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Job No: 13217/1
Our Ref: 13217/1-AA
29 July 2014

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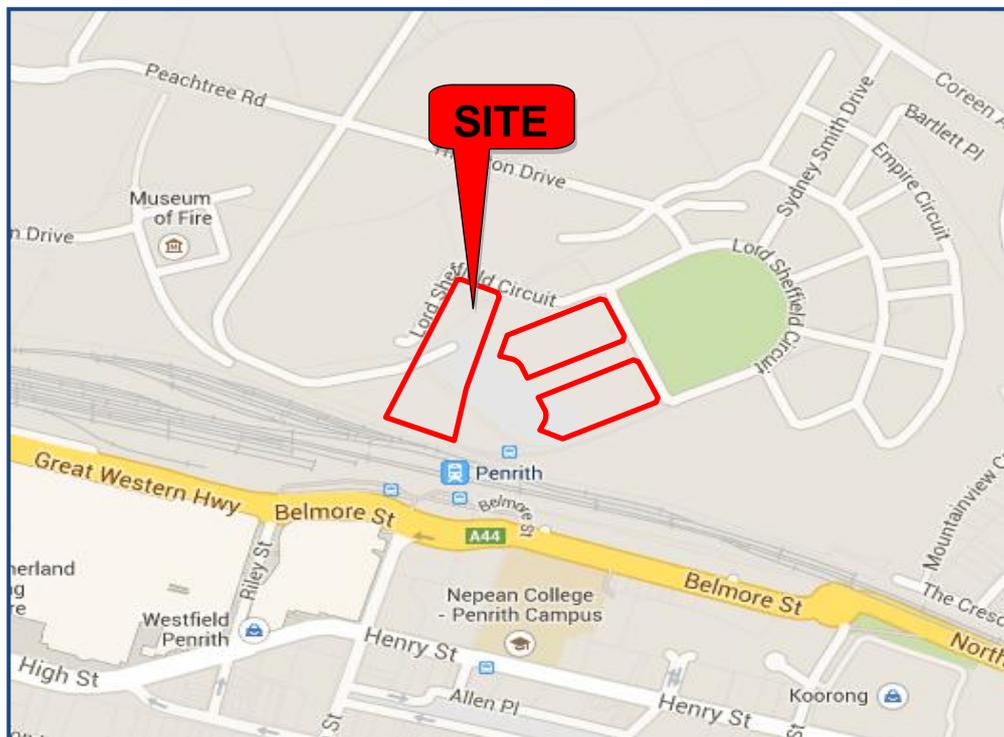
Attention: Mr R Powell

Dear Sir

re: **Proposed Residential Development
Lord Sheffield Circuit, North Penrith
Contamination Assessment of Soils**

Further to the *Virgin Excavation Natural Material Classification* Report 12994/5-AA dated 18 November 2013 prepared by Geotechnique Pty Ltd (Geotechnique) and as requested, a contamination assessment of soils has been undertaken in the subject site located at Lord Sheffield Circuit, North Penrith, as shown on Figure 1 below.

FIGURE 1



Map Data ©2014 Google

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OBJECTIVES OF THE ASSESSMENT & SCOPE OF WORK

The objectives of this assessment were to determine the contamination status of the soils and to assess whether the soils present a risk of harm to human health and / or the environment under the conditions for the proposed development.

In order to achieve the objectives of the assessment, the scope of work included; review of the Report No 12994/5-AA, a site inspection, soil sampling and laboratory testing.

SITE INFORMATION & PROPOSED DEVELOPMENT

The subject site comprises a parcel of land known as Lots 3003 to 3007, 3009 and 3010 as proposed. As shown on Drawing No 13217/1-AA1 the site is irregular in shape and covers an area of approximately 2.42 hectares (ha).

At the time of the field sampling on 1 and 2 July 2014, the following observations were made;

- The site is vacant with no specific usage noted. The following site features were noted;
 - Bitumen car parks in part Lots 3006 and 3010;
 - Soil stockpiles located in Lot 3007 and part Lot 3009;
 - Power poles (the exact numbers should be confirmed by survey) located within the subject site;
 - Bitumen covered area in Lot 3003 and
 - An ash area.
- There were no signs of soil staining, plant distress or other visible / olfactory indicators of potential contamination. There were no obvious features associated with any underground storage tanks (bowser, breather pipe, inlet valve and piping) or odour that would indicate the potential for contamination.
- The site is bound to the north by Sheffield Circuit, to the east by Avators Way, to the south by Sheffield Circuit (unformed) and vacant land; to the further south by Penrith Railway and to the west by Dunshea Place and Commuter Car Park.
- There were no air emissions emanating from the site and neighbouring properties.

