mg/l	0.001	<0.001		
	Bromodichloromethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Bromoform	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Carbon tetrachloride	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Chlorodibromomethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Chloroethane	mg/l	0.01 (Primary): 0.05 (Interlab)	<0.01	<0.05	0
	Chloroform	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Chloromethane	mg/l	0.01 (Primary): 0.05 (Interlab)	<0.01	<0.05	0
	cis-1,2-dichloroethene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	cis-1,3-dichloropropene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Dibromomethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Hexachlorobutadiene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Trichloroethene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Tetrachloroethene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	trans-1,2-dichloroethene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	trans-1,3-dichloropropene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Vinyl chloride	mg/l	0.01 (Primary): 0.05 (Interlab)	<0.01	<0.05	0
Halogenated Hydrocarbons						
	1,2-dibromoethane	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Bromomethane	mg/l	0.01 (Primary): 0.05 (Interlab)	<0.01	<0.05	0
	Dichlorodifluoromethane	mg/l	0.01 (Primary): 0.05 (Interlab)	<0.01	<0.05	0
	Trichlorofluoromethane	mg/l	0.01 (Primary): 0.05 (Interlab)	<0.01	<0.05	0
Halogenated Benzenes						
	1,2,3-trichlorobenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,2,4-trichlorobenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,2-dichlorobenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,3-dichlorobenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	1,4-dichlorobenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	2-chlorotoluene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	4-chlorotoluene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Bromobenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
	Chlorobenzene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.005	0
Solvents						
	Cyclohexane	mg/l	0.001	<0.001		
PAH/Phenols						
	Total Positive PAHs	mg/l	0.0001	<0.0001		
	Acenaphthene	mg/l	0.0001	<0.0001	<0.0001	0
	Acenaphthylene	mg/l	0.0001	<0.0001	<0.0001	0
	Anthracene	mg/l	0.0001	<0.0001	<0.0001	0
	Benz(a)anthracene	mg/l	0.0001	<0.0001	<0.0001	0
	Benzo(a) pyrene	mg/l	0.0001 (Primary): 0.00005 (Interlab)	<0.0001	<0.0001	0
	Benzo(g,h,i)perylene	mg/l	0.0001	<0.0001	<0.0001	0
	Chrysene	mg/l	0.0001	<0.0001	<0.0001	0
	Dibenz(a,h)anthracene	mg/l	0.0001	<0.0001	<0.0001	0
	Fluoranthene	mg/l	0.0001	<0.0001	<0.0001	0
	Fluorene	mg/l	0.0001	<0.0001	<0.0001	0
	Indeno(1,2,3-c,d)pyrene	mg/l	0.0001	<0.0001	<0.0001	0
	Naphthalene	mg/l	0.001 (Primary): 0.005 (Interlab)	<0.001	<0.0001	0
	Naphthalene	mg/l	0.0002 (Primary): 0.005 (Interlab)	<0.0002	<0.0001	0
	Phenanthrene	mg/l	0.0001	<0.0001	<0.0001	0
	Phenolics Total	mg/l	0.05	<0.05		
	Pyrene	mg/l	0.0001	<0.0001	<0.0001	0

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

- The typically low actual differences in the concentrations of the replicate pairs where some RPD exceedances occurred. High RPD values reflect the small differences between two small numbers;
- The number of replicate pairs being collected from fill soils which were heterogeneous in nature;
- Soil replicates, rather than homogenised soil duplicates, were used to minimise the risk of possible volatile loss, hence greater variability can be expected;
- Some of the recorded concentrations being relatively close to the PQL. High RPD values reflect the low concentrations;
- The majority of RPDs within a replicate pair being within the acceptable limits; and
- All other QA/QC parameters met the DQIs.

Overall inter-laboratory replicate comparisons indicate that the sampling technique was generally consistent and repeatable and the two laboratory sampling handling and analytical methods are comparable.

D2.3 Trip (Field) Blank

The purpose of a trip blank is to assess the potential for transfer of contaminants into samples to have occurred between the time of collection and analysis of the sample by the laboratory. Laboratory prepared soil and groundwater field blanks were taken out to the field unopened, subjected to the same preservation methods as the field samples, then analysed for the purposes of determining whether transfer of contaminants into the blank sample had occurred prior to reaching the laboratory. The results of the laboratory analysis for the field blanks are shown in Table 8 and Table 9.

Table 8: Trip Blank Results - Soil (mg/kg)

Sample ID	Benzene	Toluene	Ethylbenzene	M + P Xylene	O Xylene
TB2	<0.2	<0.5	<1	<2	<1

Table 9: Trip Blank Results - Groundwater (mg/L)

Sample ID	Benzene	Toluene	Ethylbenzene	M + P Xylene	O Xylene
TB1	<0.001	<0.001	<0.001	<0.002	<0.001

The concentrations of the analytes were all below laboratory detection limits indicating that significant cross contamination had not occurred during the course of the round trip from the site to the laboratory. As discussed above, the soil bore trip blank was inadvertently not analysis, however, field and laboratory test results would suggest the absence of significant cross contamination during transport.

D2.4 Trip Spike

The purpose of a trip spike is to assess the potential for loss of volatile analytes to have occurred between the time of collection and analysis of the sample by the laboratory.

For soil trip spikes, the laboratory prepared the trip spike by injecting 220µL of BTEX into the trip spike. The results were then analysed and expressed as % of theoretical value of a 50ppb standard.

For water trip spikes, the laboratory prepared the trip spike by injecting 220µL of BTEX into the trip spike. The results were then analysed and expressed as % of theoretical value of a 50ppb standard.

The generally acceptance limit for trip spikes is 60-140% in difference compared to the control or standard.

The results of the laboratory analysis for the trip spikes are shown in Table 10 and Table 11.

Table 10: Trip Spike Results – Soil (% Recovery)

Sample ID	Benzene	Toluene	Ethylbenzene	M + P Xylene	O Xylene
TS2	113	109	109	110	113

Table 11: Trip Spike Results – Groundwater (% Recovery)

Sample ID	Benzene	Toluene	Ethylbenzene	M + P Xylene	O Xylene
TS1	113	109	103	98	104

Results indicate that the percentage loss for BTEX during the trip was minimal and therefore appropriate preservation techniques were employed.

D3 Data Quality Indicators

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

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

The DQIs were assessed as outlined in the following Table 9.

Table 9: Data Quality Indicators

DQI	Frequency	Data Acceptance Criteria
Completeness		
Field documentation correct	All samples	All samples
Soil bore logs complete and correct	All samples	All samples
Suitably qualified and experience sampler	All samples	All samples
Appropriate lab methods and limits of reporting (LORs)	All samples	All samples
Chain of custodies (COCs) completed appropriately	All samples	All samples
Sample holding times complied with	All samples	All samples
Proposed/critical locations sampled	-	Proposed/critical locations sampled
Comparability		
Consistent standard operating procedures for collection of each sample. Samples should be collected, preserved and handled in a consistent manner	All samples	All samples
Experienced sampler	All samples	All samples
Consistent analytical methods, laboratories and units	All samples	All samples

Table 9: Data Quality Indicators (cont)

DQI	Frequency	Data Acceptance Criteria
Representativeness		
Sampling appropriate for media and analytes (appropriate collection, handling and storage)	All samples	All Samples
Samples extracted and analysed within recommended holding times	All samples	-
Precision		
Blind duplicates (intra-laboratory duplicates)	1 per 20 samples	30% RPD, then review RPDs >30% would be reviewed in relation to heterogeneity of sample and LOR
Split duplicates (inter-laboratory duplicates)	1 per 20 samples	30% RPD, then review RPDs >30% would be reviewed in relation to heterogeneity of sample and LOR
Laboratory duplicates	1 per 20 samples	<20% RPD Result > 20 × LOR <50% RPD Result 10-20 × LOR No Limit when RPD Result <10 × LOR
Accuracy		
Trip blanks	1 per sampling event (as required)	COPCs<LOR
Trip Spikes	1 per sampling event (as required)	70-130%
Surrogate spikes	All organic samples	50-150%
Matrix spikes	1 per 20 samples	70-130% (inorganics) 60-140% (organics)
Laboratory control samples	1 per 20 samples	70-130% (inorganics) 60-140% (organics)
Method blanks	1 per 20 samples	<LOR

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

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CHAIN OF CUSTODY FIELD SHEET

Project No: 91667	**Client Project Name:** Nihon University
Client: Built	**Location:** 9 Church Street, Newcastle
Project Manager: MRH	**DP Lab Received** By: LCD 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] Envirolab Date	Lab 2[B] Date	Lab 3[C] Date	
MS4	0.02		S	G		KLP	19/11	14:00		27-11-19 ✓			
	0.1 0.3							14:10		✓			
	0.3							14:20					
	0.5							14:30					
	0.8							14:40					
	~~0.15~~												
	~~1.15~~							15:00					
	2.0							15:10					
	3.5							15:20					
	4.5							15:30					
	6.0							15:40					
	7.5							15:50					
	9.0							16:00					
	10.5							16:10					

*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

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CHAIN OF CUSTODY FIELD SHEET

Project No: 91667.01	**Client Project Name:** Nihon University
Client: Built	**Location:** 9 Church St, Newcastle
Project Manager: MRH	**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*	Envirolab 27-11-19			
GEO1	0.2		S	G, P		MEB	21/11/19						
	0.5	D1	S	G, P									
	1.0		S	G, P									
	1.3		S	P									
	2.0		S	G P									
	3.3		S	P									
	4.7		S	P									
	6.3		S	P									
	7.8		S	P		JCL	22/11/19						
	11.8		S	P									
	13.3		S	P									
	14.5		S	P									
F1	–									✓			potential asbestos
F2	–									✓			
	3.0		S	G		MEB	21/11/19						

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

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CHAIN OF CUSTODY FIELD SHEET

Project No: 91667.02	**Client Project Name:** Proposed Nihon University
Client: Built	**Location:** 9 Church Street, Newcastle
Project Manager: MJB	**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	
TS1-11/12/19	-	-	S	G		DEW	11/12/19			12-12-19			
TB1-11/12/19	-	-	S	G		DEW	"						
202	0.3		S	G,P		DEW	11/12/19						
	0.6												
	1.0												
	1.5												
	2.0	D1											
	2.5												
	3.0												
	3.5	D2, T2											
	4.0												
	4.5												
	4.8									✓			
	5.0			↓									
	6.0			G									M. Hand / say with headspace
	6.5			G,P									

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

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

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CHAIN OF CUSTODY FIELD SHEET

Project No: 91667.02	**Client Project Name:** Proposed Nihon University
Client: Built	**Location:** 9 Church Street, Newcastle
Project Manager: MJB	**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	
										12-12-19			
202	7.0	–	S	G,P	–	DEW	11/12/19			✓			
	7.3	–	|	/	–							
	7.8	–	|	/	–							
	8.8	–	|	/				1210pm				
	9.8	–			–	CMF							
	10.8	–			–	CMF		1.15pm					
	11.8												
203	0.0-0.5									✓ 16-12-19			
	0.1												
	0.5												
	0.5	D3								✓ + D3			
	1.5-1.6												
	1.5-1.6	D4											
	1.5-1.6	T4											
	2.0												
	2.5												

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

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

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CHAIN OF CUSTODY FIELD SHEET

Project No: 91667.02	**Client Project Name:** Proposed Nihon University
Client: Built	**Location:** 9 Church Street, Newcastle
Project Manager: MJB	**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	
203	3.0	—	S	G, P		CDL, CMF	11-12-19	3pm					
	3.5												
	4.0												
	4.5												
	5.0												
	5.5												
	6.0												
	6.5												
	5.2												
	5.8												
	7.0												
	7.5												
	8.0												
	8.3							4:45					
	9.0							4:50					
	9.8					CDL	12-12-19	7:40					

*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
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CHAIN OF CUSTODY FIELD SHEET

Project No:	91667.02	**Client Project Name:**	Newcastle
Client:	Built Pty Ltd	**Location:**	9 Church Street, Newcastle
Project Manager:	Matthew Blackert	**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	
										12-12-19			
201	0.15-0.19	—		GP		CDL	12-12	9:00am					
201	~~0.19-0.4~~												
	~~0.2-0.3~~												
	~~0.4-0.5~~												
	~~0.42-0.85~~												
	0.9-1.2									✓			
	1.4-1.6												
	1.9-2.2												
	2.8-3.1			G									
	2.8-3.1	D5		G, P									
	2.4-26	—											
	2.4-2.6	D6											
	2.8-3.1	—											
	3.5												
	4.1												
	4.5												
	5.1												
	5.5												
	6.1												

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

A Provide name of Lab 1 *Envirolab Services* B Provide name of Lab 2 *ALS* C Provide name of Lab 3

Douglas Partners
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CHAIN OF CUSTODY FIELD SHEET

