UPSS Contamination Assessment

for

Government Property New South Wales

Lot 3, DP 239249 Pacific Highway, Mooney Mooney NSW

September 2013

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Noel Arnold & Associates Pty Ltd
Level 2, 11 Khartoum Road
North Ryde NSW 2113
Ph: (02) 9889 1800 Fax: (02) 9889 1811
www.noel-arnold.com.au

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Executive Summary

Noel Arnold & Associates Pty Ltd (NAA) was commissioned by Government Property New South Wales to undertake a Contamination Assessment of the Underground Petroleum Storage System (UPSS) at the site, Lot 3 of Deposited Plan 239249, located on the old Pacific Highway at Mooney Mooney NSW. A site location plan is included as Figure 1 in Appendix A. A portion of Lot 3 adjacent to the highway was formerly occupied by a service station.

The overall objective of this environmental assessment is to investigate the extent of the UPSS on site and the nature and extent of soil and groundwater contamination potentially resulting from the former use of the site as a service station.

Two underground storage tanks were identified by ground penetrating radar at the following locations:

- one UST was located within the site near the northern boundary below the two fill points on the concrete pad (UST 1). This UST was aligned north-south;
- a second UST was located beneath the filler point on the grassed area 1.4 m north of the northern boundary fence line (UST 2). This UST was larger and aligned east-west.

It is not known whether or not the USTs have been decommissioned including removal of fuel product and filling of tanks with inert material. Details on historical use of the USTs and types of fuel stored are not known. It is likely that both petrol and diesel were stored. A former bowser plinth is located approximately 10 m south of the area where the USTs were identified.

The current investigation was limited to the area of identified UPSS. Based on the environmental assessment, the following conclusions can be drawn:

Soils

Hydrocarbon odours were detected in three boreholes near the underground fuel storage tanks (USTs) and in two boreholes near the former service station building. This indicates some impact from the UPSS, however, petroleum hydrocarbon contamination was not reported for the laboratory soil samples analysed. Results of soil analysis met the adopted assessment criteria for commercial/industrial land use.

Groundwater

No groundwater contamination was identified during this investigation. All groundwater sample results were below the adopted assessment criteria (ANZECC 2000 trigger values), for the contaminants analysed.

Asbestos Cement Waste

Asbestos was detected in a piece of fibrous cement sheeting sampled from the central area of the site on the ground surface. An asbestos survey including surface gravels and soils across the site should be carried out to determine the extent of remediation required where asbestos is present. Soil and other waste materials removed from the Site that contains asbestos is to be classified as “Special Waste-asbestos” for disposal at a landfill licensed to receive asbestos and soil containing asbestos must not be reprocessed or recycled.

An assessment and supervision of asbestos removal by a qualified consultant/hygienist and licensed asbestos removalist is required to clear asbestos containing material. An asbestos clearance and validation report should be issued by a qualified consultant prior to redevelopment of the site.

Occurrence of asbestos containing material (ACM) is expected to be limited to the ground surface or near surface soil layer, if the source of the ACM was demolition of the building. ACM may be present at greater depths in fill material, particularly if fill has been imported onto the site or if waste dumping has occurred.

Waste Soil Classification

The results for the soil samples analysed meet the limits for classification as "General Solid Waste-non-putrescible" under the NSW EPA's Waste Classification Guidelines 2009. Excavated soil material will likely classify as General Solid Waste-non putrescible, subject to confirmation during excavation due to possible impacts associated with petroleum hydrocarbons associated with the UPSS.

Soil and other waste materials removed from the Site that contains asbestos is to be classified as "Special Waste-asbestos" for disposal at a landfill licensed to receive asbestos and soil containing asbestos must not be reprocessed or recycled.

Conceptual Site Model

The 2013 NEPM amendment emphasises the importance of risk assessment and application of HSLs in the context of the Conceptual Site Model for sites, so that the assessment criteria are applicable to specific site conditions including the nature of the petroleum hydrocarbon contamination, subsurface conditions (soil types and groundwater depth) and site uses including design of buildings (vapour intrusion risk).

The conceptual site model for the Mooney Mooney site requires further development in the context of the proposed future use of the site and results of further investigations during excavation work for removal of the USTs and other fuel infrastructure.

The site UPSS is located on a weathered Hawkesbury Sandstone soil landscape. The sandstone bedrock is likely to be fractured and groundwater flows are potentially intermittent in response to rainfall events. The site is on an easterly slope and is up-gradient of residential properties and the Hawkesbury River. At this stage the contamination impacts from the UPSS have been identified based on soil odour. Despite the lack of detections in laboratory analysis samples, it is not known if the tanks still contain product or if there is significant contamination in the tank pit soils and rock surrounding the USTs. Further assessment is required especially during removal of UPSS in order to advance the conceptual site model and the overall assessment of risk.

Further Site Assessment / Remediation Action Plan

The extent of the hydrocarbon impacted area has not been accurately delineated and further assessment is required to advance the site assessment, remediation and enable validation for the proposed future landuse. Assessment of the excavation during removal of the USTs and other UPSS infrastructure (buried fuel conduits, waste water pits/pipe network) should be carried out by a qualified consultant when the UPSS is removed and fuel impacted soils are excavated. A validation report should be prepared for the UST/UPSS excavations including soil sampling and analysis from the walls and bases of all excavations.

Further groundwater assessment should be carried out according to findings during excavation of the USTs and other UPSS infrastucture and further soil contamination assessment.

The underground storage tanks may contain fuel products and, if so, should be emptied and either decommissioned by filling with inert material or be removed along with associated fuel impacted soils adjacent to tanks, as they may pose ongoing sources of potential groundwater contamination.

Soil vapour assessment has not been carried out at the site. Vapour risk assessment based on the NEPM 2013 amendment (National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No 1) should be carried out during the site remediation validation process.

The site could be made suitable for redevelopment following removal of underground storage tanks and remediation of hydrocarbon impacted soil (if present). Impacted soil could be disposed of offsite or remediated onsite (landfarmed).

Any site excavation works should be assessed by a qualified consultant to:

- Investigate site contamination and advance the site assessment according to the 2013 NEPM amendment;
- Validate excavations and document the remediation process;
- Verify waste classifications of material removed from the site; and

- Assess requirements for further remediation to enable site validation for the proposed future landuse.

A Remediation Action Plan (RAP) can be prepared based on the findings of this UPSS investigation. The RAP would propose further investigation during removal of the USTs and excavations including other subsurface UPSS components such as fuel lines to the bowser stand.

Based on the results of this assessment, which was limited to the area of the site UPSS, there is not a duty to report the Site contamination under the NSW DECCW's Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act (NSW DECC 2009).

Appropriate site management, assessment and remediation should be completed to ensure the site is suitable for the future landuse. Presence / absence of volatile organic compounds and odours in the excavations and remediation requirements should be assessed by a qualified consultant. If VOC's and odours are present, appropriate remediation or management measures will require implementation.

A Site remediation validation report should be prepared in accordance with the regulatory and development consent requirements for the Site.

UPSS Contamination Assessment
Government Property New South Wales
Lot 3, DP 239249 Pacific Highway, Mooney Mooney NSW

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Document Quality Management:

Document Quality Management Details	
Report Name:	UPSS Contamination Investigation
Site Details:	Lot 3, DP 239249 Pacific Highway, Mooney Mooney NSW
Project Number:	J119655
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A	12/09/2013	Ian McLennan	12/09/2013	Naomi Price	Draft
B	26/09/2013	Ian McLennan	27/09/2013	Naomi Price	Final Report

Statement of Limitations - Environment

Statement of Limitations

This report has been prepared in accordance with the agreement between Government Property NSW Constructions Pty Ltd and Noel Arnold & Associates Pty Ltd (NAA).

Within the limitations of the agreed upon scope of services, this work has been undertaken and performed in a professional manner, in accordance with generally accepted practices, using a degree of skill and care ordinarily exercised by members of its profession and consulting practice. No other warranty, expressed or implied, is made.

This report is solely for the use of Government Property NSW Constructions Pty Ltd and any reliance on this report by third parties shall be at such party's sole risk and may not contain sufficient information for purposes of other parties or for other uses. This report shall only be presented in full and may not be used to support any other objective than those set out in the report, except where written approval with comments are provided by NAA.

Reliance on Information Provided by Others

Whilst the techniques used in the assessment are in accordance with recognised industry standards, the investigations also rely on information provided to NAA by third parties. Naturally, NAA cannot guarantee completeness or accuracy of any descriptions or conclusions based on information supplied to it during site surveys, visits and interviews. The extent of risk Government Property NSW Constructions Pty Ltd wishes to accept is something which Government Property NSW Constructions Pty Ltd must determine and accordingly, Government Property NSW Constructions Pty Ltd waives any claim against NAA and agrees to defend, indemnify and hold NAA harmless from any claim or liability for injury or loss allegedly arising from errors, omissions or inaccuracies in documents or other information provided to NAA by Government Property NSW Constructions Pty Ltd.

Recommendations for Further Study

NAA's preliminary findings which may result from this investigation/study may require verification through further analytical testing programs. The final decision to conduct additional investigative activities will be dependent upon Government Property NSW Constructions Pty Ltd assessment of the business risks involved. Government Property NSW Constructions Pty Ltd agrees to hold NAA harmless from any claim, losses or damages arising out of Government Property NSW Constructions Pty Ltd rejection of any additional work suggested by NAA as a result of the work performed hereunder.

1. Introduction

Noel Arnold & Associates Pty Ltd (NAA) was commissioned by Government Property New South Wales to undertake a Contamination Assessment of the Underground Petroleum Storage System (UPSS) at the site, Lot 3 of Deposited Plan 239249, located on the old Pacific Highway at Mooney Mooney NSW. A site location plan is included as Figure 1 in Appendix A. A portion of Lot 3 adjacent to the highway was formerly occupied by a service station. Jonathon Hilliard of NAA undertook the site inspection on 20th May 2013, and soil and groundwater sampling was conducted by Jon Hilliard and Stuart Carroll of NAA on 22nd and 23rd July 2013 and 1 August 2013. Reporting has been completed in September 2013 following the completion of laboratory analysis.

2. Background and Site Description

NAA conducted an initial inspection of the disused service station site on Monday 20th May 2013. The old service station site covered only a small part of Lot 3 of DP 239249 (Lot 3 comprising an area of approximately 4,500 m^2). The section of the Lot comprising the former service station assessed (the site) is defined as the paved area adjacent to the highway and the grassed area immediately to the north of the pavement where an underground storage tank and filler point are located. This section of the Lot covers an area of approximately 1,300 m^2. This part of the Lot shall be defined as "the site" for the purposes of this project and the layout is shown on the aerial photo taken prior to demolition of the site building included as Figure 2 in Appendix A. All aboveground buildings and structures have been demolished and removed from site including the service station building shown o Figure 1. The majority of the site surface is either concrete or asphalt paved and a retaining wall bounds the western margin of the site. Two UPSS filler points were identified within the fenced area of the site near the northern boundary and one UPSS filler point was identified outside the northern boundary of the fenced site area. Two UPSS ventilation points were also identified near the northern boundary.

The site is situated in a low density urban area. Bushland covers land to the north. To the west and east are low density residential development areas. To the west and southwest is the Sydney to Newcastle freeway (Pacific Highway) and to the east the site is bound by the old Pacific Highway. Highest density of developed land is to the east including residential and commercial land uses near to river located approximately 200 m east of the site. The site itself is generally flat but the surrounding topography slopes to the east and south-east towards the Hawkesbury River. According to a survey carried out the site elevation is approximately17 metres Australian Height Datum (AHD).The Geological Survey of NSW *1:100,000 Sydney Geological Survey Map (9130)* indicates the site is situated close to the boundary of the Hawkesbury Sandstone (comprising medium to coarse grained quartz sandstone and very minor shale and laminite lenses) and the underlying Terrigal Formation of the Narrabeen Group (characterised by interbedded laminite and shale and quartz to lithic sandstone). Based upon site geological observations during drilling it is considered that the site is most likely situated in the Hawkesbury Sandstone.

3. Objectives

The overall objective of this environmental assessment is to investigate the extent of the UPSS on site and the nature and extent of soil and groundwater contamination potentially resulting from the former use of the site as a service station. The assessment aims to provide sufficient site characterisation information to enable preparation of a remedial action plan (RAP), if required.

4. Scope of Work

The site assessment was carried out in general accordance with the NSW EPA Guidelines *for Consultants Reporting on Contaminated Sites* 2011. The project scope targeted the UPSS system only and comprised the following:

- Site inspection, services locating and investigation of the extent of the UPSS with ground penetrating radar;
- Application to NSW Office of Water for groundwater well installation approval;

- Borehole drilling and groundwater well installation and soil and groundwater sampling);
- Field screening of soil samples with a photo-ionisation detector (PID) for volatile organic compounds (VOCs).
- Groundwater well gauging for depth to water and presence of phase separated hydrocarbons (PSH) in the wells, such as floating fuel, using an interface meter.
- Development of wells by purging groundwater.
- Sampling of wells and analysis of groundwater samples with a water quality meter for indicator parameters (pH, electrical conductivity, redox potential and temperature) during purging;
- NATA certified laboratory analysis of soil and groundwater samples targeting contaminants relating to UPSS including:
    - Total Recoverable Hydrocarbons (TRH);
    - Benzene, toluene, ethylbenzene and xylene (BTEX); and
    - Lead (Pb).
- Assess ground contamination by comparison of analytical results against adopted health based soil investigation levels (NEPM 2013) and trigger values for groundwater (ANZECC 2000) in accordance with the conceptual site model with regard to contamination on the site;
- Insitu waste classification (for materials sampled) in accordance with NSW EPA waste regulations including the *Waste Classification Guidelines 2009.* This provides a preliminary indication of waste classification if excavated materials are to be removed from the site during future remediation and site development works.
- Assess requirements under the NSW DECCW's *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act* (NSW DECCW 2009) which are applicable to land owners or persons responsible for contamination. Knowledge of Site contamination at concentrations that pose a risk and trigger the duty to report contamination to the NSW DECCW can lead to requirements for remediation agreements with the DECCW.
- Preparation of this report.

The staging of works for the field based portion of the Contamination Assessment was as follows:

- Initial site inspection/underground service location: 20th July 2013.
- Drilling of soil boreholes and installation and development of groundwater monitoring wells: 22nd and 23rd July 2013.
- Groundwater sampling and survey of groundwater wells: 1st August 2013.