The features and layout of the site and adjoining properties are indicated on Drawing No 13217/1-AA1 in Attachment A.

It is understood that the site is proposed for residential development. However, the details of the development are unknown.

FIELD WORK & LABORATORY ANALYSIS

Sampling and analyses for this contamination assessment were carried out to obtain a reasonable assessment of the following;

1. Nature, location and likely distribution of contaminants in the soils across the site.
2. The risks that the contaminants (if present) pose to human health or the environment under the conditions for the proposed development.

The risk of harm to human health and the environment was determined through comparison of test results with NSW Environment Protection Authority (EPA) produced and / or endorsed criteria, as specified in the section "ASSESSMENT CRITERIA" of this report.

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An Environmental Scientist from Geotechnique, who was responsible for sampling and logging the sub-surface profile encountered, carried out the field work on 1 and 2 July 2014 in accordance with Geotechnique standard sampling and decontamination procedures.

In accordance with NSW EPA "Sampling Design Guidelines for Contaminated Sites", soil sampling was carried out at;

- Twenty-two (22) locations TP1 to TP22 in Lots 3003, 3004 and 3005 covering an area of 1.1ha;
- Sixteen (16) locations TP23 to TP28, BH29, BH30 and TP31 to TP38 in Lots 3006 and 3007 covering an area of 0.66ha and
- Sixteen locations TP39 to TP46, BH47, BH48 and TP49 to TP 54 in Lots 3009 and 3010 covering an area of 0.66ha.

The abovementioned fifty-four (54) sampling locations, as shown on Drawing No 13217/1-AA2 in Attachment A, were systematically excavated / drilled to depths up to 2.0 metres (m) below the existing ground surface (EGS). A number of fill samples were recovered. In addition, two surface soil samples A1 and A2 were also recovered from ash area. Standard quality assurance (QA) and quality control (QC) samples, including duplicate, split, trip spike and rinsate samples were also prepared.

All the recovered fill samples were screened for the presence of volatile compounds using a calibrated Photo-Ionised Detector (PID). All the PID readings were equal to 0.0ppm.

Reference should be made to the attached Table 1 for detailed descriptions of the soil profile encountered during field work. Sub-surface materials encountered in the test pits are summarised below:

- Type 1 fill comprising silty clay, low to medium, medium or high plasticity, grey, brown, or dark grey, underlain by natural silty clay or clayey silt, encountered in most of the test pit locations. Fill thickness ranges from about 0.1m to 1.5m.

The Type 1 fill was similar to the fill identified in the Report 12994/5-AA.

Trace of bitumen or ash in the fill layer was noted at TP8, TP11, TP21 and TP53. Inclusion of ash in the fill layer was observed at TP7, TP16 and TP18. Scattered asphaltic concrete fragments were noted on the ground surface around TP17.

- Type 2 fill comprising silty sand, fine grained, orange, yellow or dark grey, underlain by natural silty clay or clayey silt, encountered in TP7, TP10, TP13, TP19, TP42, TP43, BH47, A1 and A2. Fill thickness ranges from 0.1m to 0.3m.

Scattered asphaltic concrete fragments were noted on the ground surface around TP13. Inclusion of ash and charcoal in the fill layer was noted at A1 and A2 in an ash area.

- A layer of bitumen or ash was noted beneath the fill at TP3 and TP49 at thickness of 0.1m and 0.15m respectively.

With the exception of bitumen, asphaltic concrete fragments, ash and charcoal in the above mentioned locations, observations by the Environmental Scientist indicated no visual evidence of asbestos-cement pieces or other indicators of significant contamination, such as staining, odours, or other foreign matter on the ground surface or in the test pits, boreholes and recovered fill samples that would indicate potential for contamination.

Industry standard decontamination procedures were adopted during sampling.

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Soil sampling at most of the locations was carried out using an excavator. Soil sampling at locations BH29, BH30, BH47 and BH48 located in the bitumen car park was undertaken using a stainless steel auger mounted on the excavator. The surface soil samples at locations A1 and A2 were recovered using a stainless steel trowel. The stainless steel auger or trowel was decontaminated prior to use in order to prevent cross contamination.