Project No:	91667.02	**Client Project Name:**	Newcastle
Client:	Built Pty Ltd	**Location:**	9 Church Street, Newcastle
Project Manager:	Matthew Blackert	**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	
201	7.1	—	S	G, P		CDL	12-12-19			12-12-19			
	6.5			G, P									
	7.8			P									
	3.2			P									
	7.4			P									
	7.9			G/P						✓			
	8.9												
	9.8							12.30					

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

A Provide name of Lab 1 *Envirolab Services* B Provide name of Lab 2 *ALS* C Provide name of Lab 3

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY FIELD SHEET

Project No: 91667.02	**Client Project Name:**
Client:	**Location:**
Project Manager:	**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*	Envirolab 7/11/20			
201			W	G,P		JBS/EDL	7/11/20	10	Esky	✓			
202										✓			
203		DW1 & TW1								✓			
TB1				VG						✓			
TS1				G				2		✓			

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

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CHAIN OF CUSTODY FIELD SHEET

Project No: 91667.02	**Client Project Name:** Proposed Nihon University
Client: Nihon Daigaku Australia Newcastle Pty Ltd	**Location:** 9 Church Street, Newcastle
Project Manager: MJB	**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	
										4-3-2020			
307/F1			S, M	P		JC	3.3.20	0900	BAM III	✓			ASBESTOS FRAG + 50g SAMPLE.
307/F2			↓	↓		↓	↓	↓	↓	✓			
308/F1			↓	↓		↓	↓	↓		✓			
309/310/F1			↓	↓		↓	↓	↓	↓	✓			
307/F1S										✓			
307/F2S										✓			
TS2										✓			
TB2										✓			

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

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

Douglas Partners
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CHAIN OF CUSTODY FIELD SHEET

Project No: 91667.02	**Client Project Name:** Proposed Nihon University
Client: Nihon Daigaku Australia Newcastle Pty Ltd	**Location:** 9 Church Street, Newcastle
Project Manager: MJB	**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	
304	0.1		S	G.P		JC	3/3/20	0800	RACWI	4-3-2020			
↓	0.3		↓	↓		↓	↓	↓	↓	✓			
	0.5	D1, T1								✓ 9-3-2020			
	1.0												
	0.7			✓									GRAB SAMPLE.
✓	0.2-0.4			B									
310	0.05			G.P				↓		✓			
	0.2			↓									
↓	0.6		✓			✓	✓	1520	✓				

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

A Provide name of Lab 1 Envirolab

B Provide name of Lab 2

C Provide name of Lab 3

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CHAIN OF CUSTODY FIELD SHEET

Project No: 91667.02	**Client Project Name:** Proposed Nihon University
Client: Nihon Daigaku Australia Newcastle Pty Ltd	**Location:** 9 Church Street, Newcastle
Project Manager: MJB	**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	
304	0.2		S	G, P		LL	3/3/20	0800	RM111	✓			
↓	0.4		↓	↓		↓	↓	↓	↓				
↓	0.6		↓	↓		↓	↓	↓	↓				
↓	0.1-0.2		↓	B		↓	↓	↓	↓				
306	0.13		↓	G, P		↓	↓	↓	↓				
↓	0.2		↓	↓		↓	↓	↓	↓				
↓	0.5		↓	↓		↓	↓	↓	↓	✓			
↓	0.8		↓	↓		↓	↓	↓	↓				
↓	0.2-0.3		↓	B		↓	↓	↓	↓				
308	0.1		↓	G, P		↓	↓	↓	↓	✓			
↓	0.5		↓	↓		↓	↓	↓	↓				
↓	0.9		↓	↓		↓	↓	↓	↓				
↓	0.1-0.2		↓	B		↓	↓	1500	↓				

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

A Provide name of Lab 1 Envirolab

B Provide name of Lab 2

C Provide name of Lab 3

Douglas Partners
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CHAIN OF CUSTODY FIELD SHEET

Project No: 91667.02	**Client Project Name:** Proposed Nihon University
Client: Nihon Daigaku Australia Newcastle Pty Ltd	**Location:** 9 Church Street, Newcastle
Project Manager: MJB	**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	
										4-3-2020	4-3-2020		
301	0.05		S	G, P		JLL	3-3-2020	0800	BAM111	✓			
	0.2									✓			
	0.35												GRAB SAMPLE.
	0.4	D3, T2								✓+D3	✓T2		
	0.7									✓			
↓	1.1												
302	0.3									✓			
	0.5												
	1.0			✓									
↓	01-02			B									
303	0.2			G, P						✓			
	0.5	D2						✓					
↓	0.9		↓	↓		✓	✓	1500	✓				

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

A Provide name of Lab 1 Enviro lab

B Provide name of Lab 2 ALS

C Provide name of Lab 3

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CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91667.02	**Suburb/Town: Newcastle**	**To: Envirolab Services Pty Ltd**	
DP Order No: 147227	**DP Contact Person:** Matthew Blackert / Chris Bozinovski	**12 Ashley Street, CHATSWOOD NSW 2067**	
Prior Storage: Esky X Fridge ☐ Shelved ☐		**Ph: (02) 9910 6200**	**Attn: Jacinta Hurst**

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

	Sample				Analytes									Notes
	DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH / BTEX	PAH	Metals (8)	OPP / OCP / PCB	pH	CEC	Asbestos I.D	Coal Tar ID		
1	F1	22/11/19	S	1							X			
2	F2	22/11/19	S	2							X			
3	MS4/0.02	19/11/19	S	3								X		
4	MS4/0.2	19/11/19	S	4	X	X	X				X			Combo 3a
PQL (S) mg/kg														
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐													

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

ENVIROLAB GROUP

Job No: 231798
Date Received: 28/11/19
Time Received: 1106
Received by: JO
Temp: Cool/Ambient 17.6°C
Cooling: Ice/Icepack
Security: Intact/Broken/None

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

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se, Sn, Sb, Mg, Co, B,

Total number of samples in container: .....4.....

Date relinquished: .....27/11/19. ..... By: JRK

..... Results required by.....

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

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

Signature: ..... Jason Day

Date: 28/11/19 1106

Lab Ref: ELS STD 231798

Send results to:
Douglas Partners Pty Ltd
Email: Matthew.Blackert@douglaspartners.com.au
Chris.Bozinovski@douglaspartners.com.au

Douglas Partners
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CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91667.02	**Suburb/Town:** Newcastle	**To:** Envirolab Services Pty Ltd	
DP Order No: 147240	**DP Contact Person:** Matthew Blackert / Chris Bozinovski	12 Ashley Street, CHATSWOOD NSW 2067	
Prior Storage: Esky X Fridge ☐ Shelved ☐		**Ph:** (02) 9910 6200	**Attn:** Jacinta Hurst

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

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH / BTEX	PAH	Metals (8)	OPP / OCP / PCB	pH	CEC	Asbestos I.D	TCLP PAHs		
MS4/0.2	19/11/2019	S	4								x		
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐												

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

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se, Sn, Sb, Mg, Co, B,

Total number of samples in container: ...4.....

Date relinquished:..27/11/2019 (already received) By: JRK

Results required by:.....

[Same day [24 hours [48 hours [72 hours X Standard

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

Signature: .....

Date: 5/12/19

Lab Ref: 231798-A

DJe: 12/12/19

Send results to:
Douglas Partners Pty Ltd
Email: matthew.blackert@douglaspartners.com.au
chris.bozinovski@douglaspartners.com.au

std T/A.

Douglas Partners
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CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91667.02	**Suburb/Town: Newcastle**	**To: Envirolab Services Pty Ltd**	
DP Order No: 147248	**DP Contact Person:** Matthew Blackert / Chris Bozinovski	**12 Ashley Street, CHATSWOOD NSW 2067**	
Prior Storage: Esky X Fridge ☒ Shelved ☐		**Ph: (02) 9910 6200**	**Attn: Jacinta Hurst**
Do samples contain 'potential' HBM? Yes ☐ No ☒ (If YES, then handle, transport and store in accordance with FPM HAZID)			

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH / BTEX	PAH	Metals (8)	OPP / OCP / PCB	Phenols	pH / CEC	Asbestos I.D	VOC	Coal Tar ID	
a 201 / 0.9-1.2	12-12-19	S	1	x	x	x	x	x			x		Combo 8 + VOC
b 201 / 7.9	12-12-19	S	2	x	x	x					x		Combo 3 + VOCs
c 202 / 4.8	11-12-19	S	3	x	x	x					x		"
d 202 / 7.0	11-12-19	A/C	4	x	x	x					x		"
203 / 0-0.05	11-12-19	S	5	x	x	x	x	x			x		Combo 8 + VOC
e 203 / 0.5	11-12-19	S	6	x	x	x	x	x			x		Combo 8 + VOC
f D3	11-12-19	S	7	x	x	x							Combo 3
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐												

ENVIROLAB
~~Envirolab Services~~
~~12 Ashley St~~
~~Chatswood NSW 2067~~
~~Ph: (02) 9910 6200~~
Job No: 233090
~~Date Received:~~ 13.12.19
Time Received: 10:15
Received by: MO
Temp: ~~Cool~~/Ambient
Cooling: ~~Ice~~/Icepack
Security: ~~Intact~~/~~Broken~~/~~None~~

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

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se, Sn, Sb, Mg, Co, B,

Total number of samples in container: ..7.....

Date relinquished:..12/12/2019 By: CDL

Results required by:.....

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

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

Signature: .....

Date: 13.12.19

Lab Ref: 233090

Send results to:
Douglas Partners Pty Ltd
Email: matthew.blackert@douglaspartners.com.au
chris.bozinovski@douglaspartners.com.au
dana.wilson@douglaspartners.com.au

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91667.02	**Suburb/Town: Newcastle**	**To: Envirolab Services Pty Ltd**	
DP Order No: 150307	**DP Contact Person:** Matthew Blackert / Chris Bozinovski	**12 Ashley Street, CHATSWOOD NSW 2067**	
Prior Storage: Esky X Fridge ☐ Shelved ☐		**Ph: (02) 9910 6200**	**Attn: Jacinta Hurst**
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)			

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH / BTEX	PAH	Metals (8)	OPP / OCP / PCB	pH	CEC	Asbestos I.D	TCLP PAHs	TCLP Pb	
D3	11/12/2019	S	5								x	x	
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐												

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

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se, Sn, Sb, Mg, Co, B,

Total number of samples in container: ...4.....

Date relinquished:..12/12/2019 (already received) By: CDL

Results required by:.....

Same day 24 hours 48 hours 72 hours X Standard

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

Signature: .....

Date: ..20/12/2019

Lab Ref: ..233090-A

Due: 6/1/20

Std TAT

Send results to:
Douglas Partners Pty Ltd
Email: matthew.blackert@douglaspartners.com.au
chris.bozinovski@douglaspartners.com.au
dana.wilson@douglaspartners.com.au

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91667.02	**Suburb/Town:** Newcastle	**To:** Envirolab Services Pty Ltd 12 Ashley Street, CHATSWOOD NSW 2067	
DP Order No: 150309	**DP Contact Person:** Matthew Blackert / Chris Bozinovski		
Prior Storage: Esky X Fridge ☐ Shelved ☐		**Ph:** (02) 9910 6200	**Attn:** Jacinta Hurst
Do samples contain 'potential' HBM? Yes ☐ No ☑ (If YES, then handle, transport and store in accordance with FPM HAZID)			

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH / BTEX	PAH (ANZECC LEVEL2)	Metals (8)	VOC	Phenols					
201	7-1-2020	W	1	✓	✓	✓	✓	✓					Combo 4L plus VOC
202	"	W	2	✓	✓	✓	✓	✓					
203	"	W	3	✓	✓	✓	✓	✓					
DW1	"	W	4	✓	✓	✓	✓	✓					
TS1	"	W	5	✓									
TB1	"	W	6	✓									
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☒												

ENVIROLAB — Envirolab Services, 12 Ashley St, Chatswood NSW 2067, Ph: (02) 9910 6200
Job No: 234001
Date Received: 8/1/20
Time Received: 11:05
Received by: MT
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se, Sn, Sb, Mg, Co, B,

Total number of samples in container: 5

Date relinquished: 7/1/20 By: DPS

Results required by:

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

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

Signature: MT

Date: 8/01/20

Lab Ref: 234001

Send results to:
Douglas Partners Pty Ltd
Email: matthew.blackert@douglaspartners.com.au
chris.bozinovski@douglaspartners.com.au
dana.wilson@douglaspartners.com.au

Allocated. 10.03.2020

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CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91667.02	**Suburb/Town: Newcastle**	**To: Envirolab Services Pty Ltd** **12 Ashley Street, CHATSWOOD NSW 2067**
DP Order No:	**DP Contact Person:** Matthew Blackert / Chris Bozinovski	
Prior Storage: Esky X Fridge X Shelved ☐		**Ph: (02) 9910 6200** **Attn: Jacinta Hurst**
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)		

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH / BTEX	PAH	Metals (*)	OPP / OCP / PCB	Phenols	pH / CEC	Asbestos I.D	VOC	Coal Tar ID	
301/0.4	3/03/2020	S			x	x							
301/0.7	3/03/2020	S			x	x							
302/0.3	3/03/2020	S		x	x	x	x	x		x	x		Combo 8a + VOC
303/0.2	3/03/2020	S		x	x	x							Combo 3
304/0.2	3/03/2020	S		x	x	x				x			Combo 3a
306/0.5	3/03/2020	S		x	x	x							Combo 3
308/0.1	3/03/2020	S		x	x	x				x			Combo 3a
309/0.3	3/03/2020	S		x	x	x				x			Combo 3a
309/0.5 ~~309/0.7~~	3/03/2020	S		x	x	x							Combo 3
310/0.2	3/03/2020	S		x	x	x							Combo 3
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐												

(21)

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

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se, Sn, Sb, Mg, Co, B,

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

Date relinquished:..4/03/2020 By: JCL

Results required by:.....