5. Fieldwork Observations and UPSS Identified

Fieldwork took place on the following dates:

- 20th May 2013 – initial Site walkover and inspection (as part of the initial proposal and conducted by Jonathon Hilliard);
- 19th July 2013 – underground services location by a qualified locator and scanning for for underground storage tanks with ground penetrating radar (GPR observed by Aaron Smith);
- 22nd and 23rd July 2013 – borehole drilling, well installation, soil sampling and initial well development (groundwater purging) conducted by Stuart Carroll and Jonathon Hilliard; and

1st August 2013 – level survey, purging and sampling of groundwater monitoring wells (conducted by Stuart Carroll and Jessica Little).

Two underground storage tank (UST) fill points were identified within the site near the northern boundary (leaded and unleaded petrol) and one filler point was identified a short distance (1.4 m) outside the northern boundary of the site (refer Figure 3).

Two underground storage tanks were identified by ground penetrating radar at the following locations:

- one UST was located within the site near the northern boundary below the two fill points on the concrete pad (UST 1). This UST was aligned north-south;
- a second UST was located beneath the filler point on the grassed area 1.4 m north of the northern boundary fence line (UST 2). This UST was larger and aligned east-west.

Further evidence for presence of two USTs was the presence of two gas venting pipes in the northern central portion of the site.

It is not known whether or not the USTs have been decommissioned including removal of fuel product and filling of tanks with inert material. Details on historical use of the USTs and types of fuel stored are not known. It is likely that both petrol and diesel were stored.

A former bowser plinth was observed approximately 10 m south of the area where the USTs were identified.

6. Soil and Groundwater Sampling and Laboratory Analysis

6.1 Fieldwork

The soil sampling and groundwater well installation took place on 22nd and 23rd July 2013 with a total number of ten (10) judgemental sampling locations selected based on the UPSS identified during site inspections. The scope of site investigation work completed was as follows:

- Eight (8) proposed borehole locations were cleared by a services locator for drilling of boreholes using a truck mounted drill rig (Matrix drillers). Pavements were cored and a hand auger was used to approximately 0.5 m depth to avoid potential unidentified conduits, followed by drilling.
- Borehole locations are shown on Figure 3. Five boreholes were drilled for soil sampling (BH01 to BH05). Three additional boreholes were drilled for soil sampling and installation of groundwater monitoring wells (MW01, MW02 and MW03).
- Two additional test points were excavated by hand auger for sampling of near surface soils (TP01 and TP02). Boreholes and wells were positioned to target areas of concern around the identified UPSS, at the locations shown on Figure 2;
- Boreholes were excavated to a maximum depth of 10.5 m below ground level (m BGL) and subsurface conditions encountered are described on the borehole logs included in Appendix E;
- Boreholes were logged, and soil samples collected in accordance with NAA standard procedures. Soil samples were recovered using push tube soil cores and from auger flights. Selected samples were screened using a photo-ionisation detector (PID) for the presence of volatile organic compounds (VOCs). Soil samples were collected at near surface depths, then at approximate 1 m intervals to a maximum depth of 4 m. Refer to Appendix B for Sampling Procedures;
- Selected soil samples were submitted to a NATA-accredited laboratory (Eurofins Pty Ltd) for analysis of the selected contaminants of concern (TRH, BTEX and lead).
- The three groundwater monitoring wells were developed prior to sampling by purging using a waterra valve pump. Wells were left to equilibrate prior to sampling.
- Groundwater depths were measured using an interface probe which also detects the presence or absence of phase separated hydrocarbons (PSH) such as floating fuel.
- Water quality parameters were measured (pH, electrical conductivity, redox potential and temperature) during purging and samples for laboratory analysis were collected new plastic bailers at each well.
- Groundwater samples were collected from the 3 groundwater monitoring wells on 1 August 2013, including a field duplicate from well MW03. The samples and were submitted to a NATA accredited laboratory (Eurofins Pty Ltd) for analysis.
- Groundwater depths in the wells were recorded prior to sampling. Ground surface elevations were recorded by a registered surveyor. Groundwater elevations and the inferred direction of groundwater flow are shown on Figure 4.

A total of three groundwater samples and nine soil samples were taken from the various locations shown on Figure 3 and analysed for the following selected contaminants of concern:

- Total Recoverable Hydrocarbons (TPH);
- Benzene, Toluene, Ethylbenzene and Xylenes (BTEX); and
- Lead.

6.2 Quality Assurance / Quality Control (QA/QC)

The Data Quality Objectives (DQOs) for laboratory data in this investigation were as follows:

- Accuracy to be in the range of 70% to130% for lab sample inorganic spike recoveries and 60% to140% for organic spike recoveries;
- Reproducibility (relative percent difference, RPDs) to <30% for internal laboratory duplicates;
- Method blanks results to be less than Limits of Reporting (LORs);
- Limits of Reporting should be a maximum of 1/5, and preferably 1/10 of the acceptance criteria concentration.
- Field duplicate samples to be collected at a frequency of at least 1 in 10 samples. Reproducibility as relative percent difference (RPDs) to be <50% for field sample duplicates results. Recoveries for trip spike sample analytes to be 70% to130%.
- QA/QC data assessment is included in Appendix C with the laboratory certificates of analysis.

Table A summarises the Data Quality Objectives for the UPSS contamination assessment according seven step process described in the NSW EPA's *Guidelines for the NSW Site Auditor Scheme* 2006.

Table A: Data Quality Objectives: Seven Step Process
Step 1: State the problem
The UPSS contamination assessment is to be undertaken to determine the potential for soil and groundwater contamination associated with the presence of UPSS and associated infrastructure (such as bowsers) on the site. The purpose of the assessment is to outline what remedial works may be required to manage risk and mitigate liability for Government Property New South Wales.
Step 2: Identify the decision
The UPSS contamination assessment is to be undertaken to assess: ❑ Is there soil or groundwater contamination on-site which is associated with the UPSS and exceeds the adopted criteria? ❑ Where is the contamination located? ❑ Will soil and groundwater contamination impact upon the ongoing land use on and/or off-site receptors?
Step 3: Identify inputs to the decision
The UPSS contamination assessment is to be undertaken to attempt to quantify the following parameters: ❑ The type and nature of contamination at the site. ❑ The depth of contamination. ❑ The accessibility of contamination.
Step 4: Define the boundaries of the study
The UPSS contamination assessment is limited to contaminants of concern for UPSS (such as petroleum hydrocarbons and lead) and the portions of the site located in Figures 1 and 2 in Appendix A. The UPSS contamination assessment was limited in extent to investigate the potential extent of soil and groundwater contamination related to UPSS within the site and as such has focussed on the area around identified UPSS infrastructure.
Step 5: Develop a decision rule
Results of the UPSS contamination assessment are compared with investigation levels for selected soil contaminants of concern which are defined by relevant site uses, utilising information as recommended by NSW EPA and other applicable agencies (NEPC NEPM). This initial site investigation aims to assess potential site contamination and requirements for further investigation, risk assessment,

Table A: Data Quality Objectives: Seven Step Process
site management and remediation. This methodology is undertaken in accordance with National Environmental Protection (Assessment of Site Contamination) Measure 1999 (2013 Amendment) and the Australian and New Zealand Environmental & Conservation Council 2000 water quality criteria (ANZECC 2000).
Step 6: Acceptable limits on decision error
Results of the soil contamination investigation are evaluated by assessment against predetermined data quality objectives and indicators including Documentation/Data Completeness, Comparability, Representativeness and Precision and Accuracy as specified in Appendix B.
Step 7: Optimise the design for obtaining data
The data collection method for the UPSS contamination assessment has been optimised by the following: ❑ Undertaking judgemental sampling at selected locations across the site based on site inspections regarding UPSS at the site.

6.3 Groundwater Well Construction

The groundwater well installation took place on 22nd July 2013 with a total of three monitoring well locations selected around the identified UPSS at the northern end of the site. The three wells labelled MW01, MW02 and MW03 were installed at locations shown on Figures 3 and 4, borelogs are included in Appendix E. Well installation details include:

- Monitoring wells were installed using a truck mounted drill rig to depths of 10.0 m, 10.5 m and 10.0 m at MW01, MW02 and MW03 respectively;
- Boreholes were drilled through the weathered sandstone soil profile (sandy clays/clayey sands) using solid flight augers. Sandstone bedrock was encountered and bored using air hammer from 7 m to 10 m depth at MW01, from 6.5 m to 10.5 m at MW02 and from 5 m to 10 m at MW03;
- Water was encountered in the boreholes at 8.5m depth and no evidence of groundwater contamination (no odour) was recorded. Wells were screened from 7m to their base (10m). Fully screened wells were not installed (to avoid creation of a conduit between potentially contaminated soils adjacent to the USTs depth and the groundwater aquifer in the sandstone;
- The borehole annulus around the standpipes was backfilled with coarse sand from 6.5 m to the base. Bentonite backfill from 5.5m to 6.5 m. Borehole cuttings backfill from 0-6.5 m.

7. Site Assessment Criteria

The Site has been used for commercial / industrial purposes, however, the proposed future use of the site has not been confirmed.

Results of soil and groundwater sampling and analysis were assessed based on investigation and screening levels for commercial/industrial landuse. Criteria for residential landuse have also been included for reference. The adopted criteria were taken from the following references:

- Human health based soil and groundwater contamination assessment criteria provided in the 2013 Amendment of the *National Environmental Protection (Assessment of Site Contamination) Measure* 1999 (NEPM) *Schedule B(1) Guideline on Investigation Levels for Soil and Groundwater*.
  - Table 1A(3) of the 2013 Schedule B1 amendment provides health screening levels (HSLs) for soils with petroleum hydrocarbon contamination based on vapour intrusion risk. HSLs are provided for selected petroleum compounds for assessing human health risk associated with inhalation and direct contact. The HSLs adopted depend on specific soil properties and depths, types of landuse and characteristics of buildings;
  - Table 1A(4) of the 2013 Schedule B1 amendment provides health screening levels (HSLs) for groundwater with petroleum hydrocarbon contamination based on vapour intrusion risk.

  The HSLs were developed to be protective of human health by deriving the maximum threshold concentrations based on exposure pathways from site sources for a range of situations commonly encountered on contaminated sites. The adopted threshold concentrations for the selected contaminants of concern used in this site assessment are listed in Tables 1 and 2 in Appendix D with the soil and groundwater sample analysis results;
- Health Investigation Levels for lead (Pb) for Soils provided in Table 1A(1) of the 2013 NEPM Schedule B1 amendment. The adopted criteria are for ongoing commercial industrial landuse (HIL-D);
- Results of groundwater sampling and analysis were assessed according to groundwater investigation levels (GILs) provided in a Table 1C of the 2013 NEPM Schedule B1 amendment and the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC 2000). Groundwater sample results are compared against the trigger values for 95% Protection of Species for marine water. These ANZECC 2000 trigger values are provided in Table 2 of Appendix D with the groundwater analysis results.

Soil and groundwater analysis results were also assessed based on:

- NSW DECCW's *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act* (NSW DECC 2009);
- Waste Classification Guidelines (NSW DECC 2009);

7.1 Summary of Health Screening Levels for Petroleum Hydrocarbons and Limitations

The adopted threshold concentrations for the selected contaminants of concern used in this site assessment are listed in Tables 1 and 2 in Appendix D with the soil and groundwater sample analysis results.

The following HSLs are available in Schedule B1 of the NEPM 2013 amendment:

- Soil HSLs for Vapour Intrusion (Table 1(A)3)
- Groundwater HSLs for Vapour Intrusion (Table 1A(4))
- Soil Vapour HSLs for Vapour Intrusion (Table 1A(5))

Soil and groundwater HSLs have been adopted for this UPSS site assessment. The HSLs are further divided according to:

- Landuse scenarios (residential, recreational, commercial industrial)
- Sample Depth
- Soil Type *sand, silt and clay

The application of soil depth guidelines needs to take into account the movement of soil around the site and possibility of excavation for a basement in future landuse.

If there is no control on soil movement through a site management plan then it may be necessary to assume the soil in the top 2 m may be relocated to the surface, and therefore apply the 0-1m HSL for the top 2 m of soil sampled during site investigations. If a basement is allowed under the zoning, the surface HSLs may need to be applied for the top 4 m bgs.

HSLs can be modified based on site specific characteristics such as

- vapour biodegradation, based on presence of oxygen, slab dimensions and depth to contamination source
- soil organic carbon content,
- air exchange rate, and
- soil moisture content.

Adjustments of the HSL require careful consideration and should only be done with the input of a qualified risk assessor and consideration of cumulative effects when applying the HSLs if the concentrations are close to the threshold concentrations. Application of HSLs may require consideration of cumulative exposure.

Applying the HSL criteria and guidelines requires a good understanding site subsurface conditions and the relevant exposure setting associated with the current landuse and/or future landuse. The intent and limitations of derived guidelines in the context of the conceptual site model and proposed future landuse and building design need consideration. Multiple lines of evidence for assessment of vapour intrusion risk are very important.

Soil vapour investigation and soil vapour HSLs are not included in the scope of this site UPSS assessment report. Soil vapour sampling and analysis requires appropriately designed monitoring wells and/or other appropriate subsurface vapour sampling methods and is not within the scope of the current investigation.

As with all generic screening levels, actual site-specific conditions may mean that assumptions underpinning the derivation of the screening levels are not valid for the site and consequently a site-specific risk assessment may be required for validation of the site for a proposed landuse.

7.2 Ecological Screening Levels

ESLs have been developed for selected petroleum hydrocarbon compounds and TRH fractions and are applicable for assessment of risk to terrestrial ecosystems. ESLs are provided in the NEPM 2013 Schedule B(1) amendment for coarse and fine-grained soils and various land uses. They are generally applicable to the top two metres of soil.

ESLs were used to assess TPH, BTEX and lead analysis results in this site assessment. The ESLs adopted apply to Commercial/Industrial land use and are included on Table 1 with the soil analysis results in Appendix D.

7.3 Aesthetic Considerations

The NEPM 2013 Schedule B(1) amendment NSW DECCW *Guidelines for the NSW Site Auditor Scheme (2nd Edition)*, 2006 includes aesthetic considerations for site assessment, particularly for residential landuse. An assessment of the site aesthetics requires consideration of the natural state of soil on any given site, and a comparison between it and the soil encountered during investigation works. Higher standards for soil aesthetic considerations apply to residential land than to industrial land.