To prevent the potential loss of any volatile compounds, the recovered soil samples were immediately transferred into labelled, laboratory supplied 250ml glass jars and sealed with an airtight Teflon screw top lid. The fully filled jars were then placed in a chilled container.

The recovered soil sample for asbestos analysis was immediately transferred into a small plastic bag. The small plastic bag was labelled and placed inside a large plastic bag.

A rinsate water sample was collected on completion of field work each day and placed in a glass bottle and vial supplied by the laboratory. The rinsate water sample was labelled and placed in a chilled container.

In order to ensure the analytical performance of the primary laboratory, duplicate and split soil samples were prepared and kept in labelled, laboratory supplied glass jars (acid-washed and solvent-rinsed) sealed with airtight Teflon screw top lids. The fully filled jars were placed in a chilled container.

At completion of field sampling the chilled containers and the large plastic bag were transported to our Penrith office. The chilled containers were then transferred to a refrigerator where the temperature was maintained below 4°C.

On 4 July 2014, the primary samples and QA / QC samples with trip spike sample in the chilled containers and the large plastic bag were forwarded under COC conditions to the primary laboratory SGS Environmental Services (SGS), whilst the split samples in the chilled container were forwarded under COC conditions to the secondary laboratory Envirolab Services Pty Ltd (Envirolab). Both SGS and Envirolab are NATA accredited.

On receipt of the samples the laboratories returned the Sample Receipt Advice verifying the integrity of all the samples received.

Within the holding times detailed in Schedule B3 of The National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (Amendment NEPM 2013) and USEPA SW846 or ISO 5667.3 2008 Draft, the recovered soil and rinsate water samples were analysed. It should be noted that there is no specific holding time for asbestos analysis.

Potential contaminants in the soils are generally governed by present and / or past usage of the site.

Geotechnique carried out an assessment of natural soils to be excavated from part of the site for the proposed Stage 3A development. For details, reference should be made to Report 12994/5-AA.

In order to formulate a picture of the site history and to assist in identification of potential contamination, the Report 12944/5-AA was reviewed and the findings are presented as follows.

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The aerial photographs taken in 1947, 1961, 1970, 1978, 1986, 1994, 2002 and 2013 revealed that the site was used as agricultural land between the 1940s and late 1950s. The site was left vacant since at least 1961 to the late 1960s. Since then, the site was occupied by buildings / hardstands between 1970 and 1978 and then was cleared into paddock.

There is potential for applied agricultural chemicals and fertilisers from the possible former agricultural activities in the site. The use of agricultural chemicals and fertilisers for possible former agricultural activities could lead to contamination of metals including arsenic (As), cadmium (Cd), copper (Cu), lead (Pb), mercury (Hg) and zinc (Zn), Organophosphate Pesticides (OPP) and persistent Organochlorine Pesticides (OCP), such as Dieldrin, Heptachlor and DDT, which have been either restricted or prohibited from agricultural use since 1986/1987. The predicted persistence of OCP is less than 15 years, whilst the predicted persistence of OPP is typically less than one year, therefore OCP and OPP are not of concern.

In the surface soils surrounding the former buildings, there is potential for metal, OCP and asbestos contamination, due to degradation of building materials, such as metal roof, paint (if painted with lead based paint) and asbestos (if present), and / or possible pest control. The metals of concern include As, Cd, chromium (Cr), Cu, Pb, nickel (Ni) and Zn.

Due to site levelling, there was potential for filling to have taken place beneath the former buildings / hardstands. Fill materials could have been imported from unknown sources, therefore with potential for the fill materials to be contaminated. A typical analyte suite for screening soils of unknown origin with no visual or olfactory indication of contamination includes metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn), Total Petroleum Hydrocarbons (TPH), BTEX (Benzene, Toluene, Ethyl Benzene and Xylenes), Polycyclic Aromatic Hydrocarbons (PAH), OCP and Polychlorinated Biphenyls (PCB). Asbestos might be present in fill materials with inclusions of demolition waste and / or fibro-cement pieces.

It is understood that environmental investigations were conducted in many stages over a long time, followed by remediation and detailed validation. Contaminants of concern identified in the site include metals, petroleum hydrocarbons and PAH. The land including the site has been audited by the appointed Site Auditor Mr G Nyland.