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

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

Signature: .....

Date: 10.03.2020 10:07

Lab Ref: 238190

Send results to:
Douglas Partners Pty Ltd
Email: matthew.blackert@douglaspartners.com.au
chris.bozinovski@douglaspartners.com.au
jason.lambert@douglaspartners.com.au

Ref: 238190-A

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91667.02	**Suburb/Town: Newcastle**	**To: Envirolab Services Pty Ltd**	
DP Order No:	**DP Contact Person:** Matthew Blackert / Chris Bozinovski	**12 Ashley Street, CHATSWOOD NSW 2067**	
Prior Storage: Esky X Fridge X Shelved ☐		**Ph: (02) 9910 6200**	**Attn: Jacinta Hurst**
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)			

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH / BTEX	PAH	Metals (*)	OPP / OCP / PCB	Phenols	pH / CEC	Asbestos I.D	VOC	Coal Tar ID	
302/F1	3/03/2020	Material	1							x			
307/F1	3/03/2020	Material	2							x			
307/F1S	3/03/2020	S	3							x			
307/F2	3/03/2020	Material	4							x			
307/F2S	3/03/2020	S	5							x			
310/F1	3/03/2020	Material	6							x			
TS2	3/03/2020	S	7	x									
TB2	3/03/2020	S	8	x									
301/0.05	3/03/2020	S	9		x	x							
301/0.2	3/03/2020	S	10	x	x	x				x			Combo3a
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐												

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 238190
Date Received: 5.3.20
Time Received: 1108
Received By: MO
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se, Sn, Sb, Mg, Co, B,

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

Date relinquished:..4/03/2020 By: JCL

Results required by:.....

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

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

Signature: .....

Date: 5.3.20

Lab Ref: 238190

Send results to:
Douglas Partners Pty Ltd
Email: matthew.blackert@douglaspartners.com.au
chris.bozinovski@douglaspartners.com.au
jason.lambert@douglaspartners.com.au

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91667.02	**Suburb/Town: Newcastle**	**To: Envirolab Services Pty Ltd**	
DP Order No:	**DP Contact Person:** Matthew Blackert / Chris Bozinovski	**12 Ashley Street, CHATSWOOD NSW 2067**	
Prior Storage: Esky X Fridge X Shelved ☐		**Ph: (02) 9910 6200**	**Attn: Jacinta Hurst**
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)			

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH / BTEX	PAH	Metals (*)	OPP / OCP / PCB	Phenols	pH / CEC	Asbestos I.D	VOC	Coal Tar ID	
301/0.4	3/03/2020	S	11		x	x							
301/0.7	3/03/2020	S	12		x	x							
302/0.3	3/03/2020	S	13	x	x	x	x	x		x	x		Combo 8a + VOC
303/0.2	3/03/2020	S	14	x	x	x							Combo 3
304/0.2	3/03/2020	S	15	x	x	x				x			Combo 3a
306/0.5	3/03/2020	S	16	x	x	x							Combo 3
308/0.1	3/03/2020	S	17	x	x	x				x			Combo 3a
309/0.3	3/03/2020	S	18	x	x	x				x			Combo 3a
309/0.7	3/03/2020	S	~~14~~ NR	x	x	x							Combo 3
310/0.2	3/03/2020	S	~~20~~ 19	x	x	x							Combo 3
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐												

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

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se, Sn, Sb, Mg, Co, B,

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

Date relinquished:..4/03/2020 By: JCL

Results required by:.....

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

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

Signature: .....

Date: 5.3.20

Lab Ref: 238190

Send results to:
Douglas Partners Pty Ltd
Email: matthew.blackert@douglaspartners.com.au
chris.bozinovski@douglaspartners.com.au
jason.lambert@douglaspartners.com.au

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91667.02	**Suburb/Town: Newcastle**	**To: Envirolab Services Pty Ltd**	
DP Order No:	**DP Contact Person:** Matthew Blackert / Chris Bozinovski	**12 Ashley Street, CHATSWOOD NSW 2067**	
Prior Storage: Esky X Fridge X Shelved ☐		**Ph: (02) 9910 6200**	**Attn: Jacinta Hurst**

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

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH / BTEX	PAH	Metals (*)	OPP / OCP / PCB	Phenols	pH / CEC	Asbestos I.D	VOC	Coal Tar ID	
D3	3/03/2020	S	84 20		x	x							
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐												

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

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se, Sn, Sb, Mg, Co, B,

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

Date relinquished:..4/03/2020 By: JCL

Results required by:.....

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

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

Signature: .....

Date: ...5.3.20.....

Lab Ref: ...239190.....

Send results to:
Douglas Partners Pty Ltd
Email: matthew.blackert@douglaspartners.com.au
chris.bozinovski@douglaspartners.com.au
jason.lambert@douglaspartners.com.au

Douglas Partners
Geotechnics | Environment | Groundwater

238190-B

CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91667.02	**Suburb/Town:** Newcastle	**To:** Envirolab Services Pty Ltd 12 Ashley Street, CHATSWOOD NSW 2067
DP Order No: 149991	**DP Contact Person:** Matthew Blackert / Chris Bozinovski	
Prior Storage: Esky X Fridge X Shelved ☐		**Ph: (02) 9910 6200** **Attn: Jacinta Hurst**
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)		

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TCLP Pb	TCLP PAH	ASLP Pb	ASLP PAH						
301/0.05	3/03/2020	S	9	x	x	x	x						
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐												

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

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se, Sn, Sb, Mg, Co, B,

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

Date relinquished:..4/03/2020 (already received) By: JCL

Results required by:....13/03/2020.....

Same day ☒ 24 hours | 48 hours | 72 hours | Standard

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

Signature: .....

Date: .....

Lab Ref: .....

Send results to:
Douglas Partners Pty Ltd
Email: matthew.blackert@douglaspartners.com.au
chris.bozinovski@douglaspartners.com.au
jason.lambert@douglaspartners.com.au

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91667.02	**Suburb/Town: Newcastle**	**To: Envirolab Services Pty Ltd**	
DP Order No: 149987	**DP Contact Person:** Matthew Blackert / Chris Bozinovski	**12 Ashley Street, CHATSWOOD NSW 2067**	
Prior Storage: Esky X Fridge ☐ Shelved ☐		**Ph: (02) 9910 6200**	**Attn: Jacinta Hurst**
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)			

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH / BTEX	PAH	Metals (*)	OPP / OCP / PCB	Phenols	pH / CEC	Asbestos I.D	VOC	Coal Tar ID	
S1	3/03/2020	S	1	x	x	x	x	x		x	x		Combo 8A + VOC
S2	3/03/2020	S	2	x	x	x	x	x		x	x		Combo 8A + VOC
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐												

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

Job No: 238799
Date Received: 13/03/20
Time Received: 1047
Received by: SB
Temp: Cool/Ambient
~~Cooling: Ice/Icepack~~
Security: Intact/Broken/None

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

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se, Sn, Sb, Mg, Co, B,

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

Date relinquished:..12/03/2020 By: JRK

Results required by: 13/03/2020.....

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

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

Signature: .....

Date: 13/03/20

Lab Ref: 238799

Send results to:
Douglas Partners Pty Ltd
Email: matthew.blackert@douglaspartners.com.au
chris.bozinovski@douglaspartners.com.au
jason.lambert@douglaspartners.com.au

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Chris Bozinovski

Sample Login Details

Your reference	91667.02, Newcastle
Envirolab Reference	231798
Date Sample Received	28/11/2019
Date Instructions Received	28/11/2019
Date Results Expected to be Reported	05/12/2019

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	2 material, 2 SOIL
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	17.6
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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12 Ashley St Chatswood NSW 2067
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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Acid Extractable metalsin soil	Misc Inorg - Soil	Asbestos ID - soils	Asbestos ID - materials
F1							✓
F2							✓
MS4-0.02					✓		
MS4-0.2	✓	✓	✓	✓		✓	

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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customerservice@envirolab.com.au
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SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew Blackert, Chris Bozinovski

Sample Login Details

Your reference	91667.02, Newcastle
Envirolab Reference	231798-A
Date Sample Received	28/11/2019
Date Instructions Received	05/12/2019
Date Results Expected to be Reported	12/12/2019

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	2 material, 2 SOIL
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	17.6
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

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www.envirolab.com.au

Sample ID	sTRH for TCLP	On Hold
F1		✓
F2		✓
MS4-0.02		✓
MS4-0.2	✓	

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew. Blackert

Sample Login Details

Your reference	91667.02, Newcastle
Envirolab Reference	233090
Date Sample Received	13/12/2019
Date Instructions Received	13/12/2019
Date Results Expected to be Reported	20/12/2019

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	7 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	11.9
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
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customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	VOCs in soil	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBsin Soil	Misc Soil - Inorg	Acid Extractable metalsin soil
201/0.9-1.2-0.9-1.2	✓	✓	✓	✓	✓	✓	✓	✓	✓
201/7.9-7.9	✓	✓	✓	✓					✓
202/4.8-4.8	✓	✓	✓	✓					✓
202/7.0-7.0	✓	✓	✓	✓					✓
203/0-0.05-0-0.05	✓	✓	✓	✓	✓	✓	✓	✓	✓
203/0.5-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓
D3		✓	✓	✓					✓

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew. Blackert, Chris Bozinovski, Dana Wilson

Sample Login Details

Your reference	91667.02, Newcastle
Envirolab Reference	233090-A
Date Sample Received	13/12/2019
Date Instructions Received	06/01/2020
Date Results Expected to be Reported	06/01/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	7 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	11.9
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	Metals in TCLP USEPA1311	Naphthalene in TCLP	Acenaphthylene in TCLP	Acenaphthene in TCLP	Fluorene in TCLP	Phenanthrene in TCLP	Anthracene in TCLP	Fluoranthene in TCLP	Pyrene in TCLP	Benzo(a)anthracene in TCLP	Chrysene in TCLP	Benzo(bjk)fluoranthene in TCLP	Benzo(a)pyrene in TCLP	Indeno(1,2,3-c,d)pyrene - TCLP	Dibenzo(a,h)anthracene in TCLP	Benzo(g,h,i)perylene in TCLP	Total +vePAH's	Surrogate p-Terphenyl-d14	On Hold
201/0.9-1.2-0.9-1.2																			✓
201/7.9-7.9																			✓
202/4.8-4.8																			✓
202/7.0-7.0																			✓
203/0.5-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
D3																			✓
203/0-0.05-0-0.05																			✓

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

Additional Info

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

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

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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customerservice@envirolab.com.au
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SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew. Blackert, Paulo Sebastian

Sample Login Details

Your reference	91667.02
Envirolab Reference	234001
Date Sample Received	08/01/2020
Date Instructions Received	08/01/2020
Date Results Expected to be Reported	15/01/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	6 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	15.8
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	VOCs in water	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water - Low Level	HM in water - dissolved	Total Phenolicsin Water
201	✓	✓	✓	✓	✓	✓
202	✓	✓	✓	✓	✓	✓
203	✓	✓	✓	✓	✓	✓
DW1	✓	✓	✓	✓	✓	✓
TB1		✓				
TS1		✓				

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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customerservice@envirolab.com.au
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SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew. Blackert

Sample Login Details

Your reference	91667.02, Newcastle
Envirolab Reference	238190-A
Date Sample Received	05/03/2020
Date Instructions Received	10/03/2020
Date Results Expected to be Reported	17/03/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	4 Material, 17 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	18.1
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Acid Extractable metalsin soil	On Hold
302/F1					✓
307/F1					✓
307/F1S					✓
307/F2					✓
307/F2S					✓
310/F1					✓
TS2					✓
TB2					✓
301/0.05					✓
301/0.2					✓
301/0.4					✓
301/0.7					✓
302/0.3					✓
303/0.2					✓
304/0.2					✓
306/0.5					✓
308/0.1					✓
309/0.3					✓
310/0.2					✓
D3					✓
309/0.5	✓	✓	✓	✓	