In particular, soils on site should not exhibit discolouration (staining), a malodorous nature (odours) or abnormal consistency (rubble and asbestos). Where any of these characteristics were observed, they were noted on the borehole logs, to enable an assessment of aesthetic issues.

8. Contamination Investigation Findings

8.1 Subsurface Conditions

Borehole logs are included in Appendix E. Table B describes the maximum depth of excavation, measured depth of fill materials and depth of the sample taken for each sample location.

Table B: Investigation Findings

Borehole	Location (ref. Figure 3)	Borehole Depth (m)	Fill Material Depth (m)	Number of Soil Samples Collected	Number of Samples Analysed
BH01	1.4 m north of northern boundary fence (near UST 1)	3.7	0 - 2.9	5	1
BH02	East of fill points (near UST 2)	4.8	0 - 0.4	6	2
BH03	West of fill points (near UST 2)	3	0 - 2.2	5	2
BH04	NE of exposed fill below former building	0.9	0 - 0.9	2	1
BH05	Within footprint of former building	1.5	0 - 0.9	2	0
TP01	Southeast corner of site	0.3	0 - 0.25	1	1
TP02	West side of former building	0.7	0 - 0.7	2	1
MW01	Central northern area near bowser stand	10.0	0 – 0.8	3	1
MW02	East (down-gradient) of UPSS	10.5	0 -1.1	3	1
MW03	1.4 m north of northern boundary fence (near UST 1)	10.0	0 -0.9	5	1

Deepest fill material was identified at BH01 and BH03 and is likely associated with UST installations.

Natural soil profiles below shallow fill were observed at MW01, MW02 and MW03 and comprised weathered sandstone soil profiles including brown, orange brown and red brown clayey sands and sandy clays, grading to grey weathered sandstone around 4 m depth. Sandstone rock was encountered at approximately 6.0 to 7 m depth.

Hydrocarbon odours were recorded at BH01, BH02, BH03 near the USTs and at BH04 and BH05 in the area of the former building. Slight and faint hydrocarbon odour was also recorded at MW03 at 2.5 to 3.8 m depth and between 5 m and 10 m depth.

8.2 Groundwater Parameters

Phase separated hydrocarbons (e.g. sheen or floating fuel layer) were not detected in the wells during use of the interface probe.

No hydrocarbon odours were recorded during purging and sampling of the wells.

Groundwater levels were derived by ground level survey and water level gauging at each well. Groundwater levels and water quality parameters measured are presented in Table C below. Groundwater levels and inferred flow direction are shown on Figure 4 in Appendix A.

Table C: Groundwater Levels and Water Quality Parameters (1 August 2013)

Well	Ground Level (m AHD)	Water Depth (m bgl)	Groundwater Levels (m AHD)	pH	EC (µS/cm)	Redox (mV)	Temp (°C)	Purge volume (litres)
MW01	16.965	4.21	12.755	4.9 – 5.2	320 - 390	60 - 120	20.6	42
MW02	17.03	4.94	12.09	5.1 – 5.4	440 - 470	30 - 90	20.7	36
MW03	17.21	3.3	13.91	4.1 – 4.2	246 - 273	278 - 289	18.9	17 (dry)

Notes: m bgl: metres below ground level, EC: electrical conductivity, Redox: oxidation reduction potential

During installation of the wells groundwater was encountered at 8.5 m depth below ground surface level.

8.3 Field Screening for Volatile Organic Compounds

Soil samples collected during drilling were screened for the presence of volatile organic compounds (VOCs e.g. petrol compounds) using a PID. The PID calibration was carried out prior to use by the supplier (Airmet P/L).

Results of PID screening are provided on the borehole logs in Appendix E. PID readings for samples submitted for laboratory analysis are also listed in Table 1 of Appendix D. PID readings generally low (<30 ppm) and indicated a low probability of VOCs contamination in the soils sampled. Samples collected at BH02/0.4-0.5 m, BH02/0.5-0.7 m and BH03/0.6-0.7 m near the USTs recorded the highest values (78 ppm, 32 ppm and 37 ppm).

8.4 Soil Analysis Results

Soil analysis results are presented in Summary Tables 1 and 2 of Appendix D. Laboratory certificates and chain of custody sheets are available in Appendix C.

Petroleum hydrocarbons

Results for all petroleum hydrocarbons NEPM 2013 fractions were below the limit of reporting for all the soil samples analysed.

Results for BTEX were below the limit of reporting for all the soil samples analysed.

Naphthalene and Lead

Results for naphthalene were below the limit of reporting for all the soil samples analysed.

Lead was detected at low concentrations and all samples analysed were below the adopted assessment criteria.

Results for all soil samples met the assessment criteria for residential and commercial industrial landuses, for the contaminants analysed.

Asbestos

Asbestos was identified in a piece of fibrous cement sheeting that was sampled from the ground surface in the central area of the site and submitted for asbestos analysis at the NAA laboratory (NATA accredited). Results are included in Table 3 Appendix D.

8.5 Groundwater Analysis Results

Groundwater analysis results are presented in Table 2 Appendix D. Laboratory certificates and chain of custody sheets are included in Appendix C.

Petroleum hydrocarbons

Results for all petroleum hydrocarbon fractions were below the limit of reporting for all samples analysed.

Results for BTEX were below the limit of reporting for all samples analysed.

Naphthalene and Lead

Results for naphthalene were below the limit of reporting for all the samples analysed.

Results for lead were below the limit of reporting for all the samples analysed.

All groundwater sample results were below the adopted assessment criteria (ANZECC 2000 trigger values), for the contaminants analysed.

8.6 Quality Assurance and Quality Control

The soil and groundwater sample analysis was carried out by MGT Eurofins P/L using NATA accredited sample extraction and analytical procedures. An assessment of the quality assurance and quality control results for this investigation is provided on the data validation sheets with the laboratory certificates of analysis in Appendix C. Notes on standard procedures and quality assurance are also provided in Appendix B.

The quality of the data generated from this assessment is considered sufficient and the data set is considered representative for the purpose of assessing site contamination at the locations sampled.

9. Conclusions

The current investigation was limited to the area of identified UPSS. Based on the environmental assessment, the following conclusions can be drawn:

9.1 Soils

Hydrocarbon odours were detected in three boreholes near the USTs (BH01, BH02 and BH03) and in two boreholes near the former service station building (BH04 and BH05). This indicates some impact from the UPSS, however, petroleum hydrocarbon contamination was not reported for the soil samples analysed.

Results of soil analysis met the adopted assessment criteria for commercial/industrial land use.

Results indicate that excavated materials including hydrocarbon impacted soil will likely be classified as General Solid Waste (non-putrescible), if disposed of, offsite, following excavation. Alternatively the excavated impacted materials can be remediated and retained onsite following validation testing.

The extent of the hydrocarbon impacted area has not been accurately delineated and further assessment is required to advance the site assessment, remediation and enable validation for the proposed future landuse. Assessment of the excavation during removal of the USTs and other UPSS infrastructure (buried fuel conduits, waste water pits/pipe network etc) should be carried out by a qualified consultant when the UPSS is removed and fuel impacted soils are excavated. A validation report should be prepared for the UST/UPSS excavations including soil sampling and analysis from the walls and bases of all excavations.

9.2 Groundwater

No groundwater contamination was identified during this investigation. All groundwater sample results were below the adopted assessment criteria (ANZECC 2000 trigger values), for the contaminants analysed. Further groundwater assessment should be carried out according to findings during excavation of the USTs and other UPSS infrastucture and further soil contamination assessment.

9.3 Remediation of Asbestos Cement Waste

Asbestos was detected in a piece of fibrous cement sheeting sampled from the central area of the site on the ground surface. An asbestos survey including surface gravels and soils across the site should be carried out to determine the extent of remediation required where asbestos is present. Soil and other waste materials removed from the Site that contains asbestos is to be classified as “Special Waste-asbestos” for disposal at a landfill licensed to receive asbestos and soil containing asbestos must not be reprocessed or recycled.

An assessment and supervision of asbestos removal by a qualified consultant/hygienist and licensed asbestos removalist is required to clear asbestos containing material. An asbestos clearance and validation report should be issued by a qualified consultant prior to redevelopment of the site.

Occurrence of asbestos containing material (ACM) is expected to be limited to the ground surface or near surface soil layer, if the source of the ACM was demolition of the building. ACM may be present at greater depths in fill material, particularly if fill has been imported onto the site or if waste dumping has occurred.

9.4 Waste Classification

The results for the soil samples analysed meet the limits for classification as “General Solid Waste-non-putrescible” under the NSW EPA’s Waste Classification Guidelines 2009. Excavated soil material will likely classify as General Solid Waste-non putrescible, subject to confirmation during excavation due to possible impacts associated with petroleum hydrocarbons associated with the UPSS.

Soil and other waste materials removed from the Site that contains asbestos is to be classified as “Special Waste-asbestos” for disposal at a landfill licensed to receive asbestos and soil containing asbestos must not be reprocessed or recycled.

9.5 Conceptual Site Model

The 2013 NEPM amendment emphasises the importance of risk assessment and application of HSLs in the context of the Conceptual Site Model for sites, so that the assessment criteria are applicable to specific site conditions including the nature of the petroleum hydrocarbon contamination, subsurface conditions (soil types and groundwater depth) and site uses including design of buildings (vapour intrusion risk).

The conceptual site model for the Mooney Mooney site requires further development in the context of the proposed future use of the site and results of further investigations during excavation work for removal of the USTs and other fuel infrastructure.

The site UPSS is located on a weathered Hawkesbury Sandstone soil landscape. The sandstone bedrock is likely to be fractured and groundwater flows are potentially intermittent in response to rainfall events. The site is on an easterly slope and is up-gradient of residential properties and the Hawkesbury River. At this stage the contamination impacts from the UPSS have been identified based on soil odour. Despite the lack of detections in laboratory analysis samples, it is not known if the tanks still contain product or if there is significant contamination in the tank pit soils and rock surrounding the USTs. Further assessment is required especially during removal of UPSS in order to advance the conceptual site model and the overall assessment of risk.

9.6 Further Site Assessment / Remediation Action Plan

The underground storage tanks may contain fuel products and, if so, should be emptied and either decommissioned by filling with inert material or be removed along with associated fuel impacted soils adjacent to tanks, as they may pose ongoing sources of potential groundwater contamination.

Soil vapour assessment has not been carried out at the site. Vapour risk assessment based on the NEPM 2013 amendment (National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No 1) should be carried out during the site remediation validation process.

The site could be made suitable for redevelopment following removal of underground storage tanks and remediation of hydrocarbon impacted soil (if present). Impacted soil could be disposed of offsite or remediated onsite (landfarmed).

Any site excavation works should be assessed by a qualified consultant to:

- Investigate site contamination and advance the site assessment according to the 2013 NEPM amendment;
- Validate excavations and document the remediation process;
- Verify waste classifications of material removed from the site; and
- Assess requirements for further remediation to enable site validation for the proposed future landuse.

A Remediation Action Plan (RAP) can be prepared based on the findings of this UPSS investigation. The RAP would propose further investigation during removal of the USTs and excavations including other subsurface UPSS components such as fuel lines to the bowser stand.

Based on the results of this assessment, which was limited to the area of the site UPSS, there is not a duty to report the Site contamination under the NSW DECCW's Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act (NSW DECC 2009).

Appropriate site management, assessment and remediation validation should be completed to ensure the site is suitable for the future landuse. Presence / absence of volatile organic compounds and odours in the excavations and remediation requirements should be assessed by a qualified consultant. If VOC's and odours are present during excavation, appropriate remediation or management measures will require implementation.

A Site remediation validation report should be prepared in accordance with the regulatory and development consent requirements for the Site.

10. References

- NSW Office of Environment and Heritage (OEH) endorsed *Guidelines for the NSW Site Auditor Scheme* (2nd Edition) 2006;
- *Guidelines for the Assessment and Management of Groundwater Contamination 2007*;
- *Guidelines for Assessing Service Station Sites 1994*;
- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1) ;
- NSW State Protection of the Environment Operations Act (POEO Act), 1997;
- AS 4482.1-2005 Guide to the Sampling and Investigation of Potentially Contaminated Soil – Non-volatile and Semi-volatile Compounds;
- NSW DECCW – Guidelines for Consultants Reporting on Contaminated Sites, 2011; and
- NSW DECCW – Sampling Design Guidelines, 1995.

UPSS Contamination Assessment

Government Property New South Wales

Lot 3, DP 239249 Pacific Highway, Mooney Mooney NSW

Appendix A: Figures 1 to 4

SOURCE: SIX MAPS NSW

Noel Arnold & Associates
A GREENCAP CONSULTING COMPANY
Level 2, 11-17 Khartoum Road
North Ryde NSW 2113
Ph: 02-9889-1800
Fx: 02-9889-1811

Client Name:	Government Property NSW
Client Number:	C107943
Project Number:	J119655
Project Description:	UPSS Assessment
Address:	Old Pacific Hwy, Mooney Mooney NSW
Figure x:	Figure 1 Site Location