Geotechnique undertook contamination assessments and validation in various stages in 2012 for the land of Stage 1 Development in the vicinity of the site. Contaminants of concern, such as As, TPH, PAH including Benzo(a)pyrene (BaP) and / or asbestos were identified.

As mentioned, with the exception of bitumen, asphaltic concrete fragments, ash and charcoal, the soil profile encountered did not reveal any visual or olfactory indicators of potential contaminants. The PID readings on recovered fill samples were zero, suggesting that the presence of volatiles in the soil is unlikely.

Polycyclic Aromatic Hydrocarbons are contaminants commonly associated with bitumen, asphaltic concrete fragments, ash and charcoal.

As a result and for screening purposes, 29 discrete fill samples and associated QA / QC samples were scheduled for the following laboratory testing;

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- 19 selected Type 1 fill samples including all 7 samples with trace or inclusion of bitumen or ash, as well as the corresponding 2 duplicate and 2 split samples for analysis of 8 metals including As, Cd, Cr, Cu, Pb, Hg, Ni and Zn, TPH, BTEX, PAH, OCP and PCB.
- All 9 Type 2 fill soil samples, 2 duplicate samples and 1 split sample for analysis of the above 8 metals including As, Cd, Cr, Cu, Pb, Hg, Ni and Zn, TPH, BTEX, PAH, OCP and PCB.
- 1 ash sample recovered from TP49 for analysis of the above 8 metals including As, Cd, Cr, Cu, Pb, Hg, Ni and Zn, TPH, BTEX, PAH, OCP and PCB.
- The above 29 selected samples for analysis of asbestos, for screening purposes.
- 10 samples were selected for analysis of Cation Exchange Capacity (CEC), pH and Total Organic Carbon (TOC).
- 2 rinsate water samples for analysis of TPH, BTEX and PAH.
- 2 trip spike samples for analysis of BTEX.

FIELD QUALITY ASSURANCE & QUALITY CONTROL (QA & QC)

The following QA / QC procedures were implemented for the sampling and analytical program.

Rinsate Samples

Rinsate water samples (Rinsate R1 and R2) were recovered over the course of the field work (one each day) in order to identify possible cross contamination between the sampling locations.

The rinsate water samples were analysed for TPH, BTEX and PAH. The test results for the rinsate water samples are summarised in Table A in Attachment C. The original laboratory analytical report is kept in our office and is available upon request.

As indicated in Table A, concentrations of analytes in the rinsate water samples were less than laboratory limits of reporting (LOR), which indicates that adequate decontamination had been carried out in the field.

Trip Spike Samples

Trip spike samples are obtained from the laboratory on a regular basis, prior to conducting field sampling where volatile substances are suspected. The samples are held in Penrith office of Geotechnique at less than 4 degrees Celsius for a period of not more than seven days. During field work the trip spike samples are kept in the chilled container with soil samples recovered from the site. The trip spike samples are then forwarded to the primary laboratory together with the soil samples recovered from the site.

The trip spike is prepared by the laboratory by adding a known amount of a pure petrol standard to a clean sand sample. The sample is mixed thoroughly to ensure a relatively homogenous distribution of the spike throughout the sample. When the sample is submitted for analysis the same procedure is adopted for testing as the soil samples being analysed from the site.

The purpose of the trip spike is to detect any loss, or potential loss, of volatiles from the soil samples, during field work, transportation, sample extraction or testing.

Two trip spike samples (TS1 and TS2) were forwarded to the primary analytical laboratory with the soil samples collected from the site and tested for BTEX. The test results for the trip spike samples, reported as a percentage recovery of the applied and known spike concentrations, are shown in Table B in attachment C. A copy of the laboratory analytical report is kept in our office and is available upon request.

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As indicated in Table B the results show a generally good recovery of the spike concentrations. Applying the losses experienced in the spike sample (worst case scenario) the actual concentrations of BTEX in each soil sample analysed might be at worst 0.1mg/kg (Benzene), 0.11mg/kg (Toluene), 0.12mg/kg (Ethyl benzene) and 0.37mg/kg (Xylenes). The concentrations in this case would still be considerably less than the relevant assessment criteria adopted (refer to Table F).

Furthermore, zero PID readings for the recovered fill samples were recorded in the field, BTEX results were less than laboratory LOR and there was no visible or olfactory indication of hydrocarbon contamination.