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

Envirolab Services Pty Ltd
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12 Ashley St Chatswood NSW 2067
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customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew. Blackert

Sample Login Details

Your reference	91667.02, Newcastle
Envirolab Reference	238190-B
Date Sample Received	05/03/2020
Date Instructions Received	12/03/2020
Date Results Expected to be Reported	13/03/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	4 Material, 16 Soil
Turnaround Time Requested	1 day
Temperature on Receipt (°C)	18.1
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	Naphthalene in TCLP	Acenaphthylene in TCLP	Acenaphthene in TCLP	Fluorene in TCLP	Phenanthrene in TCLP	Anthracene in TCLP	Fluoranthene in TCLP	Pyrene in TCLP	Benzo(a)anthracene in TCLP	Chrysene in TCLP	Benzo(b)fluoranthene in TCLP	Benzo(a)pyrene in TCLP	Indeno(1,2,3-c,d)pyrene - TCLP	Dibenzo(a,h)anthracene in TCLP	Benzo(g,h,i)perylene in TCLP	Total +vePAH's	Surrogate p-Terphenyl-d14	pH of soil for fluid#determ.	pH of soil TCLP (after HCl)	Extraction fluid used	pH of final Leachate	Lead in TCLP	PAHs in water leach	Metals-ASLP Neutral (ICP-MS)	On Hold
302/F1																									✓
307/F1																									✓
307/F1S																									✓
307/F2																									✓
307/F2S																									✓
310/F1																									✓
TS2																									✓
TB2																									✓
301/0.05	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
301/0.2																									✓
301/0.4																									✓
301/0.7																									✓
302/0.3																									✓
303/0.2																									✓
304/0.2																									✓
306/0.5																									✓
308/0.1																									✓
309/0.3																									✓
310/0.2																									✓
D3																									✓

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

Sample ID	Naphthalene in TCLP	Acenaphthylene in TCLP	Acenaphthene in TCLP	Fluorene in TCLP	Phenanthrene in TCLP	Anthracene in TCLP	Fluoranthene in TCLP	Pyrene in TCLP	Benzo(a)anthracene in TCLP	Chrysene in TCLP	Benzo(bjk)fluoranthene in TCLP	Benzo(a)pyrene in TCLP	Indeno(1,2,3-c,d)pyrene - TCLP	Dibenzo(a,h)anthracene in TCLP	Benzo(g,h,i)perylene in TCLP	Total +vePAH's	Surrogate p-Terphenyl-d14	pH of soil for fluid#determ.	pH of soil TCLP (after HCl)	Extraction fluid used	pH of final Leachate	Lead in TCLP	PAHs in water leach	Metals-ASLP Neutral (ICP-MS)	On Hold
302/0.3 - [TRIPLICATE]																									✓

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

Additional Info

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

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

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew. Blackert, Chris Bozinovski

Sample Login Details

Your reference	91667.02, Newcastle
Envirolab Reference	238799
Date Sample Received	13/03/2020
Date Instructions Received	13/03/2020
Date Results Expected to be Reported	13/03/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	2 Soil
Turnaround Time Requested	Same day
Temperature on Receipt (°C)	11.2
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	VOCs in soil	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBsin Soil	Acid Extractable metalsin soil	Misc Soil - Inorg	Asbestos ID - soils
S1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
S2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Matthew Blackert, Chris Bozinovski, Jason Lambert

Sample Login Details

Your reference	91667.02, Newcastle
Envirolab Reference	238190
Date Sample Received	05/03/2020
Date Instructions Received	05/03/2020
Date Results Expected to be Reported	12/03/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	4 Material, 16 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	18.1
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	VOCs in soil	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBsin Soil	Misc Soil - Inorg	Acid Extractable metalsin soil	Asbestos ID - soils	Asbestos ID - materials
302/F1											✓
307/F1											✓
307/F1S										✓	
307/F2											✓
307/F2S										✓	
310/F1											✓
TS2		✓									
TB2		✓									
301/0.05				✓					✓		
301/0.2		✓	✓	✓					✓	✓	
301/0.4				✓					✓		
301/0.7				✓					✓		
302/0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
303/0.2		✓	✓	✓					✓		
304/0.2		✓	✓	✓					✓	✓	
306/0.5		✓	✓	✓					✓		
308/0.1		✓	✓	✓					✓	✓	
309/0.3		✓	✓	✓					✓	✓	
310/0.2		✓	✓	✓					✓		
D3				✓					✓		

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
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TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

15/11/2019

Landfill Gas Detector

Instrument GEM2000
Serial No. GM13360
Sensors CH4,CO2,O2,H2S,CO

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Pump	Operation	✓	
	Filter	✓	
	Flow	✓	
	Valves, Diaphragm	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	CH4	✓	
	CO2	✓	
	O2	✓	
	H2S	✓	
	CO	✓	
Alarms	Settings	✓	
Software	Version		
Datalogger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle Lot No	Instrument Reading
O2		20.9% Vol O2		Fresh Air	20.8% O2
CH4		60% CH4	NATA	SY244	60% CH4
CO2		40% CO2	NATA	SY244	39.6% CO2
CO		95ppm CO	NATA	SY174	98ppm CO
H2S		25ppm H2S	NATA	SY174	26ppm H2S

Calibration Done By: **Sarah Lian**

Calibration date: **15/11/2019**

Next calibration due: **13/05/2020**

ThermoFisher SCIENTIFIC

The world leader in serving science

SERVICE OR REPAIR: GA5000

COMPANY	Douglas Partners Pty Ltd				
CONTACT	David Holden				
SERIAL NO.	G500665	**CALL NO.**	SV1910030079		

REQUEST/PROBLEM DESCRIPTION
6 monthly calibration

This equipment has been calibrated to the manufacturer's specifications, using the standards shown below:

SENSOR	STANDARD	TRACEABILITY LOT NO.	PRE CALIBRATION READING	POST CALIBRATION READING
CH_4	0 %	892145	0.0 %	0 %
	60 %	923048	56.8%	60 %
CO_2	40 %	923048	38.6 %	40 %
O_2	0 %	892145	0.2 %	0 %
	20.9 %	Fresh Air	20.2 %	20.9 %
CO	0 ppm	892145	5 ppm	0 ppm
	250 ppm	1132670	255 ppm	250 ppm
H_2S	0 ppm	892145	0 ppm	0 ppm
	250 ppm	1029707	244 ppm	250 ppm

- **Checked battery condition**
- **Checked for adequate flow and leak tested**
- **Checked internal filters**
- **Set next service due or gas check date**

COMMENTS/ADDITIONAL REPAIRS/SERVICES PERFORMED
Firmware V1.14.12. Pump checked OK Field calibration performed as per manufacturer's specifications.

SERVICED BY	Martin Slapp	**COMPLETED**	03rd Oct 2019
SIGNATURE	M Slapp		

Distributor Service Certificate

Geotech
A subsidiary of LANDTEC

ThermoFisher SCIENTIFIC

Unit Type: GA5KA0F0-100 **Date:**

Serial Number: G500665 22-Mar-19

Company Name:
Thermo Fisher Scientific

Actions / Investigation Description	Result
External visual investigation	Pass
Shake and Rattle test	Pass
Check Serial Number	Pass
Instrument charges correctly	Pass
Accessory Test	N/A
Pump flow test	Pass
Pump Vacuum and Flow Fail Test	Pass
Factory settings restored	Pass
Internal PTFE Filters Replaced	Yes
O2 sensor replaced	No
O2 sensor replaced	No
O2 sensor replaced	No
O2 sensor replaced	No
Battery pack replaced	Yes
Pump assembly replaced	No

Methane (CH4)	
Certified Gas (%)	Reading (%)
0.0	0.0
60.0	60.0

Carbon Dioxide (CO2)	
Certified Gas (%)	Reading (%)
0.0	0.0
40.0	40.0

Oxygen (O2)	
Certified Gas (%)	Reading (%)
20.9	20.9

Carbon Monoxide (CO)	
Certified Gas (ppm)	Reading (ppm)
100.0	100.0

Hydrogen Sulphide (H2S)	
Certified Gas (ppm)	Reading (ppm)
100.0	100.0

Engineer : Martin Slapp **Signature :** M. Slapp

SERVICE & CALIBRATION REPORT
Water Quality Meter

Customer details:
Douglas Partners (Newcastle)
Attn: Matthew Blackert

Job no.
190907

Date:
6 September 2019

Instrument model:
HORIBA U-52/2m
Multi-parameter water quality meter

Instrument serial number:
POU88LTY 2015

Fault report:
Requires service/calibration.

Repairs carried out:
Replaced DO membrane, replaced pH reference soln .
Re-calibrated all sensors as follows:
Calibration: (in accordance with manufacturer's specifications)

Parameter - unit	Calibration value	After calibration	Comment
pH (pH)	7.01	7.01	Pass
pH (pH)	4.00	4.00	Pass
ORP mV	240mV	240mV	Pass
Conductivity (mS/cm	0.000	0.000	Pass
Conductivity (mS/cm)	0.718	0.718	Pass
Conductivity (mS/cm)	6.67	6.67	Pass
Conductivity (mS/cm)	58.6	58.6	Pass
Turbidity (NTU)	0.0	0.0	Pass
Turbidity (NTU)	8.0	8.0	Pass
Turbidity (NTU)	80	80	Pass
Turbidity (NTU)	400	400	Pass
D.O. zero (mg/L)	0.00	0.00	Pass
D.O span (mg/L)	8.96mg/L @ 22^{0}C	8.96mg/L @ 22^{0}C	Pass
Temperature (^{0}C)	22.4^{0}C	22.4^{0}C	Pass

Comments:
MAKE SURE the pH reference electrode is refilled with soln #330 regularly. If the pH reference filling soln solidifies in the reference electrode, rinse out the pH reference electrode with distilled water. Then refill with fresh soln # 330

Calibration carried out by:
Tony Fincher

AUSTRALIAN SCIENTIFIC PTY LTD
11 McDougall Street, Kotara NSW 2289
TEL: 1800 021 083
E-mail: sales@austscientific.com.au **www.austscientific.com.au**

Douglas Partners
Geotechnics | Environment | Groundwater

Photoionisation Detector
Calibration Record

Project Name:	Newcastle – 9 Church St
Project No:	91667.02

PID Unit (circle):	MiniRAE 3000 (NE291) MiniRAE Lite (NE205, NE309, NE309) PhotoVAC 2020 Pro Plus MiniRAE 2000
Lamp:	10.6 eV

Calibration Details:	
Zero Air:	Ambient
Response Factor:	1.0
Span Gas Type:	Isobutylene
Span Gas Concentration:	100 ppm

Operator Name:	M Blachert	**Signed:**	M Blachert	**Date:** 14/11/2019

Douglas Partners
Geotechnics | Environment | Groundwater

Photoionisation Detector (PID)
CALIBRATION RECORD

PROJECT: Environmental Investigation	PROJECT NO: 91667.02

PID: PhotoVAC 2020 Pro Plus MiniRAE 2000 MiniRAE 3000 MiniRae LITE (circle)	LAMP : 10.6 eV Unit NE number:

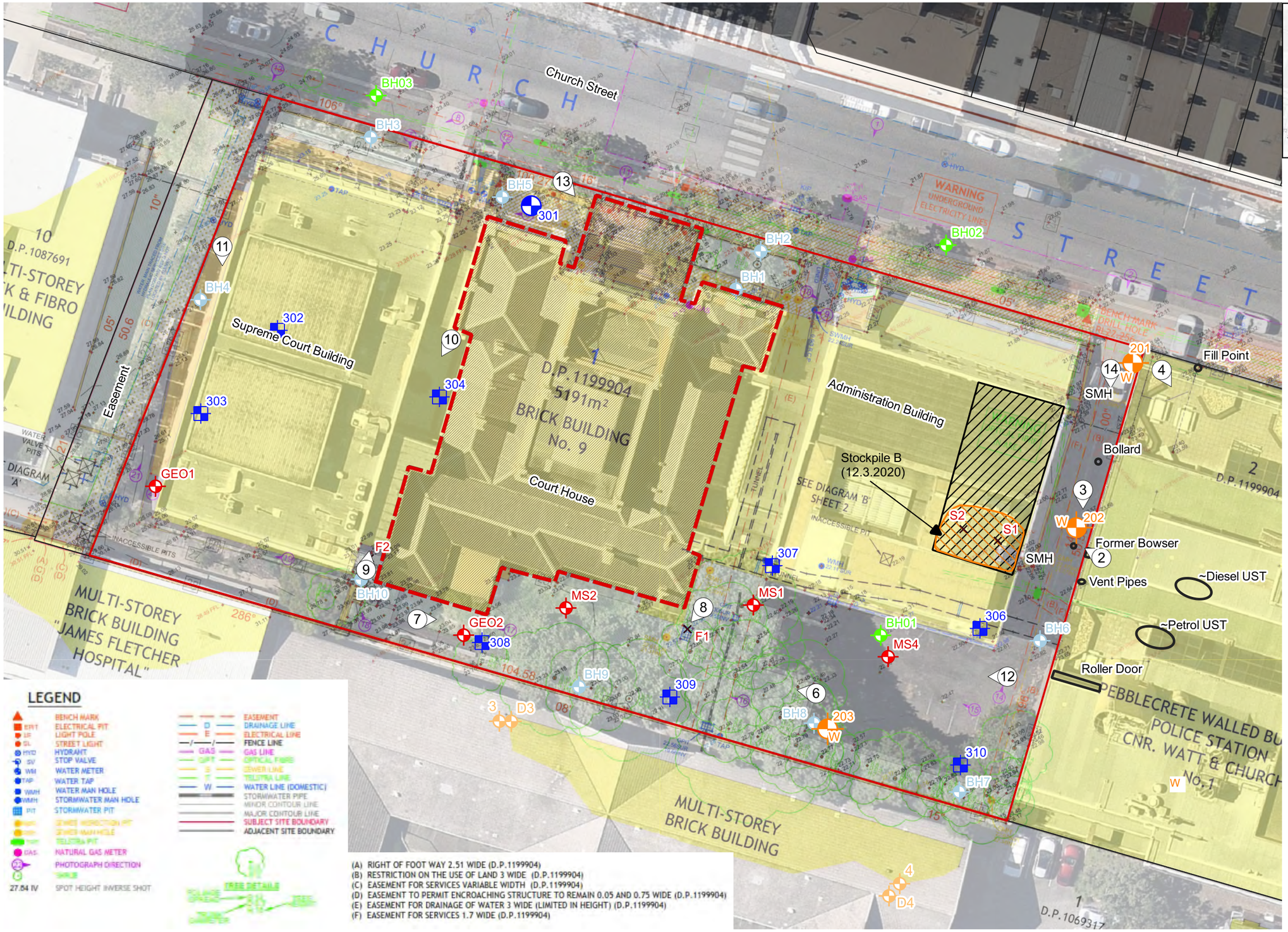
CALIBRATION	
ZERO AIR: Ambient	
RESPONSE FACTOR: 1.0	
SPAN GAS: Isobutylene	CONCENTRATION: 100 ppm

OPERATOR: JPS	SIGNED:	DATE: 7/11/20

Integrated Practical Solutions
Brisbane • Cairns • Campbelltown • Canberra • Darwin • Gold Coast • Melbourne • Newcastle • Perth • Sunshine Coast • Sydney • Townsville • Wollongong • Wyong

Appendix E

Drawing 1 – Test Location Plan
Drawing 2 – Test Location Plan - Gas Monitoring (Buildings / Grounds)
Drawings supplied by client:
ADW Johnson Detailed Survey of Lot 1 DP 1199904 (Ref 239815-DET-001-A dated 10.09.18)
Azusa Sekkei – General Arrangement Site Development Plan (A-017), Sections (A-209 to A-211) and Demolition Plan (A-018)



Site Location

Legend

- Approximate Stockpile Area
- Approximate Excavation Area
- Environmental Pit Location Post-Demolition (DP)
- Environmental Bore Location Post-Demolition (DP)
- Environmental Bore Location Pre-Demolition (DP)
- W Environmental Well Location
- Geotechnical Test Location Pre-Demolition (DP)
- Previous Test Locations (Prensa 2016)
- Previous Test Locations (Cardno 2018)
- Site Boundary
- Proposed Buildings Structures to be Retained
- Approximate Location of Material Sample Grab Sample
- Approximate Figure & Orientation Location

0 10 20 30 40 m

Drawing adapted from Nearmap Image dated 22.10.2019, plan by ADW Johnson ref 239815-DET-001-A dated 10.09.2018, and plan by Prensa ref 55499 Figures, Figure 2, Rev 1 dated 07.10.2016.

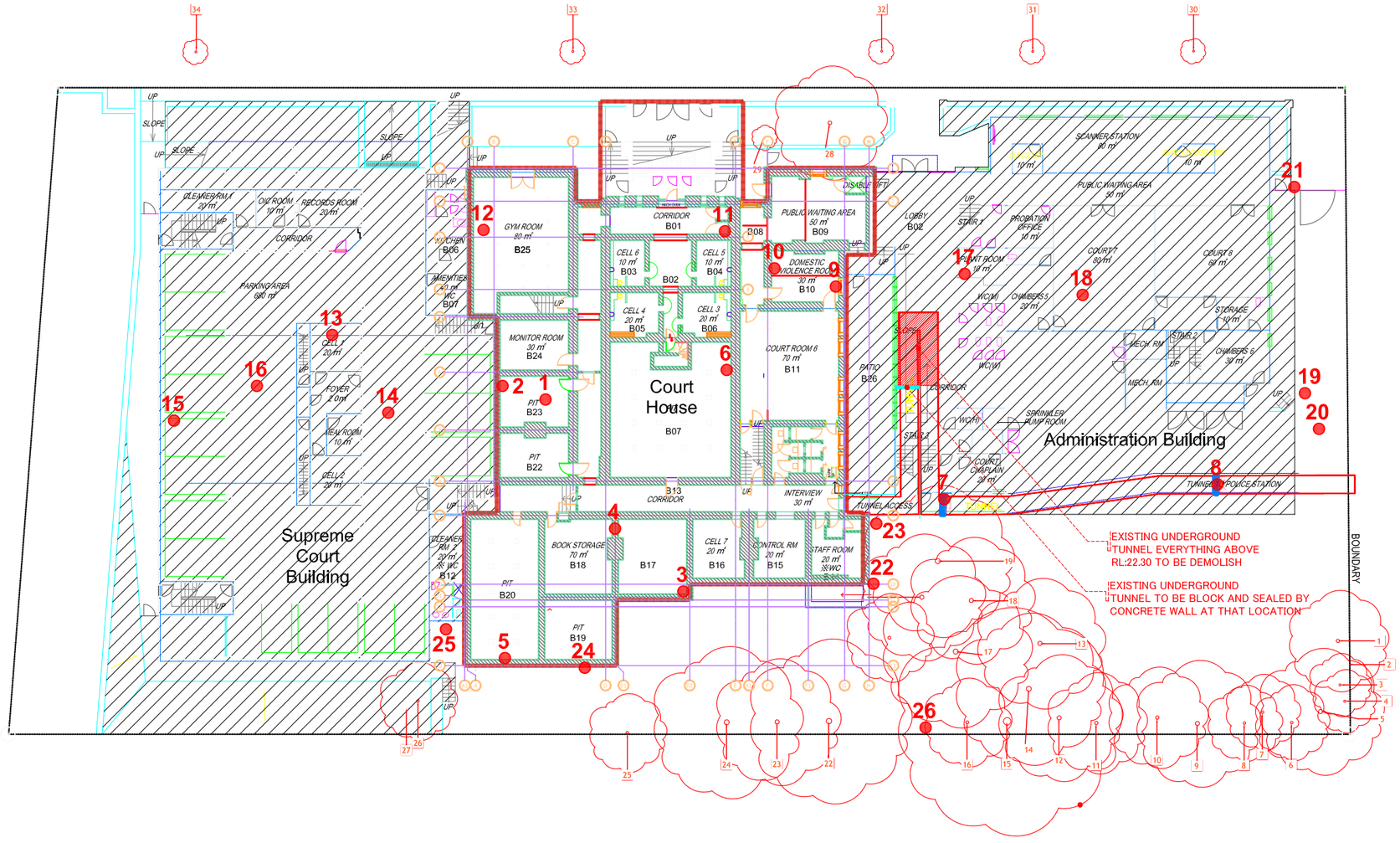
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd		
OFFICE: Newcastle	DRAWN BY: PLH	
SCALE: 1:400 @ A3	DATE: 18.March.2020	

TITLE: **Test Location Plan**
Proposed Nihon University
9 Church Street, Newcastle

PROJECT No:	91667.02
DRAWING No:	1
REVISION:	2

Church Street



LEGEND

- Approximate Gas Monitoring Location (Buildings & General Site Grounds)

NOTES

1. Drawing adapted from unreferenced, undated plan supplied by client.

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd		TITLE: **Test Location Plan - Gas Monitoring (Buildings / Grounds)** Proposed Nihon University 9 Church Street, Newcastle	PROJECT No: 91667.02
	OFFICE: Newcastle	DRAWN BY: PLH		DRAWING No: 2
	SCALE: As shown	DATE: 02.03.2020		REVISION: 0

239815-DET-001-A

DIAL1100
BEFORE YOU DIG

C H U R C H

S T R E E T

WARNING
UNDERGROUND
ELECTRICITY LINES

BENCH MARK
DRILL HOLE
RL22.256

WARNING
OPTICAL FIBRE
IN AREA

N

adw johnson

10
D.P.1087691
MULTI-STOREY
BRICK & FIBRO
BUILDING

1
D.P.1199904
5191m²
BRICK BUILDING
No. 9

2
D.P.1199904

PEBBLECRETE WALLED BUILDING
POLICE STATION
CNR. WATT & CHURCH
No.1

SEE DIAGRAM 'B'
SHEET 2

INACCESSIBLE PIT

TUNNEL

WATER
VALVE
PITS

SEE DIAGRAM
'A'

INACCESSIBLE PITS

MULTI-STORY
BRICK BUILDING
"JAMES FLETCHER
HOSPITAL"

MULTI-STOREY
BRICK BUILDING

1
D.P.1069317

BRICK

LEGEND

- BENCH MARK
- EPIT ELECTRICAL PIT
- LP LIGHT POLE
- SL STREET LIGHT
- HYD HYDRANT
- SV STOP VALVE
- WM WATER METER
- TAP WATER TAP
- WMH WATER MAN HOLE
- WMH STORMWATER MAN HOLE
- PIT STORMWATER PIT
- INSP SEWER INSPECTION PIT
- SMH SEWER MAN HOLE
- TPIT TELSTRA PIT
- GAS NATURAL GAS METER
- 22 PHOTOGRAPH DIRECTION
- SHRUB
- 27.84 IV SPOT HEIGHT INVERSE SHOT

- EASEMENT
- D DRAINAGE LINE
- E ELECTRICAL LINE
- FENCE LINE
- GAS GAS LINE
- OPT OPTICAL FIBRE
- S SEWER LINE
- T TELSTRA LINE
- W WATER LINE (DOMESTIC)
- STORMWATER PIPE
- MINOR CONTOUR LINE
- MAJOR CONTOUR LINE
- SUBJECT SITE BOUNDARY
- ADJACENT SITE BOUNDARY

TREE DETAILS
S:12
D:0.5
H:12
FOLIAGE SPREAD
TRUNK DIAMETER
TREE HEIGHT

(A) RIGHT OF FOOT WAY 2.51 WIDE (D.P.1199904)
(B) RESTRICTION ON THE USE OF LAND 3 WIDE (D.P.1199904)
(C) EASEMENT FOR SERVICES VARIABLE WIDTH (D.P.1199904)
(D) EASEMENT TO PERMIT ENCROACHING STRUCTURE TO REMAIN 0.05 AND 0.75 WIDE (D.P.1199904)
(E) EASEMENT FOR DRAINAGE OF WATER 3 WIDE (LIMITED IN HEIGHT) (D.P.1199904)
(F) EASEMENT FOR SERVICES 1.7 WIDE (D.P.1199904)

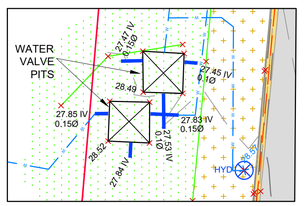


DIAGRAM 'A'
SCALE 1:100

NOTES:-

1. SERVICES HAVE BEEN LOCATED WHERE VISIBLE ONLY. PRIOR TO EXCAVATION OR CONSTRUCTION ALL SERVICES ARE TO BE LOCATED BY THE RELEVANT AUTHORITY.
2. SPOT LEVELS AND CONTOURS SHOWN HEREON ARE FOR DESIGN PURPOSES ONLY AND ARE TO BE CONFIRMED ON SITE PRIOR TO ANY EXCAVATION OR CONSTRUCTION.
3. THIS PLAN HAS BEEN PREPARED FOR THE PURPOSE OF DETAIL SURVEY AND SHOULD NOT BE USED FOR ANYTHING OTHER THAN THAT PURPOSE.