SOURCE: maps.six.nsw.gov.au

Noel Arnold & Associates
A GREENCAP CONSULTING COMPANY
Level 2, 11-17 Khartoum Road
North Ryde NSW 2113
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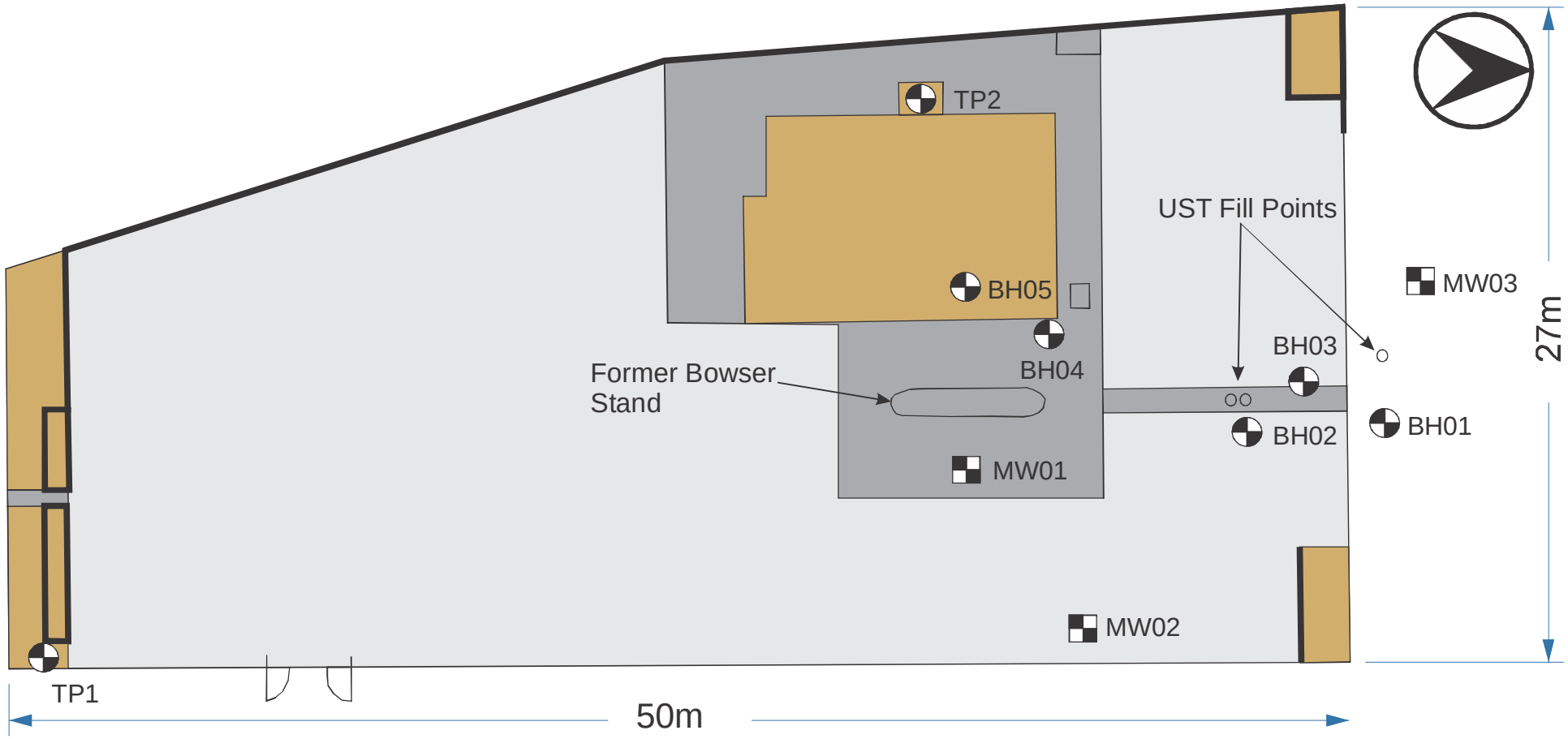
Client Name:	Government Property NSW
Client Number:	C107943
Project Number:	J119655
Project Description:	UPSS Assessment
Address:	Lot 3, DP 239249
Figure 2:	Site Layout



Concrete

Asphalt/bitumen

Unpaved

Noel Arnold & Associates
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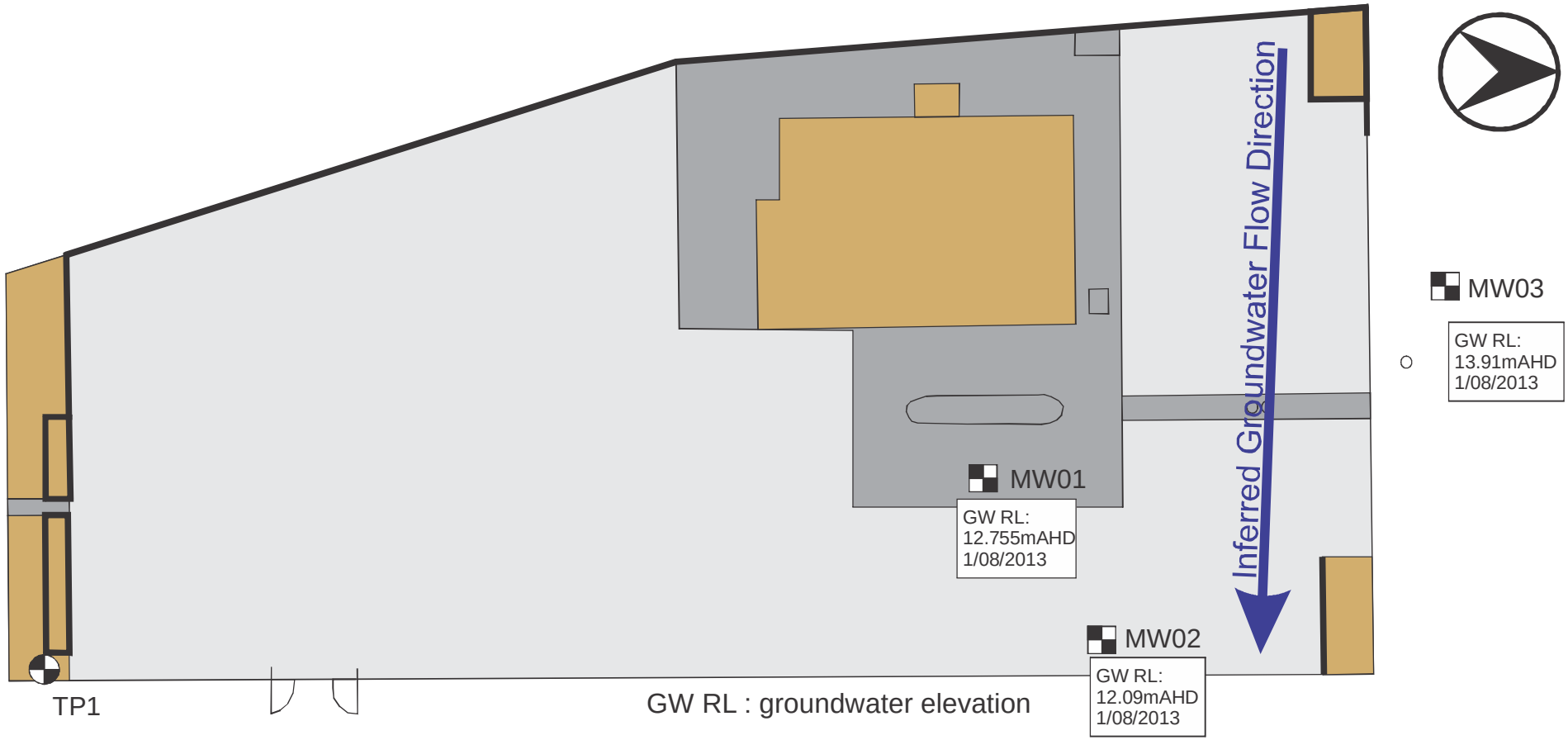
Client Name:	Government Property NSW
Client Number:	C107943
Project Number:	J119655
Project Description:	UPSS Assessment
Address:	Lot 3, DP 239249
Figure 3:	Sample Location Plan



Concrete

Asphalt/bitumen

Unpaved

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Client Name:	Government Property NSW
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Address:	Lot 3, DP 239249
Figure 4:	Groundwater Levels

UPSS Contamination Assessment

Government Property New South Wales

Lot 3, DP 239249 Pacific Highway, Mooney Mooney NSW

Appendix B: Sampling and Analysis Procedures and Quality Assurance/Control

Sampling Procedures

The following sampling protocol and procedures are adopted when undertaking contaminated site investigations. These procedures form the basis of the site investigation program, however variations may be required to suit site-specific requirements.

Soil Sampling

Sample Location and Identification

Samples were collected at judgementally chosen sampling locations or at specific "hot spots" or noted areas of concern. All sample locations are indicated on site plans.

Each soil sample is labelled with the following information:

- Job number;
- Job name;
- Client Number;
- Sampler's initials;
- Date of sampling;
- Sample Location Number;
- Sample Number; and
- Sample Depth.

Soil samples are normally recovered over a range of depths. At each sample depth, the following containers are used to contain the soil sample:

- A 250mL glass jar (laboratory prepared) with screw Teflon-coated lid; and
- Plastic zip-lock bag for asbestos cement fragments.

Soil Sampling Program

Hand Auger

A manual hand auger was used to excavate the material from each borehole location. The hand auger was decontaminated between each location with DECON 90 and water.

Drilling and well installation

All drilling and well constructions are monitored by NAA field staff and soil samples are obtained either form push tube soil cores or auger flights if push tube refusal occurs.

Soil Sampling

Subsequent to the recovery of soil from the core driller, nitrile gloves are used to prevent cross contamination when transferring the soil sample to the glass jar.

All samples are stored in ice chests whilst on site and during transportation to the laboratory.

Completion of Works

The boreholes are backfilled with spoil and compacted subsequent to completion of drilling works.

Cleaning

All sampling equipment is cleaned prior to sampling and between sampling events to prevent cross contamination. This procedure consists of the following:

- Wash and brush scrubbing with laboratory grade detergent;
- Rinse with tap water; and
- Rinse with de-ionised water.

All cleaning is performed on a clean surface.

Sampling Team

Jonathon Hilliard (Principal Environmental Consultant with 12 years' experience) and Stuart Carroll (Environmental Consultant) of NAA, completed the sampling associated with this project.

Laboratory Testing

A NATA registered laboratory completed soil and water analysis, and tests are performed in accordance with the laboratory's NATA certificate and final laboratory reports shall bear the NATA stamp. Test methods used are recognised US EPA procedures set out by appropriate regulatory authorities.

The following tests/methodologies were carried out by the primary analytical laboratory for the soil sampling analysis program:

Analyte	Laboratory Test Methodology	NATA Accredited
Eurofins mgt Laboratory		
TRH NEPM fractions	LM-LTM-ORG2010	Yes
BTEX	EO29/EO16 BTEX	Yes
Lead	EO22 Acid extractable metals	Yes

The water sample analysis program:

Analyte	Laboratory Test Methodology	NATA Accredited
MGT Labmark Environmental Laboratories		
TRH	LM-LTM-ORG2010	Yes
BTEX	EO29/EO16 BTEX	
Lead	EO20/EO30 filtered metals in water	Yes

Record Keeping

Sampling locations are identified on the site plan during site works. All sample locations are labelled by a reference number with a record kept of all sampling locations undertaken during the project. Additional sampling locations or areas of contamination noted during the investigation are indicated on the site plan.

Sub-surface conditions encountered at sample locations were recorded on site. All observed features and soil profiles are described and referred in terms of depth from the surface and thickness of layer.

Chain-of-custody documentation was prepared by the site consultant prior to delivery of the samples to the laboratory. Information recorded in the chain-of-custody form includes:

- Job name and number;
- Client name;
- Date of sample collection;
- Sample type;
- Sample location;
- Sample depth;
- Laboratory address;
- Date delivered to laboratory;
- Laboratory turn around time;
- Chemical analysis required;
- Person relinquishing samples; and
- Person receiving samples.

Quality Control/ Quality Assurance

The following QA/QC procedures are adopted:

Laboratory Quality Control

QA/QC data provided by the laboratory typically includes, but is not limited to the following:

- Matrix spikes (performed once per process batch and at least 1 in 20 samples). They are used to document the precision and bias of a method in a given sample matrix and demonstrate the observance of false negatives in analytical data. The spike recovery procedure involves adding a known amount of reagent to a clean soil sample, which is subsequently tested. The purpose of this test is to verify the absence of matrix effects and other interferences. Recovery data is compared against acceptance criteria published in the Standard Methods for Examination of Water and Waste Water, or appropriate U.S. EPA Methods. If recoveries fall outside these criteria, the analyses are discontinued and the problem rectified.
- Laboratory control samples (performed once per process batch and at least 1 in 20 samples). These samples are prepared from a source independent of the calibration standards to confirm calibration validity.
- Laboratory duplicates (performed once per process batch and at least 1 in 10 samples). Analysis of duplicate samples is undertaken to assess the reputability of the

laboratory analysis. Duplicate samples are made by thoroughly mixing a single soil sample, then coning and quartering it to form two duplicate samples. The repeatability of the analytical method is measured by calculating the relative percent difference (RPD) between the results for each duplicate sample. Should the RPD for the duplicate sample results exceed the control limit, the analysis is repeated.

- Method blanks (performed once per process batch and at least 1 in 20 samples). Method blanks are used to monitor the purity of reagents and the overall procedural blank. A method blank is where the laboratory analyses a clean sandy soil sample. Since the sample is clean it is expected to show "less than detection" concentrations for the analytes involved. Unusual or abnormal results for method blanks are investigated and corrective action taken before analysis of any batch is completed.

Data Quality Indicators

Completeness

Location of samples was judgemental based upon accessibility, location of services and surface features and infrastructure and were determined following a site inspection. An experienced staff member was utilised for all sampling to ensure sampling methodologies were utilised and implemented.

Comparability

The standard operating procedures adopted for the project were used throughout all field works, ensuring that all samples were taken in the same manner. An experienced field staff member was on site at all times to ensure that sampling methodology were utilised and implemented.

Representativeness

Sampling was undertaken at various depths from boreholes to best enable investigation of the fill material of the site. Judgemental sampling was undertaken based upon surface conditions and site knowledge.

Precision

Standard operating procedures were employed throughout the project to minimise variation during the sampling process.

Accuracy

Standard operating procedures were employed throughout the project to ensure that field procedures minimised the potential of contaminant loss or cross contamination of samples, rendering the reported results inaccurate.

Assessment of Investigation Data

Based on an assessment of field based procedures and sampling methodologies the reported analytical results are considered to be valid and representative of contaminant concentrations at the sample locations tested. The data set is considered suitable for interpretive use for the site assessment.

Field Quality Control

NAA Quality Assurance / Quality Control (QA/QC) procedures were implemented as part of this soil contamination investigation to assess data quality. The QA/QC program included the following:

- Preservation of samples in ice during transport from the field to the laboratory.
- Transportation of samples with accompanying chain of custody documentation.
- Compliance with sample holding times.
- Review of laboratory duplicates, laboratory splits and laboratory blanks.

Collection and analysis of one blind replicate QA/QC sample was carried out during the investigation. Blind replicates are prepared in the field by duplicating the original sample and placing two equivalent portions into two separate containers. The blind duplicate groundwater sample from well MW03 was submitted to the laboratory.

Assessment of field quality control duplicate samples was undertaken by calculating the Relative Percent Difference (RPD) of duplicate samples, and reviewing the concentrations detected. The criterion used for the assessment of RPDs is less than 50%. However, it should be noted that on some occasions this variation can be expected to be higher for organic analyses than for inorganic analyses, and for low concentration of analytes.

RPD's can be expressed as:

$$RPD = \frac{(X1 - X2) \times 100\%}{(X1 + X2) / 2}$$

Where: X1 = Concentration of analyte in sample; &
X2 = Concentration of analyte in replicate.