Based on the above it is considered that any loss of volatiles from the recovered samples that might have occurred would not affect the outcome / conclusions of this report.

Duplicate Samples

A field duplicate sample is prepared in the field through the following processes;

- A larger than normal quantity of soil is recovered from the sample location selected for duplication.
- The sample is placed in a decontaminated stainless mixing bowl and divided into two portions, using the decontaminated trowel.
- A portion of the sub-sample was immediately transferred using the decontaminated trowel into a labelled, laboratory supplied 250ml glass jar and sealed with an airtight Teflon screw top lid. The fully filled jar was labelled as the duplicate sample and immediately placed in a chilled container.
- The remaining portion is stored in the same way and labelled as the original sample.

Duplicate sample are prepared on the basis of sample numbers recovered during the field work. The duplicate sample frequency was computed using the total number of samples analysed as part of this assessment.

The duplicate frequency adopted (7% for metals, TPH, BTEX, PAH, OCP and PCB) complies with Schedule B3 of the Amendment NEPM 2013, which recommends a duplicate frequency of 5%.

The duplicate sample test results are summarised in Tables C1 and C2 in Attachment C. A copy of the laboratory analytical report is kept in our office and is available upon request.

A comparison was made of the laboratory test results for the duplicate samples with the original samples and the Relative Percentage Differences (RPD) was computed to assess the accuracy of the laboratory test procedures. RPD within 30% are generally considered acceptable. However, this variation can be higher for organic analysis than for inorganics and for low concentrations of analytes or non-homogeneous samples.

As shown in Tables C1 and C2 the comparisons between the duplicate and corresponding original samples indicated generally acceptable RPD, with the exception of the RPD of Hg (67%) and Ni (56%), mainly due to low concentrations of the analytes detected.

All the concentrations with RPD in excess of 30% in the duplicate pairs were both less than the relevant assessment criteria.

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Based on the above, the variations are not considered critical. Overall the duplicate sample number and comparisons indicate that the laboratory test data provided by SGS are of adequate accuracy and reliability for this assessment.

Split Samples

The split sample provides a check on the analytical performance of the primary laboratory. Split samples are prepared on the basis of sample numbers recovered during field work and the analyses undertaken by the primary laboratory. The split sample was prepared in the same manner as the duplicate sample.

The split sample frequency adopted (7% for metals, TPH, BTEX, PAH, OCP and PCB) complies with Schedule B3 of the Amendment NEPM 2013, which recommends a frequency of 5%.

The results are also summarised in Tables D1 and D2 in Attachment C. A copy of the laboratory analytical report is kept in our office and is available upon request.

Based on Schedule B3 of the Amendment NEPM 2013 the difference in the results between the split samples should generally be within 30% of the mean concentration determined by both laboratories, i.e., RPD should be within 30%. However, higher variations can be expected for organic analyses compared to inorganic analyses and for samples with low analyte concentrations or non-homogeneous samples.

As shown in Tables D1 and D2 the comparisons between the split and corresponding original samples indicated generally acceptable RPD, with the exception of the RPD of As (32%), Cr (68%), Cu (43% & 54%), Pb (52%), Hg (71%), Ni (62%), Benzo(a)pyrene (BaP) TEQ (52%), Total PAH (55%) and BaP (50%), which were in excess of 30%. This is considered to be due to the low concentrations of analytes detected, non-homogeneous nature of the soil samples and / or expected for organic analysis.

With the exception of BaP concentrations, the remaining concentrations with RPD in excess of 30% in the split pairs were both less than the relevant assessment criteria.

The BaP concentration in the original sample TP16 (0-0.2m) was in excess of the assessment criterion (refer to Table G), however the concentration of BaP in the corresponding split sample S1 was less than the assessment criterion.

As such, the higher concentration in excess of the assessment criterion in the original sample was adopted for the assessment.

Based on the above, the variations are not considered critical. Based on the overall split sample numbers and comparisons, it is concluded that the test results provided by the primary laboratory can be relied upon for this assessment.

LABORATORY QA & QC

Geotechnique uses only laboratories accredited by the NATA for chemical analyses. The laboratory must also incorporate quality laboratory management systems to ensure that trained analysts using validated methods and suitably calibrated equipment produce reliable results.