ver.	date	comment	surveyed	drawn	checked	pm
A	10.09.18	INITIAL ISSUE	CD	LB/MC	CD	TC

co-ordinate information: CO-ORDINATE SYSTEM: MGA 56; ORIGIN OF CO-ORDINATES: P.M. 19805; DATE OF SURVEY 30.08.18

level information: DATUM: AHD; ORIGIN OF LEVELS: P.M. 190805; CONTOUR INTERVAL: 0.5

scale (A1 original size): 0 5.0 10.0m; SCALE: 1:200 (FULL)

page: 1 OF 2

drawing title:
Detail Survey of
Lot 1 D.P. 1199904

location: 9 Church Street, Newcastle
council: Newcastle
dwg ref: 239815-DET-001-A
client: AZUSA SEKKEI CO LTD

adw johnson
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

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• project management • civil engineering • infrastructure • superintendency • economic analysis • social impact • town planning • surveying • development feasibility • visualisation • urban design

Plotted By: Anthony Morgan Plot Date: 10/09/18 3:25:01 PM Cad File: N:\239815\DWG'S\SURVEY\239815-DET-001-A.DWG
This plan includes coloured information. If you have a black and white copy you do not have all of the information. This note is coloured RED.
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239815-DET-001-A

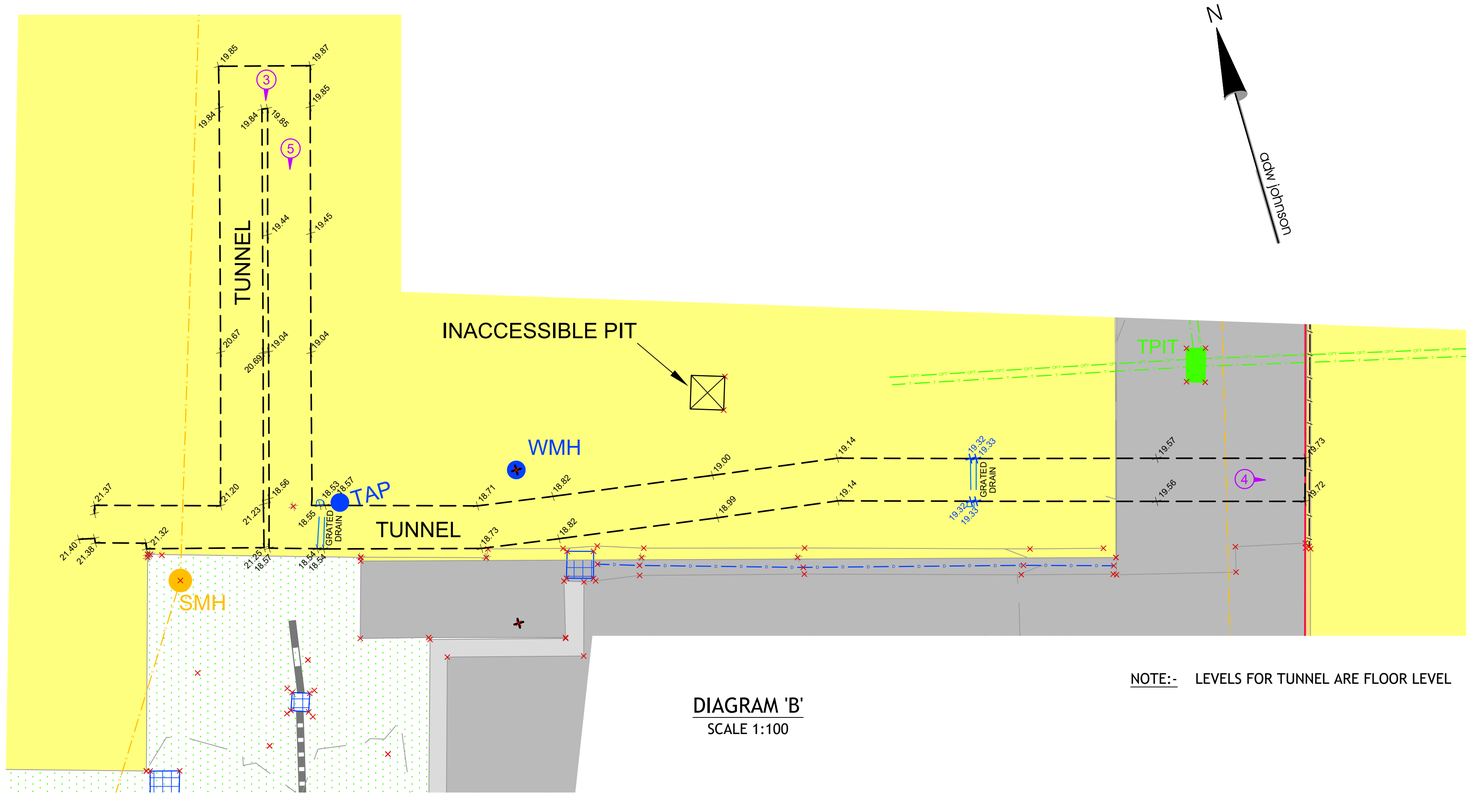

DIAGRAM 'B'
SCALE 1:100

NOTE:- LEVELS FOR TUNNEL ARE FLOOR LEVEL

PHOTO 1

PHOTO 2

PHOTO 3

PHOTO 4

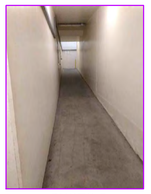
PHOTO 5

PHOTO 6

PHOTO 7

PHOTO 8

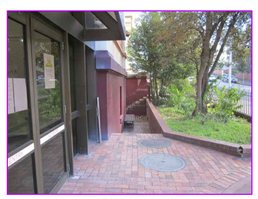
PHOTO 9

PHOTO 10

PHOTO 11

PHOTO 12

PHOTO 13

PHOTO 14

PHOTO 15

PHOTO 16

PHOTO 17

PHOTO 18

PHOTO 19

PHOTO 20

PHOTO 21

ver.	date	comment	surveyed	drawn	checked	pm	co-ordinate information	level information	scale (A1 original size)	page
A	10.09.18	INITIAL ISSUE	CD	LB/MC	CD	TC	CO-ORDINATE SYSTEM: MGA 56 ORIGIN OF CO-ORDINATES: P.M. 19805 DATE OF SURVEY 30.08.18	DATUM: AHD ORIGIN OF LEVELS: P.M. 190805 CONTOUR INTERVAL: 0.5	0 2.5 5.0m SCALE: 1:100 (FULL)	2 OF 2

DIAL1100 BEFORE YOU DIG

working beyond expectations

drawing title:
Detail Survey of
Lot 1 D.P. 1199904

location: 9 Church Street, Newcastle
council: Newcastle
dwg ref: 239815-DET-001-A
client: AZUSA SEKKEI CO LTD

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• project management • civil engineering • infrastructure • superintendency • economic analysis • social impact • town planning • surveying • development feasibility • visualisation • urban design

Plotted By: Anthony Morgan Plot Date: 10/09/18 3:25:02PM Cad File: N:\239815\DWGS\SURVEY\239815-DET-001-A.DWG
This plan includes coloured information. If you have a black and white copy you do not have all of the information. This note is coloured RED.

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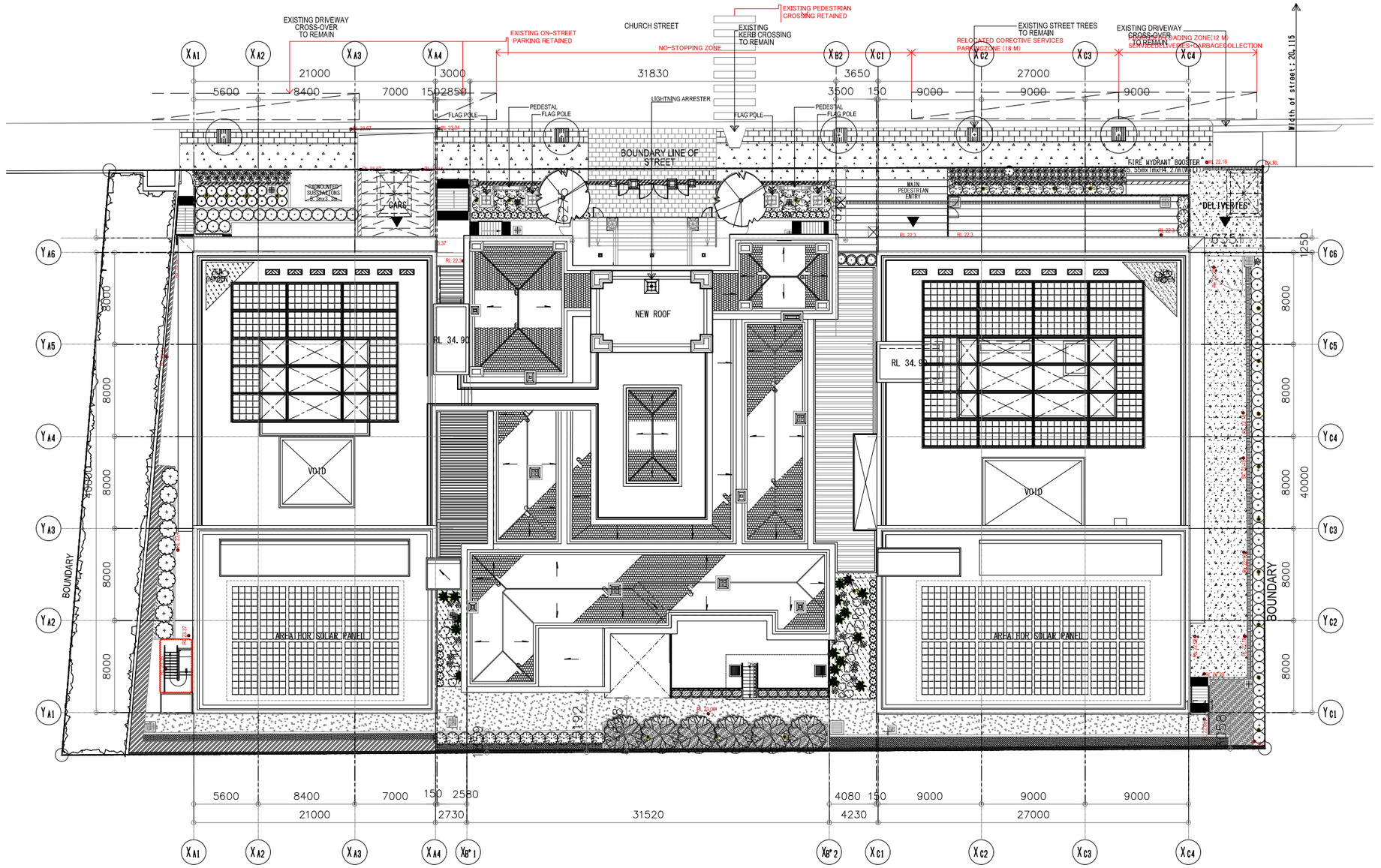


EDUCATION BUILDING | PUBLIC BUILDING | RESIDENTIAL BUILDING

GENERAL LEGEND:

COLOR LEGEND

	RESIDENTIAL		CORRIDOR
	EDUCATIONAL		PARKING SPACE
	PUBLIC SPACE		TERRACE

ABBREVIATION

FD	FLOOR DRAIN	SW	SHOWER
FFL	FINISHED FLOOR LINE	WC	WATER CLOSET
FH	FIRE HOSE	UR	URINAL
FP	FIRE PLACE		
LAV	LAVATORY		
MH	MAN HOLE		
PC	PIPE CHASE		
R	RANGE		
SK	SINK		
STR	STORAGE		

SYMBOL

FF-00 FLOOR FINISH
RF-00 ROOF FINISH
CF-00 CEILING FINISH
WF-00 WALL FINISH
LANDSCAPE AREA
ELECTRICAL BOX
FINISHED FLOOR LEVEL
SECTION
DEPRESSED FLOOR

NOTE:

DRAWING STATUS:

DATE:

ORIENTATION

AZUSA SEKKEI Architects, Engineers & Consultants | dwp | moir landscape architecture | Cardno Shaping the Future | marline BUILDING SERVICES ENGINEERS MECHANICAL . ELECTRICAL . HYDRAULIC . FIRE . ENERGY