It should be noted that:

- In instances where samples and/or their corresponding replicates returned concentrations of analytes below the detection limits, the detection limit is used for comparison.
- Low concentrations of analytes may result in a high relative percentage with differences in real concentration returning high RPDs, which are not necessarily significant when reviewed in light of potential contamination.

RPDs for the blind duplicate are included on the data validation sheets in Appendix C. RPDs for internal lab duplicates are included on the certificates of analysis.

UPSS Contamination Assessment

Government Property New South Wales

Lot 3, DP 239249 Pacific Highway, Mooney Mooney NSW

Appendix C: NATA Certified Chemical Analysis Results and Data Validation Sheets

eurofins | mgt

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Noel Arnold & Associates (NSW)
Level 2/11 Khartoum Road
North Ryde
NSW 2113

Attention: **Stuart Carroll**

Report **387016-S**
Client Reference J119655
Received Date Jul 24, 2013

Client Sample ID			**J119655-BH01/4**	**J119655-BH02/2**	**J119655-BH02/5**	**J119655-BH03/2**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S13-Jl18199**	**S13-Jl18200**	**S13-Jl18201**	**S13-Jl18202**
Date Sampled			**Jul 23, 2013**	**Jul 23, 2013**	**Jul 23, 2013**	**Jul 23, 2013**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	45	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	121	106	127	125
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
Heavy Metals						
Lead	5	mg/kg	< 5	5.2	< 5	< 5
% Moisture	0.1	%	14	11	12	11

Client Sample ID			J119655-BH03/5	J119655-BH04/1	J119655-TP01/1	J119655-TP02/1
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S13-Jl18203**	**S13-Jl18204**	**S13-Jl18205**	**S13-Jl18206**
Date Sampled			**Jul 23, 2013**	**Jul 23, 2013**	**Jul 22, 2013**	**Jul 23, 2013**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	125	126	121	123
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
Heavy Metals						
Lead	5	mg/kg	< 5	33	8.0	< 5
% Moisture	0.1	%	11	9.7	8.2	10

Client Sample ID			J119655-MW01/1	J119655-MW01/2	J119655-MW02/2	J119655-MW02/3
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S13-Jl18207**	**S13-Jl18208**	**S13-Jl18209**	**S13-Jl18210**
Date Sampled			**Jul 22, 2013**	**Jul 22, 2013**	**Jul 22, 2013**	**Jul 22, 2013**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			J119655-MW01/1	J119655-MW01/2	J119655-MW02/2	J119655-MW02/3
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S13-Jl18207**	**S13-Jl18208**	**S13-Jl18209**	**S13-Jl18210**
Date Sampled			**Jul 22, 2013**	**Jul 22, 2013**	**Jul 22, 2013**	**Jul 22, 2013**
Test/Reference	LOR	Unit				
BTEX						
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	116	121	123	122
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
Heavy Metals						
Lead	5	mg/kg	< 5	< 5	6.0	< 5
% Moisture	0.1	%	11	10	14	6.8

Client Sample ID			J119655-MW03/2	J119655-MW03/4
Sample Matrix			**Soil**	**Soil**
Eurofins | mgt Sample No.			**S13-Jl18211**	**S13-Jl18212**
Date Sampled			**Jul 23, 2013**	**Jul 23, 2013**
Test/Reference	LOR	Unit		
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				
TRH C6-C9	20	mg/kg	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50
BTEX				
Benzene	0.1	mg/kg	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	122	116
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100
Heavy Metals				
Lead	5	mg/kg	7.2	6.3

Client Sample ID			J119655-MW03/2	J119655-MW03/4
Sample Matrix			**Soil**	**Soil**
Eurofins | mgt Sample No.			**S13-Jl18211**	**S13-Jl18212**
Date Sampled			**Jul 23, 2013**	**Jul 23, 2013**
Test/Reference	LOR	Unit		
% Moisture	0.1	%	38	11

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Jul 31, 2013	14 Day
- Method: E004 Petroleum Hydrocarbons (TPH)			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jul 31, 2013	14 Day
- Method: LM-LTM-ORG2010			
BTEX	Sydney	Jul 30, 2013	14 Day
- Method: E029/E016 BTEX			
Heavy Metals	Sydney	Jul 30, 2013	180 Day
- Method: E022 Acid Extractable metals in Soils			
% Moisture	Sydney	Jul 30, 2013	28 Day
- Method: E005 Moisture Content			

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ABN – 50 005 085 521 e.mail : enviro@mgtlabmark.com.au web : www.mgtlabmark.com.au

Melbourne
3-5 Kingston Town Close
Oakleigh VIC 3166
Phone : +61 3 8564 5000
NATA # 1261
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Sydney
Unit F6, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

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Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name: Noel Arnold & Associates (NSW)
Address: Level 2/11 Khartoum Road
North Ryde
NSW 2113

Client Job No.: J119655

Order No.:
Report #: 387016
Phone: 02 9889 1800
Fax: 02 9889 1811

Received: Jul 24, 2013 4:20 PM
Due: Aug 1, 2013
Priority: 5 Day
Contact Name: Stuart Carroll

Eurofins | mgt Client Manager: Jean Heng

Sample Detail					% Moisture	HOLD	Lead	BTEX	Total Recoverable Hydrocarbons
Laboratory where analysis is conducted									
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217					X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
External Laboratory									
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
J119655-BH01/4	Jul 23, 2013		Soil	S13-Jl18199	X		X	X	X
J119655-BH02/2	Jul 23, 2013		Soil	S13-Jl18200	X		X	X	X
J119655-BH02/5	Jul 23, 2013		Soil	S13-Jl18201	X		X	X	X
J119655-BH03/2	Jul 23, 2013		Soil	S13-Jl18202	X		X	X	X
J119655-BH03/5	Jul 23, 2013		Soil	S13-Jl18203	X		X	X	X
J119655-BH04/1	Jul 23, 2013		Soil	S13-Jl18204	X		X	X	X

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Sample Detail					% Moisture	HOLD	Lead	BTEX	Total Recoverable Hydrocarbons
Laboratory where analysis is conducted									
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217					X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
External Laboratory									
J119655-TP01/1	Jul 22, 2013		Soil	S13-Jl18205	X		X	X	X
J119655-TP02/1	Jul 23, 2013		Soil	S13-Jl18206	X		X	X	X
J119655-MW01/1	Jul 22, 2013		Soil	S13-Jl18207	X		X	X	X
J119655-MW01/2	Jul 22, 2013		Soil	S13-Jl18208	X		X	X	X
J119655-MW02/2	Jul 22, 2013		Soil	S13-Jl18209	X		X	X	X
J119655-MW02/3	Jul 22, 2013		Soil	S13-Jl18210	X		X	X	X
J119655-MW03/2	Jul 23, 2013		Soil	S13-Jl18211	X		X	X	X

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Sample Detail					% Moisture	HOLD	Lead	BTEX	Total Recoverable Hydrocarbons
Laboratory where analysis is conducted									
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217					X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
External Laboratory									
J119655-MW03/4	Jul 23, 2013		Soil	S13-Jl18212	X		X	X	X
J119655-BH01/1	Jul 23, 2013		Soil	S13-Jl18213		X			
J119655-BH01/2	Jul 23, 2013		Soil	S13-Jl18214		X			
J119655-BH01/3	Jul 23, 2013		Soil	S13-Jl18215		X			
J119655-BH01/5	Jul 23, 2013		Soil	S13-Jl18216		X			
J119655-BH02/1	Jul 23, 2013		Soil	S13-Jl18217		X			
J119655-BH02/3	Jul 23, 2013		Soil	S13-Jl18218		X			

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Sample Detail					% Moisture	HOLD	Lead	BTEX	Total Recoverable Hydrocarbons
Laboratory where analysis is conducted									
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217					X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
External Laboratory									
J119655-BH02/4	Jul 23, 2013		Soil	S13-Jl18219		X			
J119655-BH02/6	Jul 23, 2013		Soil	S13-Jl18220		X			
J119655-BH03/1	Jul 23, 2013		Soil	S13-Jl18221		X			
J119655-BH03/3	Jul 23, 2013		Soil	S13-Jl18222		X			
J119655-BH03/4	Jul 23, 2013		Soil	S13-Jl18223		X			
J119655-BH04/2	Jul 23, 2013		Soil	S13-Jl18224		X			
J119655-BH05/1	Jul 23, 2013		Soil	S13-Jl18225		X			

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Sample Detail					% Moisture	HOLD	Lead	BTEX	Total Recoverable Hydrocarbons
Laboratory where analysis is conducted									
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217					X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
External Laboratory									
J119655-BH05/2	Jul 23, 2013		Soil	S13-Jl18226		X			
J119655-TP02/2	Jul 23, 2013		Soil	S13-Jl18227		X			
J119655-MW01/3	Jul 22, 2013		Soil	S13-Jl18228		X			
J119655-MW02/1	Jul 22, 2013		Soil	S13-Jl18229		X			
J119655-MW03/1	Jul 23, 2013		Soil	S13-Jl18230		X			
J119655-MW03/3	Jul 23, 2013		Soil	S13-Jl18231		X			
J119655-MW03/5	Jul 23, 2013		Soil	S13-Jl18232		X			

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Address:	Level 2/11 Khartoum Road	**Report #:**	387016	**Due:**	Aug 1, 2013
	North Ryde	**Phone:**	02 9889 1800	**Priority:**	5 Day
	NSW 2113	**Fax:**	02 9889 1811	**Contact Name:**	Stuart Carroll
Client Job No.:	J119655				

Eurofins | mgt Client Manager: Jean Heng

Sample Detail					% Moisture	HOLD	Lead	BTEX	Total Recoverable Hydrocarbons
Laboratory where analysis is conducted									
Melbourne Laboratory - NATA Site # 1254 & 14271									
Sydney Laboratory - NATA Site # 18217					X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794									
External Laboratory									
J119655-DUP1	Jul 22, 2013		Soil	S13-Jl18233		X			
J119655-DUP2	Jul 22, 2013		Soil	S13-Jl18234		X			
J119655-DUP3	Jul 23, 2013		Soil	S13-Jl18235		X			
J119655-DUP4	Jul 22, 2013		Soil	S13-Jl18236		X			

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environment Protection Authority
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions E004 Petroleum Hydrocarbons (TPH)							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX E029/E016 BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions LM-LTM-ORG2010							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH C6-C10 less BTEX (F1)	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Heavy Metals E022 Acid Extractable metals in Soils							
Lead	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions E004 Petroleum Hydrocarbons (TPH)							
TRH C6-C9	%	113			70-130	Pass	
TRH C10-C14	%	101			70-130	Pass	
LCS - % Recovery							
BTEX E029/E016 BTEX							
Benzene	%	112			70-130	Pass	
Toluene	%	103			70-130	Pass	
Ethylbenzene	%	100			70-130	Pass	
m&p-Xylenes	%	100			70-130	Pass	
o-Xylene	%	101			70-130	Pass	
Xylenes - Total	%	100			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions LM-LTM-ORG2010							
Naphthalene	%	108			70-130	Pass	
TRH C6-C10	%	112			70-130	Pass	
TRH >C10-C16	%	110			70-130	Pass	
LCS - % Recovery							
Heavy Metals E022 Acid Extractable metals in Soils							
Lead	%	75			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S13-Jl18199	CP	%	114			70-130	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
BTEX				Result 1					
Benzene	S13-Jl18199	CP	%	109			70-130	Pass	
Toluene	S13-Jl18199	CP	%	102			70-130	Pass	
Ethylbenzene	S13-Jl18199	CP	%	101			70-130	Pass	
m&p-Xylenes	S13-Jl18199	CP	%	101			70-130	Pass	
o-Xylene	S13-Jl18199	CP	%	100			70-130	Pass	
Xylenes - Total	S13-Jl18199	CP	%	101			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S13-Jl18199	CP	%	102			70-130	Pass	
TRH C6-C10	S13-Jl18199	CP	%	114			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S13-Jl18199	CP	%	76			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	S13-Jl18209	CP	%	78			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	S13-Jl18209	CP	%	82			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Lead	S13-Jl18209	CP	%	94			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S13-Jl18199	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S13-Jl18199	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S13-Jl18199	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S13-Jl18199	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S13-Jl18199	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S13-Jl18199	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S13-Jl18199	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S13-Jl18199	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S13-Jl18199	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C6-C10 less BTEX (F1)	S13-Jl18199	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S13-Jl18199	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S13-Jl18209	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S13-Jl18209	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S13-Jl18209	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S13-Jl18209	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S13-Jl18209	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S13-Jl18209	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S13-Jl18209	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
m&p-Xylenes	S13-Jl18209	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S13-Jl18209	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S13-Jl18209	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S13-Jl18209	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S13-Jl18209	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C6-C10 less BTEX (F1)	S13-Jl18209	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S13-Jl18209	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S13-Jl18209	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S13-Jl18209	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	S13-Jl18209	CP	mg/kg	6.0	6.2	4.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.

Authorised By

Jean Heng	Client Services
James Norford	Senior Analyst-Metal (NSW)
Ryan Hamilton	Senior Analyst-Organic (NSW)
Ryan Hamilton	Senior Analyst-Volatile (NSW)

Dr. Bob Symons

Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

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ABN – 50 005 085 521 e.mail : enviro@mgtlabmark.com.au web : www.mgtlabmark.com.au

Melbourne
3-5 Kingston Town Close
Oakleigh Vic 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F6, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Sample Receipt Advice

Company name: **Noel Arnold & Associates (NSW)**

Contact name: Stuart Carroll
Client job number: J119655
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Jul 24, 2013 4:20 PM
Eurofins | mgt reference: **387016**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☒ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Organic samples had Teflon liners.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Notes

Sample ID discrepancy: COC: J119655-MW03/1 JAR: J119655-BH3/1; COC: J119655-MW03/3 JAR: J119655-BH3/3 labeled as per COC unless otherwise requested | All DUP samples are on HOLD as per COC request

Contact notes

If you have any questions with respect to these samples please contact:

Jean Heng on Phone : (+61) (2) 9900 8400 or by e.mail: JeanHeng@eurofins.com.au

Results will be delivered electronically via e.mail to Stuart Carroll - stuart.carroll@noel-arnold.com.au.