In addition to the quality control samples the laboratory must also ensure that all analysts receive certification as to their competence in carrying out the analysis and participate in national and international proficiency studies.

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SGS and Envirolab, the laboratories used for this assessment, are both accredited by NATA and operate Quality Systems designed to comply with ISO / IEC 17025

The recovered samples were analysed within the allowable holding times, as detailed in Schedule B3 of the Amendment NEPM 2013.

The test methods and LOR / practical quantitation limits (PQL) adopted by the laboratories are indicated with the laboratory analytical report / certificate of analysis. A copy of the original laboratory analytical reports / certificate of analysis is kept in our office and is available upon request. As part of the analytical run for the project the laboratories included laboratory blanks, duplicate samples, laboratory control samples, matrix spikes and surrogate spikes.

We have checked the QA / QC procedures and results adopted by the laboratories against the appropriate guidelines. The quality control sample numbers adopted by SGS and Envirolab are considered to be adequate for the analyses undertaken and generally conform to the recommendations provided in the Amendment NEPM 2013 "Guideline on Laboratory Analysis of Potentially Contaminated Soils".

Overall, the quality control elements adopted by SGS and Envirolab indicate the analytical data to fall within acceptable levels of accuracy and precision for the analysis of soils. The analytical data provided is therefore considered to be reliable and useable for this assessment

ASSESSMENT CRITERIA

Investigation levels and screening levels developed in the Amendment NEPM 2013 were used in this assessment, as follows;

- Risk-based Health Investigation Levels (HIL) for a broad range of metals. The HIL are applicable for assessing human health risk via all relevant pathways of exposure. The HIL as listed in Table 1A (1) of Schedule B1 "*Guideline on Investigation Levels for Soil and Groundwater*" are provided for different land uses.

The site is proposed for residential development. However, the details of the development are unknown. As such the analytical results for this assessment are assessed against the lowest available HIL, i.e., the HIL A for *residential with garden / accessible soil*.

- Health Screening Levels (HSL) for selected petroleum compounds and fractions are applicable for assessing human health risk via inhalation and direct contact pathways. The HSL depend on specific soil physicochemical properties, land use scenarios and the characteristics of building structures. The HSL listed in Table 1A(3) of Schedule B1 "*Guideline on Investigation Levels for Soil and Groundwater*" apply to different soil types and depths below surface to >4 m.

For this assessment, the analytical results are assessed against the available HSL for *low density residential land use* (HSL A) for clay and sand to depth of 0m to <1m.

- Ecological Screening Levels (ESL) for selected petroleum hydrocarbon compounds including TPH fractions, BTEX and Benzo(a)Pyrene are applicable for assessing the risk to terrestrial ecosystems. ESL listed in Table 1B(6) of Schedule B1 "*Guideline on Investigation Levels for Soil and Groundwater*" broadly apply to coarse and fine-grained soils and various land uses and are generally applicable to the top 2m of soil.

The analytical results are assessed against the available ESL for *urban residential and public open space* for fine-grained soil (clay) and coarse-grained soil (sand).

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- Ecological Investigation Levels (EIL), a specific type of Soil Quality Guidelines (SQG) for selected metals, DDT and Naphthalene are applicable for assessing the risk to terrestrial ecosystems. EIL listed in Table 1B(1-5) of Schedule B1 “*Guideline on Investigation Levels for Soil and Groundwater*” depend on specific soil physicochemical properties and land use scenarios and generally apply to the top 2m of soil. The EIL are calculated using 30% effect concentration (EC30) or lowest observed effect concentrations (LOEC) toxicity data. EIL are the sum of the added contaminant limit (ACL) and the ambient background concentration (ABC)

Where required, EIL are calculated directly by using the EIL calculator developed by CSIRO for NEPC.

For this assessment the analytical results were assessed against the available EIL for *urban residential* land use for aged contamination in soil.

- With regard to protection of the environment and impact on plant growth the available Provisional Phytotoxicity Based Investigation Levels (PIL) published in the *Guidelines for the NSW Site Auditor Scheme* (NSW EPA / DEC, 2006) for cadmium and mercury are used.

The adopted assessment criteria are presented in the summarised Tables E1 to I.

For asbestos assessment the site must be free of asbestos pieces and no asbestos fibre detected in the soils.

The soil sample(s) will be deemed contaminated or containing contamination “hot spots” if the above criteria are unfulfilled. Further investigation, remediation and / or management will be recommended if the soil is found to be contaminated or contain contamination “hot spots”.