Planner

Nihon University
Australia Newcastle Campus Project

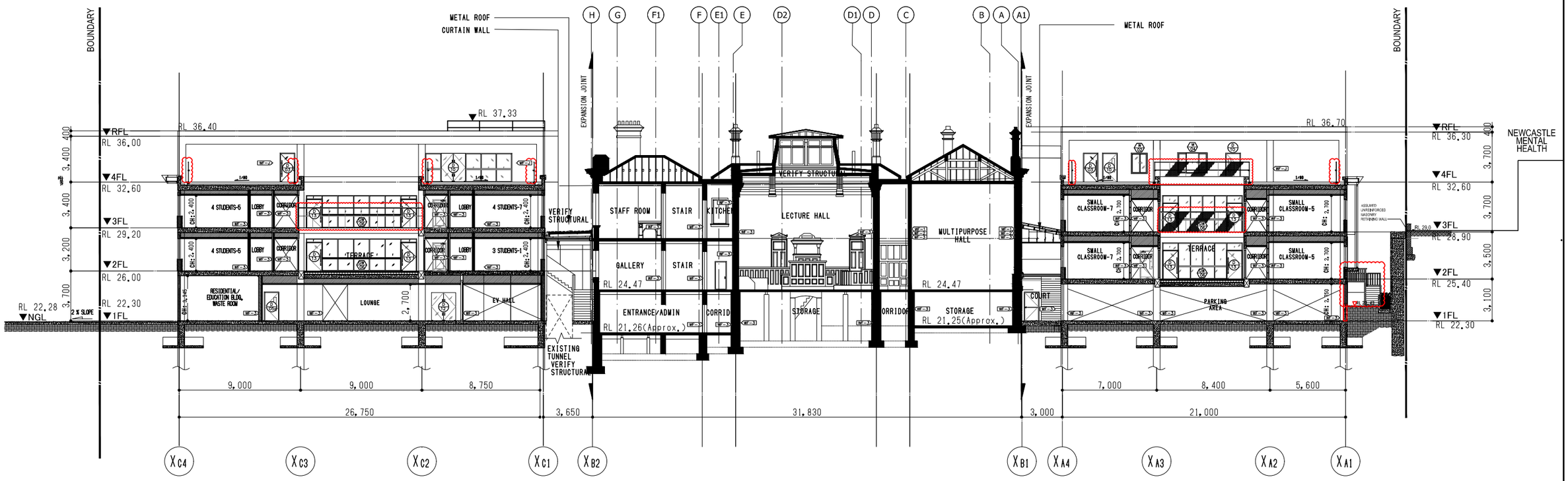
General Arrangement Site Development Plan

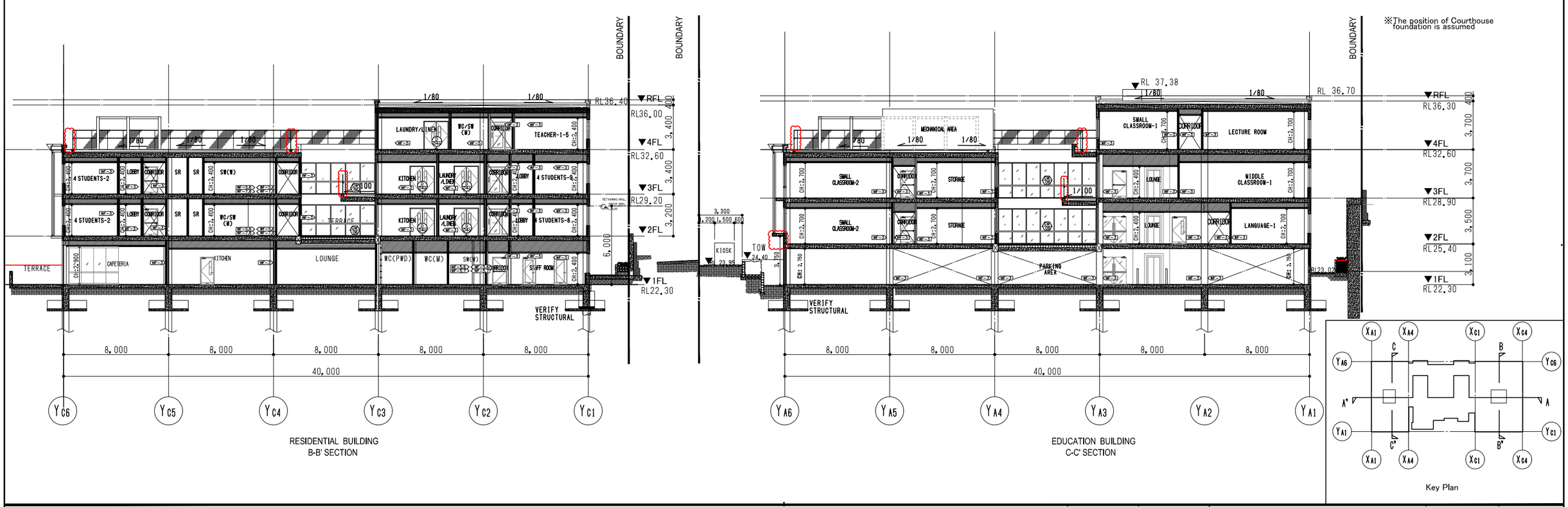
Scale 1/A1:200 A3:400

Date 2019・10・19

Drawing No. A — 017

No Rev-10 TENDER AMENDMENTS INCORPORATED





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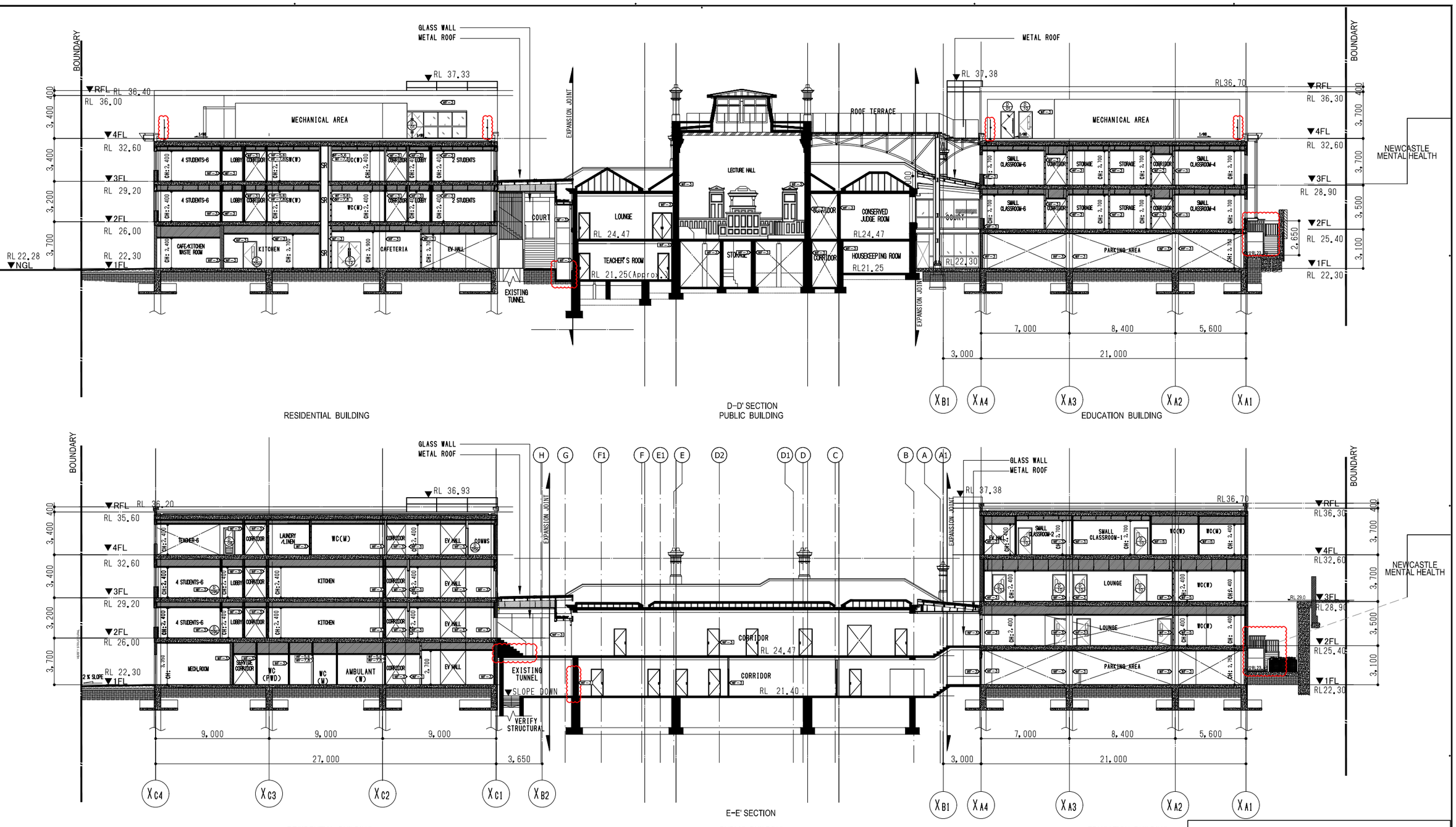
Planner

Nihon University
Australia Newcastle Campus Project

Sections-1
(A'-A',B'-B',C'-C')

Scale 1/A1-75 A3-150
Date 2019・10・19
Drawing No. A — 209
No. Rev-10 TENDER AMENDMENTS INCORPORATED



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Planner

Nihon University
Australia Newcastle Campus Project

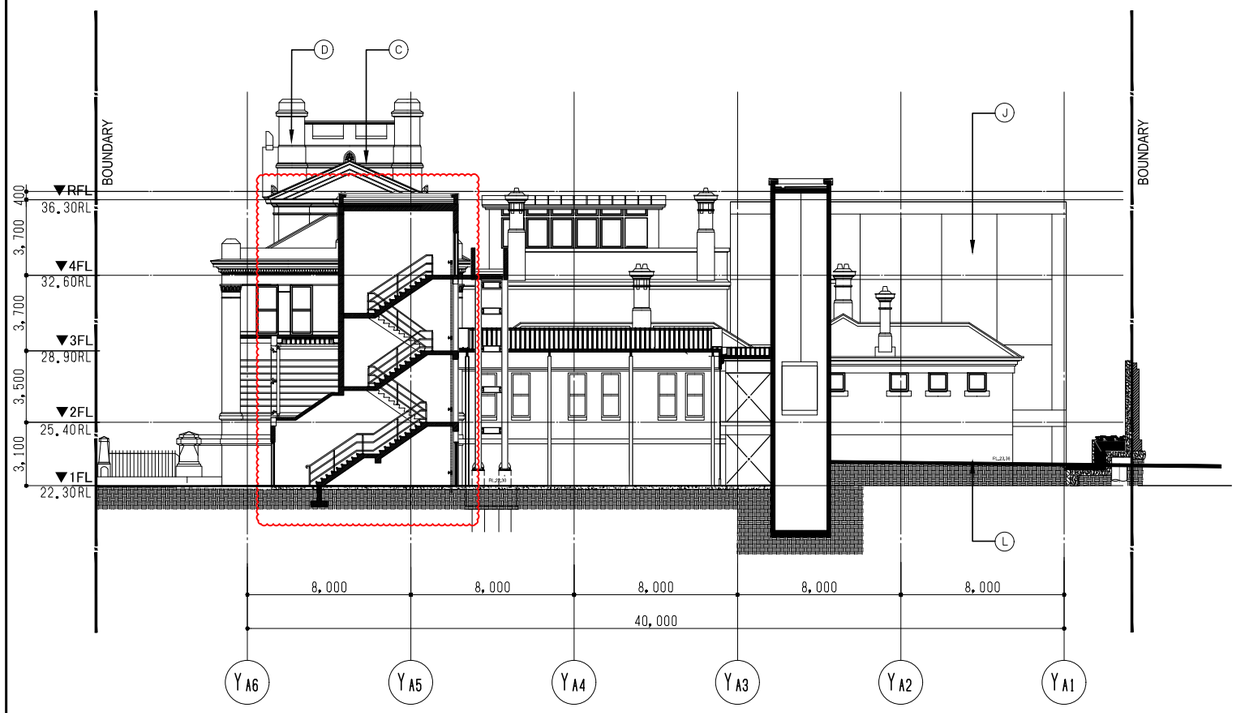
Sections-2
(D'-D',E'-E')