Eurofins | mgt Sample Receipt

mgt LabMark ENVIRONMENTAL LABORATORIES

CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Page ____ of ____ #357016

Company Name : Noel Arnold & Associates	Contact Name : Stuart Carrell	Purchase Order :	COC Number :
Office Address: Level 2, 11 Khartoum Road, North Ryde, NSW 2113	Project Manager : Stuart Carrell	PROJECT Number : J119655	mgt QUOTE ID
	e.mail for results : stuart.carrell@noel-arnold.com.au	Courier Consignment # :	

Special Directions & Comments :
Please refer to Greencap pricing

Laboratory Address:
mgt-LabMark
Unit F3, Park View Building
16 Mars Road
LANE COVE -2066
NSW, Australia
Phone: +61 2 9900 8400
Fax: +61 2 9476 8219
Contact: Bob Symons
Email: bob.symons@mgtlabmark.com.au

	Sample ID	Date	Matrix	Analytes: Total Recoverable Hydrocarbons	BTEX	Lead	Container: 1LP	250P	125P	1LA	VIAL	100mL A	OTHER
1	J119655-BH01/4	23/07/2013	Soil	X	X	X		X					
2	J119655-BH02/2	23/07/2013	Soil	X	X	X		X					
3	J119655-BH02/5	23/07/2013	Soil	X	X	X		X					
4	J119655-BH03/2	23/07/2013	Soil	X	X	X		X					
5	J119655-BH03/5	23/07/2013	Soil	X	X	X		X					
6	J119655-BH04/1	23/07/2013	Soil	X	X	X		X					
7	J119655-TP01/1	22/07/2013	Soil	X	X	X		X					
8	J119655-TP02/1	23/07/2013	Soil	X	X	X		X					
9	J119655-MW01/1	22/07/2013	Soil	X	X	X		X					
10	J119655-MW01/2	22/07/2013	Soil	X	X	X		X					
11	J119655-MW02/2	22/07/2013	Soil	X	X	X		X					
12	J119655-MW02/3	22/07/2013	Soil	X	X	X		X					
13	J119655-MW03/2	23/07/2013	Soil	X	X	X		X					
14	J119655-MW03/4	23/07/2013	Soil	X	X	X		X					
15	J119655-BH01/1	23/07/2013	Soil					X					PLEASE KEEP ON HOLD
16	J119655-BH01/2	23/07/2013	Soil					X					PLEASE KEEP ON HOLD

17	J119655-BH01/3	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
18	J119655-BH01/5	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
19	J119655-BH02/1	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
20	J119655-BH02/3	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
21	J119655-BH02/4	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
22	J119655-BH02/6	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
23	J119655-BH03/1	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
24	J119655-BH03/3	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
25	J119655-BH03/4	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
26	J119655-BH04/2	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
27	J119655-BH05/1	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
28	J119655-BH05/2	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
29	J119655-TP02/2	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
30	J119655-MW01/3	22/07/2013	Soil																	X					PLEASE KEEP ON HOLD
31	J119655-MW02/1	22/07/2013	Soil																	X					PLEASE KEEP ON HOLD
32	J119655-MW03/1	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
33	J119655-MW03/3	23/07/2013	Soil																	X					PLEASE KEEP ON HOLD
	J119655-MW03/5	23/07/2013	Soil																						PLEASE KEEP ON HOLD
	J119655-DUP1	22/07/2013	Soil																						PLEASE KEEP ON HOLD
	J119655-DUP2	22/07/2013	Soil																						PLEASE KEEP ON HOLD
	J119655-DUP3	23/07/2013	Soil																						PLEASE KEEP ON HOLD
34	J119655-DUP4	22/07/2013	Soil																	X					PLEASE KEEP ON HOLD

Relinquished By: Stuart Carroll
Date & Time : 24/7/13 16:30
Signature:

Laboratory Staff -
Received By: Sean O.
Date & Time : 24/7/13 4:20
Signature:
Report Number :

Lab Notes :

Turn around Time :
24 Hrs 48 Hrs (5 Days) 10 Days

Comments

Method Of Shipment
☐ Courier
☐ Hand Delivered
☐ Postal

NOTES :

#387016

2.0
1.5 - 1.5
1.5

SAMPLE BATCH DATA QA SUMMARY SHEET

Project Name:	**State Property NSW Mooney Mooney**	**Project Number:**	**J119655**
Primary Laboratory:	**Eurofins**	**Certificate Number:**	**387016-S**
Secondary Laboratory:	**na**		
Date Sampled:	**23/07/2013**	**Sample Medium:**	**Soil**

Sample Information

Number of Primary Samples:	**18**	**Number of Triplicate Samples:**	**0**
Number of Duplicate Samples:	**0**	**Number of Other Field QAQC Samples:**	**0**

Documentation and Sample Handling Information

	Y/N	Comments
COC completed properly?	Y	Signed by both field scientists and labs personnel.
All requested analysis completed?	Y	
Samples received intact and chilled?	Y	Samples received chilled and intact at Laboratory
Samples analysed within appropriate holding times?	Y	
Sample volumes sufficient for QC analysis?	Y	
Are there non-NATA accredited methods used?	N	
Chromatograms supplied as appropriate?	N	
Laboratory reports signed by authorised personnel?	Y	

QAQC Sample Information (Method Blank - MB, Rinsate Blank - RB, Field Blank - FB, Trip Blank - TB)

Type	Sample ID	Comments
Method Blanks		All MGT Eurofins results are less than LOR.

Trip Spike Information (BTEX)

Analyte	Spike Concentrations	Recovery Concentration	% Recovery	Comments
				no trip spike analysed

Laboratory Control Spike (LCS) Analyses

Analyte Group	Comments
	All Eurofins results were within the laboratory control limit.

Matrix Spike (MS) Analyses

Analyte Group	Comments
	All Eurofins results were within the laboratory control limit.

Laboratory Duplicates (LD) Analyses

Analyte Group	Analyte(s)	Sample ID	Comments
			All Eurofins results were within the laboratory control limit.

Field Duplicates (FD) Analyses

Analyte Group	Primary ID	Duplicate ID	Comments
			Field duplicate not analysed for soil (groundwater duplicate analysed …refer next sheet)

Field Triplicates (FT) Analyses (inter-laboratory Duplicate)

Analyte Group	Primary ID	Triplicate ID	Comments
			No interlaboratory duplicate soil sample analysed

Surrogate Compound Monitoring Analyses

Analyte Group	Analyte(s)	Sample ID	Comments
			All surrogate recoveries were within acceptance limits

Overall Comments

All soil sample results were below the limit of reporting for hydrocarbons analysed. Laboratory control samples and spike recoveries indicate appropriate sensitivity of analytical methods and accuracy and precision meeting acceptance limits.

This batch has been validated and is considered suitable for site contamination assessment.

Note: Data validation assesses each analyte in terms of all the data validation variables and only the exceedances and outliers are reported in this form.

*When concentrations are less than the LOR for both primary and duplicate/triplicate results, no RPDs are calculated

Performed By: **Ian McLennan**
Date: **25/09/2013**

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Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Noel Arnold & Associates (NSW)
Level 2/11 Khartoum Road
North Ryde
NSW 2113

Attention: **Stuart Carroll**

Report **387888-W**
Client Reference J119655
Received Date Aug 01, 2013

Client Sample ID			**J119655-MW01**	**J119655-MW02**	**J119655-MW03**	**J119655-BL01**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**S13-Au00861**	**S13-Au00862**	**S13-Au00863**	**S13-Au00864**
Date Sampled			**Aug 01, 2013**	**Aug 01, 2013**	**Aug 01, 2013**	**Aug 01, 2013**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	95	90	83	91
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Heavy Metals						
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Aug 06, 2013	7 Day
- Method: E004 Petroleum Hydrocarbons (TPH)			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Aug 06, 2013	7 Day
- Method: LM-LTM-ORG2010			
BTEX	Sydney	Aug 01, 2013	14 Day
- Method: E029/E016 BTEX			
Heavy Metals (filtered)	Sydney	Aug 01, 2013	180 Day
- Method: E020/E030 Filtered Metals in Water			

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ABN – 50 005 085 521 e.mail : enviro@mgtlabmark.com.au web : www.mgtlabmark.com.au

Melbourne
3-5 Kingston Town Close
Oakleigh VIC 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F6, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name:	Noel Arnold & Associates (NSW)	**Order No.:**		**Received:**	Aug 1, 2013 4:25 PM
Address:	Level 2/11 Khartoum Road	**Report #:**	387888	**Due:**	Aug 9, 2013
	North Ryde	**Phone:**	02 9889 1800	**Priority:**	5 Day
	NSW 2113	**Fax:**	02 9889 1811	**Contact Name:**	Stuart Carroll
Client Job No.:	J119655				

Eurofins | mgt Client Manager: Jean Heng

Sample Detail					Lead (filtered)	BTEX	Total Recoverable Hydrocarbons
Laboratory where analysis is conducted							
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217					X	X	X
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
J119655-MW01	Aug 01, 2013		Water	S13-Au00861	X	X	X
J119655-MW02	Aug 01, 2013		Water	S13-Au00862	X	X	X
J119655-MW03	Aug 01, 2013		Water	S13-Au00863	X	X	X
J119655-BL01	Aug 01, 2013		Water	S13-Au00864	X	X	X

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environment Protection Authority
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions E004 Petroleum Hydrocarbons (TPH)							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX E029/E016 BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions LM-LTM-ORG2010							
Naphthalene	mg/L	< 0.02			0.02	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH C6-C10 less BTEX (F1)	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Heavy Metals (filtered) E020/E030 Filtered Metals in Water							
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions E004 Petroleum Hydrocarbons (TPH)							
TRH C6-C9	%	81			70-130	Pass	
TRH C10-C14	%	81			70-130	Pass	
LCS - % Recovery							
BTEX E029/E016 BTEX							
Benzene	%	90			70-130	Pass	
Toluene	%	93			70-130	Pass	
Ethylbenzene	%	94			70-130	Pass	
m&p-Xylenes	%	98			70-130	Pass	
o-Xylene	%	97			70-130	Pass	
Xylenes - Total	%	97			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions LM-LTM-ORG2010							
Naphthalene	%	95			70-130	Pass	
TRH C6-C10	%	94			70-130	Pass	
TRH >C10-C16	%	90			70-130	Pass	
LCS - % Recovery							
Heavy Metals (filtered) E020/E030 Filtered Metals in Water							
Lead (filtered)	%	104			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S13-Au02230	NCP	%	80			70-130	Pass	
TRH C10-C14	S13-Au00513	NCP	%	85			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
BTEX				Result 1					
Benzene	S13-Au02230	NCP	%	89			70-130	Pass	
Toluene	S13-Au02230	NCP	%	93			70-130	Pass	
Ethylbenzene	S13-Au02230	NCP	%	92			70-130	Pass	
m&p-Xylenes	S13-Au02230	NCP	%	96			70-130	Pass	
o-Xylene	S13-Au02230	NCP	%	95			70-130	Pass	
Xylenes - Total	S13-Au02230	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S13-Au02230	NCP	%	96			70-130	Pass	
TRH C6-C10	S13-Au02230	NCP	%	92			70-130	Pass	
TRH >C10-C16	S13-Au00513	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Heavy Metals (filtered)				Result 1					
Lead (filtered)	S13-Au00861	CP	%	96			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S13-Au02229	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S13-Au02229	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S13-Au02229	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S13-Au02229	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S13-Au02229	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S13-Au02229	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S13-Au02229	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S13-Au02229	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10	S13-Au02229	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10 less BTEX (F1)	S13-Au02229	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
Heavy Metals (filtered)				Result 1	Result 2	RPD			
Lead (filtered)	S13-Au00249	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.

Authorised By

Jean Heng	Client Services
James Norford	Senior Analyst-Metal (NSW)
Ryan Hamilton	Senior Analyst-Organic (NSW)
Ryan Hamilton	Senior Analyst-Volatile (NSW)

Dr. Bob Symons

Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

eurofins | mgt

ABN – 50 005 085 521 e.mail : enviro@mgtlabmark.com.au web : www.mgtlabmark.com.au

Melbourne
3-5 Kingston Town Close
Oakleigh Vic 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F6, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Sample Receipt Advice

Company name: **Noel Arnold & Associates (NSW)**

Contact name: Stuart Carroll
Client job number: J119655
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Aug 1, 2013 4:25 PM
Eurofins | mgt reference: **387888**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Organic samples had Teflon liners.

☑ Sample containers for volatile analysis received with zero headspace.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Jean Heng on Phone : (+61) (2) 9900 8400 or by e.mail: JeanHeng@eurofins.com.au

Results will be delivered electronically via e.mail to Stuart Carroll - stuart.carroll@noel-arnold.com.au.

Eurofins | mgt Sample Receipt

mgt LabMark
ENVIRONMENTAL LABORATORIES

CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Page ____ of ____

Company Name : Noel Arnold & Associates	Contact Name : Stuart Carroll	Purchase Order :	COC Number :
Office Address : Level 2, 11 Khartoum Road NORTH RYDE NSW 2113	Project Manager : Stuart Carroll	PROJECT Number : J119655	mgt QUOTE ID :
	e.mail for results : stuart.carroll@noel-arnold.com.au	Courier Consignment # :	

Special Directions & Comments :

Please refer to Greencap pricing

Laboratory Address: mgt-LabMark
Unit F3, Park View Building
16 Mars Road
LANE COVE 2066
NSW, Australia
Phone: +61 2 9900 8400
Fax: +61 2 9476 8219
Contact: Bob Symons
Email: bob.symons@mgtlabmark.com.au

	Sample ID	Date	Matrix	Analytes: Total Recoverable Hydrocarbons	BTEX	Lead	Container: 1LP	250P	125P	1LA	VIAL	100mL A	OTHER
1	J119655 - MW01	1/08/2013	Groundwater	X	X	X				X	X	X	
2	J119655 - MW02	1/08/2013	Groundwater	X	X	X				X	X	X	
3	J119655 - MW03	1/08/2013	Groundwater	X	X	X				X	X	X	
4	J119655 - BL01	1/08/2013	Groundwater	X	X	X				X	X	X	
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													

Relinquished By: S. Carroll
Date & Time : 1/8/13 16:30
Signature:

Laboratory Staff -
Received By: Jasmine
Date & Time : 01/08/13 4:25pm
Signature:
Report Number :

Lab Notes :

Turn around Time : 24 Hrs 48 Hrs (5 Days) 10 Days

Comments
387888

Method Of Shipment
☐ Courier
☐ Hand Delivered
☐ Postal

NOTES :

SAMPLE BATCH DATA QA SUMMARY SHEET

Project Name:	**State Property NSW Mooney Mooney**	**Project Number:**	**J119655**
Primary Laboratory:	**Eurofins**	**Certificate Number:**	**387888-W**
Secondary Laboratory:	**na**		
Date Sampled:	**23/07/2013**	**Sample Medium:**	**Groundwater**

Sample Information

Number of Primary Samples:	**3**	**Number of Triplicate Samples:**	**0**
Number of Duplicate Samples:	**1**	**Number of Other Field QAQC Samples:**	**0**

Documentation and Sample Handling Information

	Y/N	Comments
COC completed properly?	Y	Signed by both field scientists and labs personnel.
All requested analysis completed?	Y	
Samples received intact and chilled?	Y	Samples received chilled and intact at Laboratory
Samples analysed within appropriate holding times?	Y	
Sample volumes sufficient for QC analysis?	Y	
Are there non-NATA accredited methods used?	N	
Chromatograms supplied as appropriate?	N	
Laboratory reports signed by authorised personnel?	Y	

QAQC Sample Information (Method Blank - MB, Rinsate Blank - RB, Field Blank - FB, Trip Blank - TB)

Type	Sample ID	Comments
Method Blanks		All MGT Eurofins results are less than LOR.