LABORATORY TEST RESULTS & ASSESSMENT

The laboratory test results are summarised in Tables E1 to I in Attachment C. A copy of the actual laboratory analytical report from SGS is kept in the offices of Geotechnique and will be provided upon request. Discussion of the test results is presented in the following sub-sections.

CEC, pH, TOC & Metals (As, Cd, Cr, Cu, Pb, Hg, Ni & Zn)

As presented in Tables E1 to E3, CEC, pH values and TOC range from 1.3 cmol/kg to 21 cmol/kg, 4.5 to 7.5 and 0.15% to 4.2% respectively.

As indicated in Tables E1 to E3, all concentrations of metals were below the relevant available HIL A, EIL and / or PIL.

TPH and BTEX

As indicated in Table F, the concentrations of F1 (TPH C6-C10 less BTEX), F2 (TPH >C10-C16 less Naphthalene), F3 (TPH >C16-C34), F4 (TPH >C34-C40) and BTEX were below the relevant available HSL A and / or ESL adopted. Moreover, the test results were all below the laboratory limits of reporting (LOR).

PAH

As summarised in Table G, with the exception of the highlighted concentrations of BaP, the concentrations of BaP TEQ, Total PAH and Naphthalene, as well as the remaining concentrations of BaP were well below the relevant HIL A, HSL A, ESL and / or EIL adopted.

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The highlighted BaP concentrations (1.8mg/kg and 1.2mg/kg) in fill samples TP7 (0.7-1.0m) and TP16 (0-0.2m) exceeded the EIL of 0.7mg/kg, which would potentially present a risk to environment but will not pose a risk of harm to human health under the conditions for the proposed development of *residential with gardens / accessible soil and minimum access to soil use*

OCP

As shown in Table H, the concentrations of OCP were less than the laboratory LOR and well below the relevant HIL A. Concentrations of DDT were also below the EIL.

PCB

As presented in Table H, the concentrations of PCB were less than the HIL A and laboratory LOR.

Asbestos

The asbestos test results are presented in Table I and as shown no asbestos was identified in the soil samples analysed.

REMEDIAL ACTION PLAN ADOPTED

The test pit excavation, borehole drilling and laboratory test results for this assessment revealed that:

- Concentrations of BaP (1.8mg/kg and 1.2mg/kg) in fill samples at test pit locations TP7 and TP16, if retained in-situ, would potentially present a risk to environment but will not pose a risk of harm to human health under the conditions for the proposed development of *residential with gardens / accessible soil and minimum access to soil use*.
- A layer of bitumen or ash was noted beneath the fill at TP3 and TP49.
Trace of bitumen or ash in the fill was noted at TP8, TP11, TP21 and TP53.
Scattered asphaltic concrete fragments were noted on the ground surface around TP13 and TP17.
Inclusion of ash and / or charcoal in the fill was encountered at TP7, TP16, TP18, A1 and A2.
An ash area was identified in Lot 3003.
The presence of bitumen, asphaltic concrete fragments, ash and / or charcoal is considered an aesthetic issue.

As such, some form of remediation / management of the fill, bitumen, asphaltic concrete fragments, ash and charcoal of concern should be undertaken.

It is our opinion that excavation and relocating of the fill, bitumen, asphaltic concrete fragments, ash and charcoal of concern at and in the vicinity of above mentioned test pit & sample locations / area, as indicated on Drawing No 13217/1-AA3 is appropriate for the site.

The fill, bitumen, asphaltic concrete fragments, ash and charcoal should be excavated and relocated for placement under roads on the site or in areas designated for development other than *residential with gardens / accessible soil*, such as *residential use with minimal access to soil* or *commercial / industrial* at depths in excess of 1.0m below the finished ground level (FGL).

However, the following measures should be implemented:

- Appropriate soil management;
- Documenting the movement of soil of concern;

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- Validation sampling and testing of residual soil in the areas of concern following completion of excavation and removal.

CONCLUSIONS AND RECOMMENDATIONS

Based on this assessment it is considered that the site can be made suitable for the proposed residential with gardens / accessible soil and / or minimum access soil use, subject to implementation of the following recommendations prior to site preparation and earthworks.