Scale 1/A1-75 A3-150

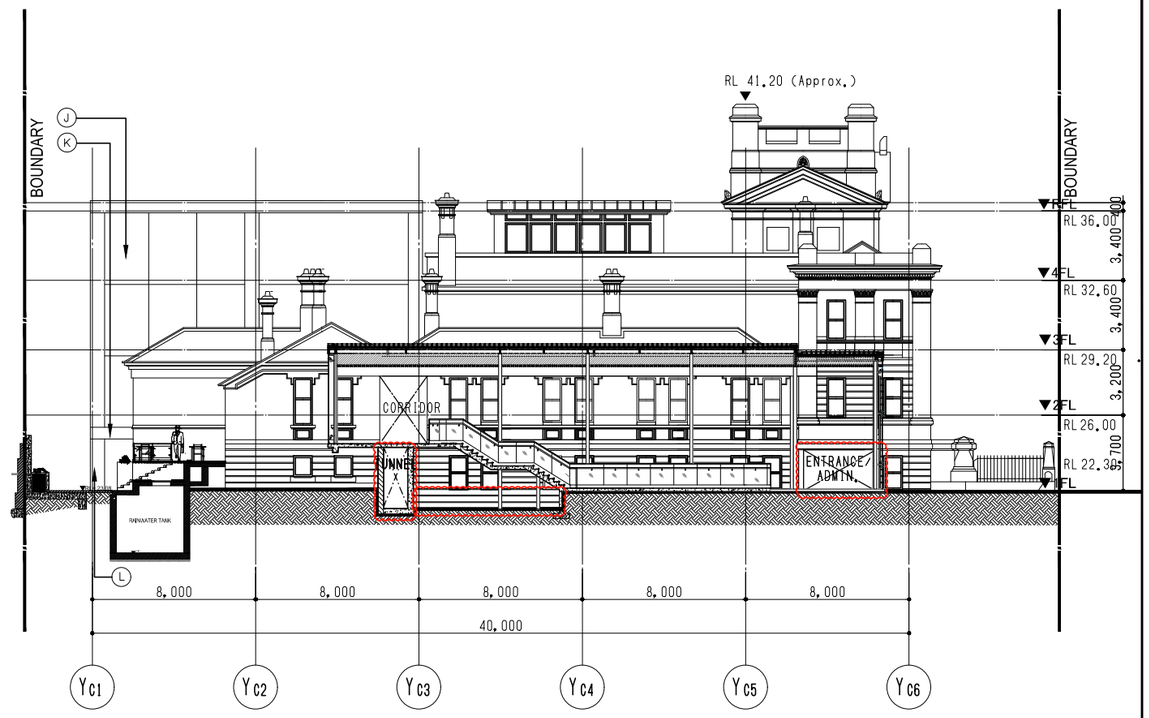
Date 2019・10・19

Drawing No. A — 210

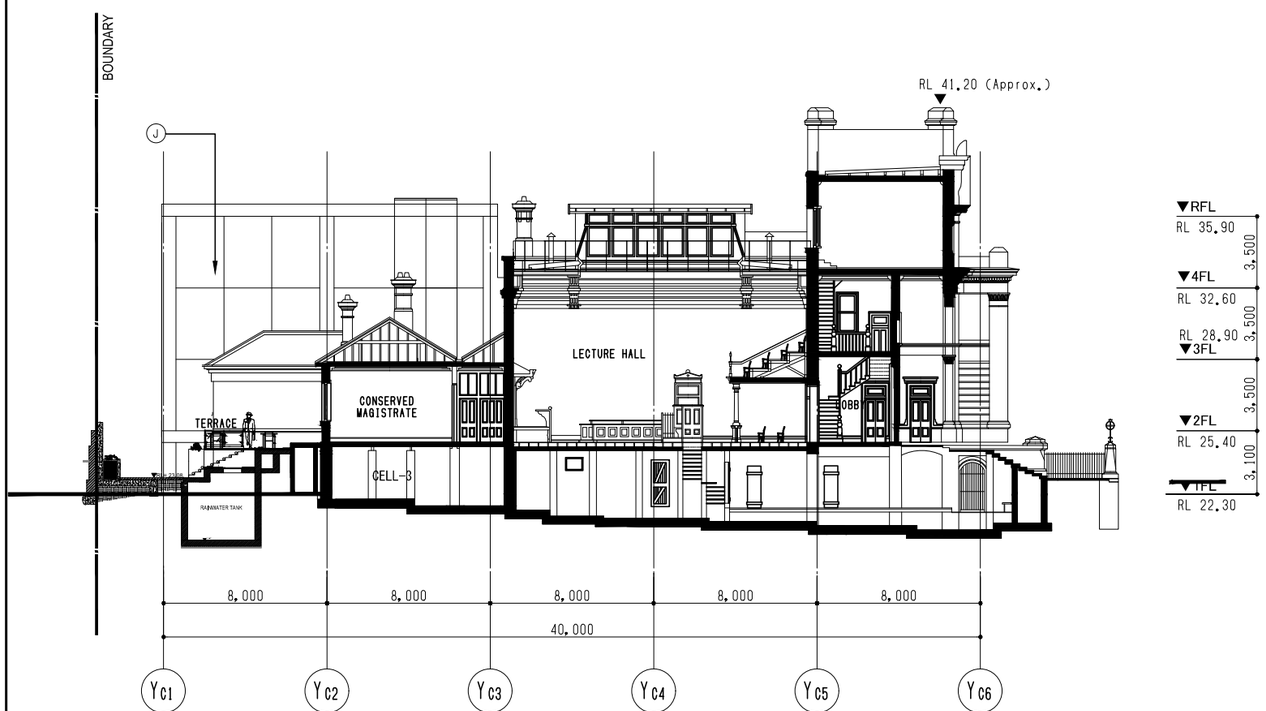
No Rev-10 TENDER AMENDMENTS INCORPORATED



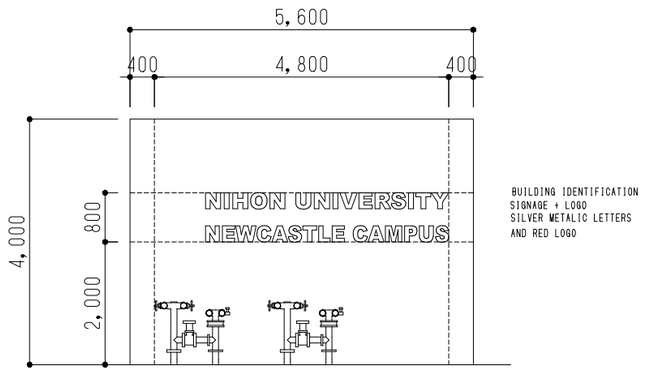
F-F' Section
Public Building (Courthouse)



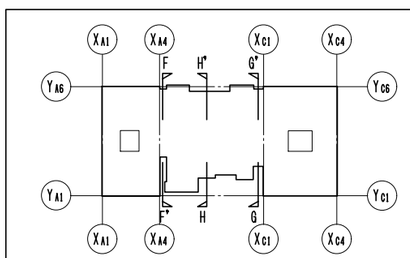
G-G' Section
Public Building (Courthouse)



H-H' Section
Public Building (Courthouse)



Building Identification Signage Elevation -1:50



Key Plan

AZUSA SEKKEI Architects, Engineers & Consultants
dwp
moir landscape architecture
Cardno Shaping the Future
marline BUILDING SERVICES ENGINEERS MECHANICAL . ELECTRICAL . HYDRAULIC . FIRE . ENERGY

Planner

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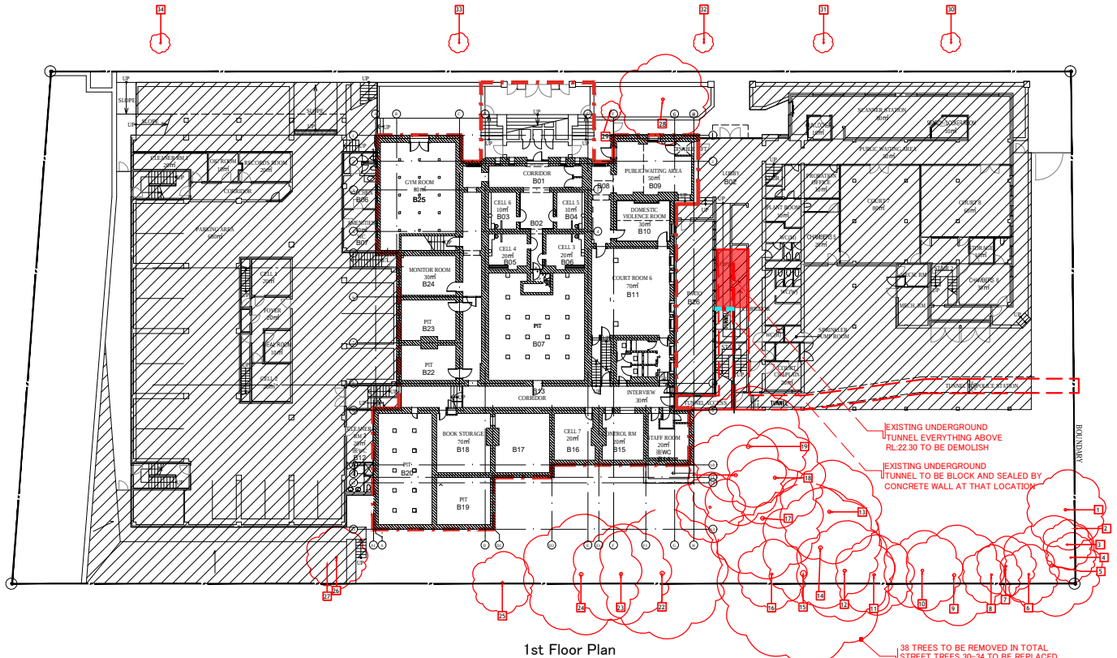
Australia Newcastle Campus Project

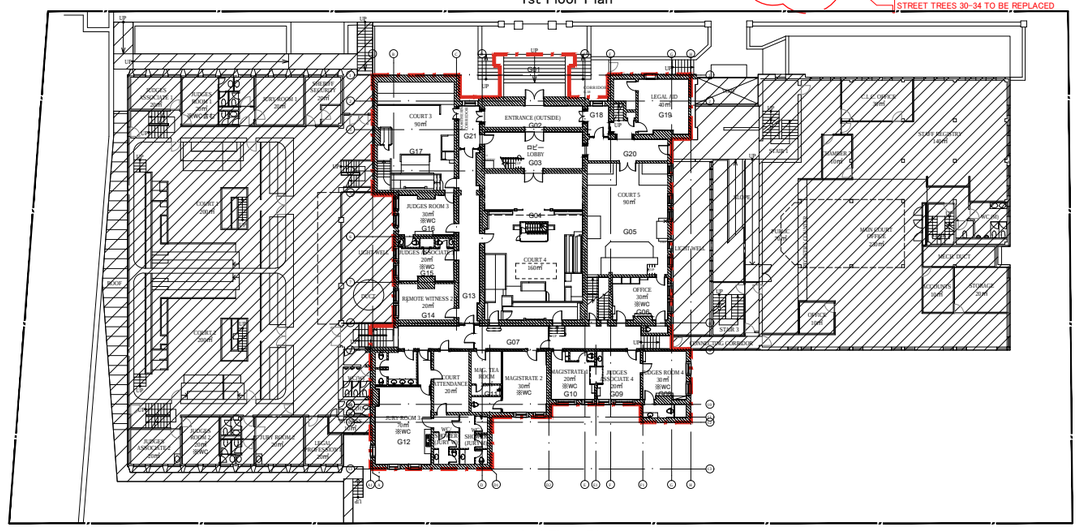
Sections-3
(F'-F', G'-G',H'-H')

Scale 1/ A3-150
Date 2019・10・19
Drawing No. A — 211
No Rev-10 TENDER AMENDMENTS INCORPORATED



1st Floor Plan

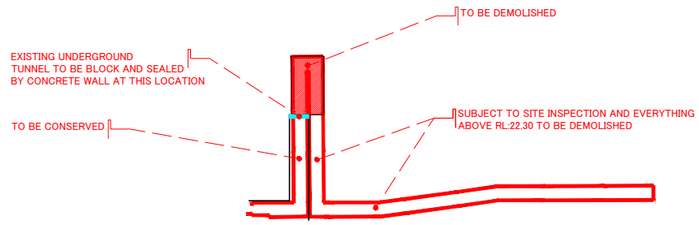
EXISTING 1ST FLOOR PLAN



2nd Floor Plan

EXISTING 2ND FLOOR PLAN

EXISTING TUNNEL NOTE:



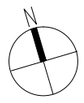
DEMILITION LEGEND:	
	REFER TO CONVERSION PLAN
	AREA TO BE DEMOLISHED
	TREES TO BE REMOVED

AREA TABULATION:		
DEMOLITION AREA		
1ST FLR	1568 sq.m	
2ND FLR	1591 sq.m	
3RD FLR	1133 sq.m	

NOTE :

DRAWING STATUS:

ORIENTATION



CONVERSION LEGEND	
	AREA TO BE CONVERTED
	AREA TO BE DEMOLISHED
	WALL OPENING AREA
	ADDITIONAL WALL
	INFILL MASONRY
D	LIST OF CONVERSION
A	LIST OF DEMOLITION

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Demolition Plan-1

Drawing No. A — 018

Scale 1/A1:1/300 A3:1/600

Date 2019・08・14

No Rev-07