Trip Spike Information (BTEX)

Analyte	Spike Concentrations	Recovery Concentration	% Recovery	Comments
				no trip spike analysed

Laboratory Control Spike (LCS) Analyses

Analyte Group	Comments
	All Eurofins results were within the laboratory control limit.

Matrix Spike (MS) Analyses

Analyte Group	Comments
	All Eurofins results were within the laboratory control limit.

Laboratory Duplicates (LD) Analyses

Analyte Group	Analyte(s)	Sample ID	Comments
			All Eurofins results were within the laboratory control limit.

Field Duplicates (FD) Analyses

Analyte Group	Primary ID	Duplicate ID	Comments
			All RPDs for field duplicate were within control limits

Field Triplicates (FT) Analyses (inter-laboratory Duplicate)

Analyte Group	Primary ID	Triplicate ID	Comments
			No interlaboratory duplicate soil sample analysed

Surrogate Compound Monitoring Analyses

Analyte Group	Analyte(s)	Sample ID	Comments
			All surrogate recoveries were within acceptance limits

Overall Comments

All groundwater sample results were below the limit of reporting for hydrocarbons analysed. Field and Laboratory control samples and spike recoveries indicate appropriate sensitivity of analytical methods and accuracy and precision meeting acceptance limits.

This batch has been validated and is considered suitable for site contamination assessment.

Note: Data validation assesses each analyte in terms of all the data validation variables and only the exceedances and outliers are reported in this form.

*When concentrations are less than the LOR for both primary and duplicate/triplicate results, no RPDs are calculated

Performed By: **Ian McLennan**
Date: **25/09/2013**

Noel Arnold & Associates
A GREENCAP CONSULTING COMPANY

Risk Management Services

NOEL ARNOLD & ASSOCIATES PTY LTD
A.C.N. 006 318 010 A.B.N. 76 006 318 010
Level 2, 11 Khartoum Road,
North Ryde, NSW 2113 Australia
Phone: (02) 9889 1800
Fax: (02) 9889 1811
Email: sydney@noel-arnold.com.au
www.noel-arnold.com.au

Wednesday, 31/07/2013

Our ref: C107943:J119655

Eng Tan
Government Property NSW
PO Box 505
DARLINGHURST NSW 2010

Dear Eng,

Re: Asbestos Identification Analysis - Lot 3 DP239249 Pacific Highway, Mooney Mooney NSW

This letter presents the results of asbestos fibre identification analysis performed on 1 sample collected by Stuart Carroll of Noel Arnold & Associates Pty Ltd on Tuesday, 23 July 2013. The sample was stated to be from Lot 3 DP239249 Pacific Highway, Mooney Mooney NSW.

All sample analysis was performed using polarised light microscopy, including dispersion staining in our Sydney Laboratory in accordance with Noel Arnold and Associates Pty Ltd Test Method NALAB 302 "Asbestos Identification Analysis" and following the guidelines of Australian Standard AS4964-2004.

The sample will be kept for six months and then disposed of, unless otherwise directed.

The results of the asbestos identification analysis are presented in the appended table.

Should you require further information please contact Stuart Carroll.

Yours sincerely
NOEL ARNOLD & ASSOCIATES PTY LTD

Simon Day : Approved Identifier

Simon Day : Approved Signatory

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.
Corporate Site No. 5450, Site No. 3402 Sydney Laboratory.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Accredited for compliance with ISO/IEC 17020, Corporate Site No. 18349.

Wednesday, 31/07/2013

Our ref: C107943:J119655

Site Location:		Lot 3 DP239249 Pacific Highway, Mooney Mooney NSW	
	Sample ID	Sample Location/Description/Weight or Size	Analysis Result
1	J119655 01	Centre of Site, Exposed Fill Material, Ground Surface - Fibre cement sheet debris Dirty grey flat fibre-cement sheet material ~ 85 x 56 x 5 mm	Chrysotile (white asbestos)

* Shaded row with bolded text indicates sample contains a positive result for asbestos.

UPSS Contamination Assessment

Government Property New South Wales

Lot 3, DP 239249 Pacific Highway, Mooney Mooney NSW

Appendix D: Summary Tables of Analytical Results

Sample I.D	Sample Type	Depth	PID	Lead	Total Recoverable Hydrocarbons 2013 NEPM fractions				Monocyclic Aromatic Hydrocarbons					PAH
					TRH C_6-C_{10} (F1)	TRH >C_{10}-C_{16} (F2)	TRH >C_{16}-C_{34}	TRH >C_{34}-C_{40}	Benzene	Toluene	Ethylbenzene	m+p-Xylene	o-Xylene	Naphthalene
		mbgl	ppm	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH01/4	Sandy Clay	2.0-2.1	na	<5	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5
BH02/2	Sandy Clay	0.4-0.5	78	5.2	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5
BH02/5	Clayey Sand	3.0-3.1	1	<5	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5
BH03/2	Sandy Clay	0.6-0.7	37	<5	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5
BH03/5	Clayey Sand	2.9-3.0	2	<5	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5
BH04/1	Sandy Clay	0.2-0.3	0	33	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5
TP01/1	Sandy Clay	0.5-0.8	na	8.0	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5
TP02/1	Sandy Clay	0.15-0.25	0	<5	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5
MW01/1	Sandy Clay	0.2-0.3	1	<5	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5
MW01/2	Sandy Clay	0.8-1.2	1	<5	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5
MW02/2	Clayey Sand	1.2-1.3	1	6.0	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5
MW02/3	Clay	3.0-3.1	1	<5	<10	<50	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5
MW03/2	Clayey Sand	0.9-1.0	0	7.2	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5
MW03/4	Sandy Clay	3.5-3.6	2	6.3	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.2	<0.1	<0.5
NEPM 2013 Health Investigation Levels - (Commercial/Industrial HIL D)				**1500**										
NEPM 2013 Health Investigation Levels - (Residential HIL A)				**300**										
NEPM 2013 Health Screening Levels - (Comm./Industrial D) - SAND HSLs : 0-1m depth / 1-2 m depth / 2-4 m depth					**260 / 370 / 630**				**3 /3 /3**			**230**		
NEPM 2013 Health Screening Levels - (Residential A & B) - SAND HSLs : 0-1m depth / 1-2 m depth / 2-4 m depth					**45 / 70 / 110**	**110 / 240 / 440**			**0.5 /0.5 / 0.5**	**160/220/310**	**55**	**40 / 60 /95**		**3**
NEPM 2013 Health Screening Levels - (Comm./Industrial D) - CLAY HSLs : 0-1m depth / 1-2 m depth / 2-4 m depth					**310 / 480 / -**				**4 / 6 / 9**					
NEPM 2013 Health Screening Levels - (Residential A & B) -CLAY HSLs : 0-1m depth / 1-2 m depth / 2-4 m depth					**50 / 90 / 150**	**280**			**0.7 / 1 / 2**	**480**		**110 / 310 / -**		**5**
NEPM 2013 Ecological Screening Levels - (comm./industrial D) - Coarse Soil Texture ESLs					**215**	**170**	**1700**	**3300**	**75**	**135**	**165**	**180**		
NEPM 2013 Ecological Screening Levels - (comm./industrial D) - Fine Soil Texture ESLs							**2500**	**6600**	**95**	**135**	**185**	**95**		

Notes:

HSLs are included for both commercial / industrial landuse and residential landuse

HSLs for both SAND soils and CLAY soils are included

For HSLs applicable to soil at greater than 4 m depth refer to NEPM 2012 Table 1A(3)

HILs apply to all soil depths and textures (sand/silt/clay)

Ecological screening levels included for commercial/industrial land only

Table 1
Soil Analytical Results
Lead, TRH & BTEX & Naphthalene

Site UPSS / Contamination Investigation

State Property NSW

Lot 3, Deposited Plan 239249 Pacific Highway, Mooney Mooney NSW

Sample I.D	Sample Type	Lead	Total Recoverable Hydrocarbons				Monocyclic Aromatic Hydrocarbons				
			TRH C_6-C10 (F1)	TRH >C_{10}-C_{16} (F2)	TRH >C_{16}-C_{34}	TRH >C_{34}-C_{40}	Benzene	Toluene	Ethylbenzene	m+p-Xylene	o-Xylene
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW01	Groundwater	<0.001	<0.02	<0.05	<0.1	<0.1	<0.001	<0.001	<0.001	<0.002	<0.001
MW02	Groundwater	<0.001	<0.02	<0.05	<0.1	<0.1	<0.001	<0.001	<0.001	<0.002	<0.001
MW03	Groundwater	<0.001	<0.02	<0.05	<0.1	<0.1	<0.001	<0.001	<0.001	<0.002	<0.001
MW03 Field Duplicate	Groundwater	<0.001	<0.02	<0.05	<0.1	<0.1	<0.001	<0.001	<0.001	<0.002	<0.001
NEPM 2013 Groundwater Investigation Levels (Marine Waters)		**0.0044**	-	-	-	-	**0.5**	-	-	-	-
NEPM 2013 Groundwater Investigation Levels (Drinking Water)		**0.01**	-	-	-	-	**0.001**	**0.8**	**0.3**	**0.6**	

Table 2
Groundwater Analytical Results
Lead, TRH & BTEX & Naphthalene

Site UPSS / Contamination Investigation
State Property NSW
Lot 3, Deposited Plan 239249 Pacific Highway, Mooney Mooney NSW

Sample ID	Sample Location/Description/Weight or Size	Analysis Result
J119655 Sample '01	Fibre cement sheet on ground surface, centre of site	Chrysotile asbestos detecetd

Table 3

Asbestos Analysis

Site UPSS / Contamination Investigation
State Property NSW
Lot 3, Deposited Plan 239249 Pacific Highway,
Mooney Mooney NSW

UPSS Contamination Assessment

Government Property New South Wales

Lot 3, DP 239249 Pacific Highway, Mooney Mooney NSW

Appendix E: Borehole and Groundwater Monitoring Well Logs

Noel Arnold & Associates
BOREHOLE LOG REPORT

Client:	State Property Authority	Test Pit Reference:	**BH01**
Job Name:	UPSS Investigation Mooney Mooney	Location:	North of boundary fence near USTs
Site Address:	Lot 3 DP239249, Pacific Highway, Mooney Mooney	Logged by:	SJC
Job/Client Number:	J119655	Checked by:	JH
Contractor:	Matrix	Date Commenced:	23/07/2013
Drill Rig:	Truck mounted rig	Date Completed:	23/07/2013

Drilling Method	DTW	Depth (m)	Material Description	Field Sample Analysed	PID (ppm)	Comments:
Backhoe		0.2	Silty sand, medium density, moist, low plasticity, dark brown/brown	S01-0.2	0.3	Grass; Topsoil
		0.4	Sandy clay, soft, medium density, moist, low plasticity, brown/orange	S02-0.4	0.2	Fill; rocks(dark grey) and sandstone cobbles, Slight hydrocarbon odour
		0.6	Sandy clay, soft, medium density, moist, medium plasticity, brown/light red, sandstone cobbles	S03-0.6	0.8	Fill; Slight hydrocarbon odour, increasing with depth
		0.8				
		1.0				
		1.2	Sandy clay, soft, medium density, moist, low plasticity, brown/orange, sandstone cobbles			Fill; Slight hydrocarbon odour
		1.4				
		1.6				
		1.8				
		2.0	Sandy clay, soft, medium density, moist, low plasticity, dark brown/brown	S04-2.0		Fill; Slight hydrocarbon odour
		2.2				
		2.4				
		2.6				
		2.8				
		3.0	Sandy clay, soft, medium density, moist, low plasticity, red/grey		0.8	Sandstone bedrock from 2.9 m to 3.7 m
		3.2				
		3.4				
		3.6		S05-3.7	0.7	

End of hole at 3.7m

Noel Arnold & Associates
BOREHOLE LOG REPORT

Client:	State Property Authority	Test Pit Reference:	**BH02**
Job Name:	UPSS Investigation Mooney Mooney	Location:	Northern area near USTs
Site Address:	Lot 3 DP239249, Pacific Highway, Mooney Mooney	Logged by:	SJC
Job/Client Number:	J119655	Checked by:	JH
Contractor:	Matrix	Date Commenced:	23/07/2013
Drill Rig:	Truck mounted rig	Date Completed:	23/07/2013

Drilling Method	DTW	Depth (m)	Material Description	Field Sample Analysed	PID (ppm)	Comments:
Backhoe			Ashphalt			Ashphalt from 0-0.04 metres
		0.2	Sand, loose, moist, dark brown/brown	S01-0.15	14.0	Fill with sandstone; Slight hydrocarbon odour
		0.4	Sandy clay, soft, medium density, moist, low plasticity, brown/grey	S02-0.4	77.9	Fill with sandstone cobbles; Moderate hydrocarbon odour
		0.6	Sandy clay, soft, medium density, moist, low plasticity, brown/red	S03-0.6	32.4	Fill with sandstone cobbles; Moderate hydrocarbon odour
		0.8	Sand/clay, soft, medium density, moist, low plasticity, grey/red			Natural soil; Moderate hydrocarbon odour, decreasing
		1.0			3.4	
		1.2	Sand/clay, soft, medium density, moist, low plasticity, brown/red			Natural; Slight hydrocarbon odour
		1.4				
		1.6				
		1.8				
		2.0	Sand/clay, soft, medium density, very moist, medium plasticity, dark brown/light brown	S04-2.0	0.8	Natural; Slight hydrocarbon odour, decreasing
		2.2				
		2.4				
		2.6	Clayey sand, soft, medium density, moist, medium plasticity, red/grey			Natural; Slight hydrocarbon odour
		2.8				
		3.0		S04-3.0	0.9	
		3.2				
		3.4				
		3.6	Sand, loose, moist, grey/white			Natural; Slight hydrocarbon odour
		3.8				
		4.0			0.7	
		4.2				
		4.4	Sand/clay, soft, loose, moist, low plasticity, red/brown			Natural; Slight hydrocarbon odour;
		4.6		S06-4.7	0.4	
		4.8				
End of hole at 4.8m - on sandstone						

Noel Arnold & Associates
TEST PIT LOG REPORT

Client:	State Property Authority	Test Pit Reference:	**BH03**
Job Name:	UPSS Investigation Mooney Mooney	Location:	Northern area near USTs
Site Address:	Lot 3 DP239249, Pacific Highway, Mooney Mooney	Logged by:	SJC
Job/Client Number:	J119655	Checked by:	JH
Contractor:	Matrix	Date Commenced:	23/07/2013
Drill Rig:	Truck mounted rig	Date Completed:	23/07/2013

Drilling Method	DTW	Depth (m)	Material Description	Field Sample Analysed	PID (ppm)	Comments:
Backhoe			Ashphalt			Ashphalt from 0-0.04 metres
		0.2	Sand, loose, moist, brown/yellow	S01-0.16	12.0	Fill; Rocks; Slight hydrocarbon odour
		0.4	Clayey sand, stiff, medium density, moist, medium plasticity, brown/orange		36.8	Fill; Rocks, moderate hydrocarbon odour
		0.6	Sand/clay, soft, medium density, moist, low plasticity,dark brown/orange	S02-0.6	35.2	Fill; Moderate hydrocarbon odour
		0.8	Clayey sand, strong, medium density, moist, medium plasticity, brown/grey	S03-0.9	8.7	Fill; Moderate hydrocarbon odour
		1.0				
		1.2	Clayey sand, soft, medium density, moist, medium plasticity, brown/grey			Fill; Slight hydrocarbon odour
		1.4				
		1.6				
		1.8		S04-1.9	2.4	
		2.0	Clayey sand, strong, medium density, moist, medium plasticity, dark brown/brown			Fill; Hydrocarbon odour
		2.2				
		2.4	Clayey sand, soft, medium density, moist, low plasticity, red/brown			Natural; Hydrocarbon odour
		2.6	Sand/clay,soft, medium density, slightly moist, low plasticity		1.3	Sandstone, Slight hydrocarbon odour
		2.8				
		3.0		S05-3.0	1.5	
End of hole at 3.0m- on sandstone						

Noel Arnold & Associates
TEST PIT LOG REPORT

Client:	State Property Authority	Test Pit Reference:	**BH04**
Job Name:	UPSS Investigation Mooney Mooney	Location:	Northeast area of former buidling, Exposed Fill
Site Address:	Lot 3 DP239249, Pacific Highway, Mooney Mooney	Logged by:	SJC
Job/Client Number:	J119655	Checked by:	JH
Contractor:	Matrix	Date Commenced:	23/07/2013
Drill Rig:	Truck mounted rig	Date Completed:	23/07/2013

Drilling Method	DTW	Depth (m)	Material Description	Field Sample Analysed	PID (ppm)	Comments:
Backhoe			Silt/sand, loose, moist, low plasticity, dark brown/brown			Topsoil from 0-0.05m
		0.2	Sand/clay, loose, moist, low plasticity, dark brown/orange	S01-0.2	0.0	Fill; Rocks; Building aggregate
		0.4	Sand/clay, soft, loose, moist, low plasticity, brown/orange			Fill; Slight hydrocarbon odour; Rocks; Building aggregate
		0.6		S02-0.7	0.5	
		0.8	Sand/clay, strong, loose, moist, medium plasticity, brown/grey			Fill; Moderate hydrocarbon odour; Rocks; Building aggregate
End of hole at 0.9m - refusal on hard fill						

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TEST PIT LOG REPORT

Client:	State Property Authority	Test Pit Reference:	**BH05**
Job Name:	UPSS Investigation Mooney Mooney	Location:	Eastern area of former building
Site Address:	Lot 3 DP239249, Pacific Highway, Mooney Mooney	Logged by:	SJC
Job/Client Number:	J119655	Checked by:	JH
Contractor:	Matrix	Date Commenced:	23/07/2013
Drill Rig:	Truck mounted rig	Date Completed:	23/07/2013

Drilling Method	DTW	Depth (m)	Material Description	Field Sample Analysed	PID (ppm)	Comments:
Backhoe			Silt/sand, loose, moist, low plasticity, dark brown/brown			Grass; Topsoil from 0-0.05m
		0.2	Sand/clay, loose, moist, low plasticity, dark brown/orange			Fill; Rocks; Building aggregate
		0.4	Sand/clay, soft, loose, moist, low plasticity, brown/orange			Fill; Slight hydrocarbon odour; Rocks; Building aggregate
		0.6				
		0.8	Sand/clay, strong, loose, moist, medium plasticity, brown/grey			Fill; moderate hydrocarbon odour; Rocks, Building aggregate
		1.0	Sand/clay, strong, loose, moist, low plasticity, dark red/brown	S01-1.0	0.0	Natural soil
		1.2	Sand/clay, soft, loose, moist, low plasticity, crimson/grey			Natural; Slight hydrocarbon odour
		1.4		S02-1.5	0.3	
End of hole at 1.5m in sandy clay						

Noel Arnold & Associates
TEST PIT LOG REPORT

Client:	State Property Authority	Test Pit Reference:	**TP01**
Job Name:	UPSS Investigation Mooney Mooney	Location:	Southeast Corner of Site
Site Address:	Lot 3 DP239249, Pacific Highway, Mooney Mooney	Logged by:	SJC
Job/Client Number:	J119655	Checked by:	JH
Contractor:	Hand Auger	Date Commenced:	23/07/2013
Drill Rig:		Date Completed:	23/07/2013

Drilling Method	DTW	Depth (m)	Material Description	Field Sample Analysed	PID (ppm)	Comments:
Backhoe		0.05	Silt, loose, moist, low plasticity, dark brown/grey			Dead grass; Topsoil
		0.10	Sand/clay, soft, loose, moist, medium plasticity, brown/orange			Fill
		0.15	Sand/clay, soft, loose, moist, medium plasticity, orange/brown			Fill
		0.20				
		0.25		TP01-0.25		
		0.30	Sand, dense, moist, low plasticity, grey/white			Natural; Turning into hard rock
End of hole at 0.3m						

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TEST PIT LOG REPORT

Client:	State Property Authority	Test Pit Reference:	**TP02**
Job Name:	UPSS Investigation Mooney Mooney	Location:	West side of site
Site Address:	Lot 3 DP239249, Pacific Highway, Mooney Mooney	Logged by:	SJC
Job/Client Number:	J119655	Checked by:	JH
Contractor:	Hand Auger	Date Commenced:	23/07/2013
Drill Rig:		Date Completed:	23/07/2013

Drilling Method	DTW	Depth (m)	Material Description	Field Sample Analysed	PID (ppm)	Comments:
Backhoe		0.1	Sand, medium density, moist, low plasticity, tan/yellow			Exposed fill
		0.2	Sand/clay, soft, medium density, moist, low plasticity, brown/orange	S01-0.15	0.0	Fill; Small rocks
		0.3	Sand, medium density, moist, low plasticity, brown/yellow			Fill; Small rocks
		0.4	Sand/clay, soft, medium density, moist, low plasticity, dark brown/brown			Fill; Small rocks
		0.5				
		0.6		S02-0.6	0.0	
		0.7				
End of hole at 0.7m - refusal on hard fill (rocks)						

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TEST PIT LOG REPORT

Client:	State Property Authority	Test Pit Reference:	**MW01 (monitoring well installed)**
Job Name:	UPSS Investigation Mooney Mooney	Location:	Central, North of Site - On Concrete Pad
Site Address:	Lot 3 DP239249, Pacific Highway, Mooney Mooney	Logged by:	SJC
Job/Client Number:	J119655	Checked by:	JH
Contractor:	Matrix	Date Commenced:	23/07/2013
Drill Rig:	Truck mounted rig	Date Completed:	23/07/2013

Drilling Method	DTW	Depth (m)	Material Description	Field Sample Analysed	PID (ppm)	Comments:
			Concrete pavement			Concrete pavement from 0-0.14m
		0.5	Sand/clay, soft, loose, moist, low/hard plasticity, light brown/brown	S01-0.7	0.9	Fill with sandstone; some clay throughout
		1.0	Sand/clay, soft, loose, moist, low/hard plasticity, light brown/brown	S02-0.8	0.7	Fill ; Small rocks and sandstone cobble
			Sand/clay, soft/strong, loose, moist, medium plasticity, dark rock/orange matter	S02(DUP1)-1.2		Natural soil, Clay content increasing with depth
		1.5	Sand/clay, strong, loose, slighty moist, medium plasticity, dark red/light grey			Natural; Light grey band of shale
		2.0				
		2.5				
			Sand/clay, strong, mildly dense, slightly moist, medium plasticity, light brown/dark red			Natural; Moisture content increasing with depth beyond 2.9m; Light grey band of shale
		3.0	Sand/ clay, strong, mildly dense, slightly moist, medium plasticity, dark red/light grey	S03-3.0		Natural; Chunks of clay; Light grey band of shale
		3.5		S03(DUP2)-3.1	11.7	
		4.0	Clayey sand, strong, mildly dense, slightly moist, medium plasticity, dark red/light grey			Natural; Light grey band of shale; Light grey with increasing depth
		4.5				
		5.0	Sand, slightly moist, dark red/brown			Natural; weathered sandstone with shale bands (light grey)
		5.5				
		6.0				
		6.5				
		7.0	sandstone			Decreasing from dark red to pink
		7.5				
		8.0	sandstone			Increasing from pink to dark red; Groundwater depth approximately 8.5m
		8.5				
		9.0	sandstone			Losing red tinge and becoming brown;
		9.5				
		10.0				
			End of hole at 10.0m			

Noel Arnold & Associates
TEST PIT LOG REPORT

Client:	State Property Authority	Test Pit Reference:	**MW02**
Job Name:	UPSS Investigation Mooney Mooney	Location:	North End of Eastern Boundary
Site Address:	Lot 3 DP239249, Pacific Highway, Mooney Mooney	Logged by:	SJC
Job/Client Number:	J119655	Checked by:	JH
Contractor:	Matrix	Date Commenced:	23/07/2013
Drill Rig:	Truck mounted rig	Date Completed:	23/07/2013

Drilling Method	DTW	Depth (m)	Material Description	Field Sample Analysed	PID (ppm)	Comments:
Backhoe		0.0	Ashphalt			Ashphalt from 0-0.4m
		0.5	Sand/clay, soft, loose, moist, medium plasticity, brown/grey		0.3	Fill
		1.0		S01-0.8		
				S02-1.2	0.4	Fill; medium sandstone chunks
		1.5	Sand/clay, soft, mildly dense, moist, low plasticity, brown/tan			Natural
		2.0	Clayey sand, strong, moist, medium plasticity, dark red/brown			Natural
		2.5				
		3.0		S03-3.0	0.6	
		3.5	Clayey sand, soft, loose, moist, low plasticity, dark red/dark brown			Natural; Decreasing red colour with depth, increasing grey colour with depth
		4.0				
		4.5				
		5.0	Sand/clay, soft, loose, moist, medium plasticity, pink/grey			Natural
		5.5				
		6.0	Sand/clay, strong, loose, moist, medium plasticity, grey/pink			Natural
		6.5	Sand/clay, soft, loose, moist, low plasticity, dark red/dark brown			Natural; Increasing red colour with depth
		7.0	sandstone			Red/pink diminishing; Rocks, sandstones
		7.5				
		8.0				
		8.5	sandstone			Pink colour increasing with depth again; Groundwater depth approximately between 8.0-8.5m
		9.0				
		9.5	sandstone			
		10.0				
		10.5				

End of hole at 10.5m

Noel Arnold & Associates
TEST PIT LOG REPORT

Client:	State Property Authority	Test Pit Reference:	**MW03**
Job Name:	UPSS Investigation Mooney Mooney	Location:	North of Site (Exterior)
Site Address:	Lot 3 DP239249, Pacific Highway, Mooney Mooney	Logged by:	SJC
Job/Client Number:	J119655	Checked by:	JH
Contractor:	Matrix	Date Commenced:	23/07/2013
Drill Rig:	Truck mounted rig	Date Completed:	23/07/2013

Drilling Method	DTW	Depth (m)	Material Description	Field Sample Analysed	PID (ppm)	Comments:
			Silt, moist, low plasticity, dark brown/brown	S01-0.2	0.0	Grass; Topsoil
		0.5	Sand/clay, soft, loose, moist, medium plasticity, brown/light brown,			
		1.0	Clayey sand, soft, loose, very moist, medium plasticity, brown/light brown			Fill; very moist at 0.9
		1.5	Sand/clay, strong, moist, medium plasticity, dark brown/brown	S02-0.9	0.1	Natural; Sandstone chunks
		2.0	Clayey sand, soft, loose, moist, medium plasticity, dark brown/red	S03-1.8	0.6	Natural
		2.5	Sand/clay, soft, loose, moist, medium plasticity, red/brown			Natural; Increasing red colour with depth
		3.0	Sand/clay, soft, loose, moist, low plasticity, red/light grey			
		3.5		S04-3.5	1.9	Natural; Increasing red colour with depth; Slight hydrocarbon odour at 3.0m
		4.0				
		4.5	Sand, very dense, moist, dark red/light grey			Natural; Sandstone; Air hammer commenced
		5.0				
		5.5	Sand/clay, strong, mildly dense, moist, medium plasticity, red/grey			Natural; Band of clay material
		6.0	Sandstone	S05-0.4	0.4	Natural; Very faint hydrocarbon odour; Sandstone
		6.5				
		7.0				
		7.5	Sandstone			Natural; Slight hydrcarbon odour; Decreasing red colour and increasing orange colour with depth; Sandstone
		8.0				
		8.5	Sandstone			Natural; Very faint hydrocarbon odour; Groundwater at approximately 8.5m
		9.0				
		9.5	Sandstone			Natural; Very faint hydrocarbon odour
		10.0				
			End of hole at 10.0m			