1. Following successful remediation of the fill, bitumen, asphaltic concrete fragments, ash and charcoal, of concern, validation by sampling and testing of the footprints of the excavated areas would be required in order to monitor the success or otherwise of the adopted remediation strategy / strategies and to confirm the suitability of the residual soil to retain on-site for the proposed development.
2. Contamination assessment of the footprints of bitumen car parks located in in part Lots 3006 and 3010, following the removal, in order to ascertain the contamination status of the residual soils in the footprints and to determine whether the soils present a risk of harm to human health and/or the environment under the conditions for the proposed development.
3. If stockpiles located in Lots 3007 and 3009 are to be re-used on-site, contamination assessment of the stockpiles is required in order to ascertain the contamination status and to determine the suitability to be retained on-site.

If the stockpiles are to be removed off-site, waste classification of the stockpiles is required for off-site disposal purposes. Contamination assessment of the footprints of the stockpiles, following the removal, is also required in order to ascertain the contamination status of the residual soils in the footprints.

4. Contamination assessment of soils at and in the vicinity of power poles within the site will be required after removal of the poles in order to ascertain the contamination status of the soils.

Contamination assessment of the soils within the excavated pits in the footprints of power poles, following the removal, is also required in order to ascertain the contamination status of the residual soils in the footprints and to determine whether the soils present a risk of harm to human health and/or the environment under the conditions for the proposed development.

5. Contamination assessment of the footprint of bitumen area, following the removal of asphaltic concrete located in Lot 3003, is required to ascertain the contamination status of the residual soils in the footprint and to determine whether the soils present a risk of harm to human health and/or the environment under the conditions for the proposed development.

Reference should be made to Drawing No 13217/1-AA1 for locations of the bitumen car parks, stockpiles, power poles and bitumen area.

If suspect materials (identified by unusual staining, odour, discolouration or inclusions such as building rubble, asbestos sheets/pieces / pipes, ash material, etc.) are encountered during any stage of future earthworks / site preparation, we recommend that this office is contacted for assessment and to take all necessary actions.

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Any imported fill should be tested or appropriate validation certification provided by a qualified consultant, to ensure suitability for the proposed use. The imported fill must be free from asbestos, ash and odour, not be discoloured and acid sulphate soil. Environmentally, virgin excavated natural material (VENM) or excavated natural material (ENM) will be suitable for use as fill for the site. Salinity assessment might be required.

For any materials to be excavated and removed from the site it is recommended that waste classification of the materials, in accordance with the "Waste Classification Guidelines Part 1: Classifying Waste" DECCW, 2009 or NSW EPA guidelines for the resource recovery exemptions under the Protection of the Environment Operations (Waste) Regulation 2005, is undertaken prior to disposal at an appropriately licensed landfill or potential re-use at other sites.

LIMITATIONS

The services performed by Geotechnique in preparation of this report were conducted in a manner consistent with the level of quality and skill generally exercised by members of the profession and consulting practice.

This report was prepared for the purposes stated within. Any reliance on this report by other parties shall be at such parties' sole risk as the report might not contain sufficient information for other purposes.

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 is provided by Geotechnique.

The information in this report is considered accurate at the date of issue, in accordance with current site conditions observed at the completion of field sampling (2 July 2014). Any variations to the site form or use beyond this date could nullify the conclusions stated.

No contamination assessment can eliminate all risk; even a rigorous professional assessment might not detect all contamination within a site. Reference should be made to "Environmental Notes" in Attachment D for details of the limitations of this assessment.

If you have any questions, please do not hesitate to contact the undersigned.

Yours faithfully
GEOTECHNIQUE PTY LTD



JOHN XU
Associate
BE, MEngSc, MIEAust

Attachment A	Drawing Nos 13217/1-AA1 to 13217/1-AA3
Attachment B	Table 1 – Soil Descriptions
Attachment C	Laboratory Analytical Results Summary Tables (Tables A to I)
Attachment D	Environmental Notes

13217/1-AA
Lord Sheffield Circuit, North Penrith

LIST OF REFERENCES

Contaminated Land Management Act 1997

Contaminated Land Management Regulation 1998

Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition) – NSW DEC 2006

Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land – Department of Urban Affairs and Planning / NSW Environment Protection Authority 1998

National Environmental Protection (Assessment of Site Contamination) Amendment Measures 2013 – National Environmental Protection Council

National Environment Protection (Assessment of Site Contamination) Measure – National Environmental Protection Council 1999

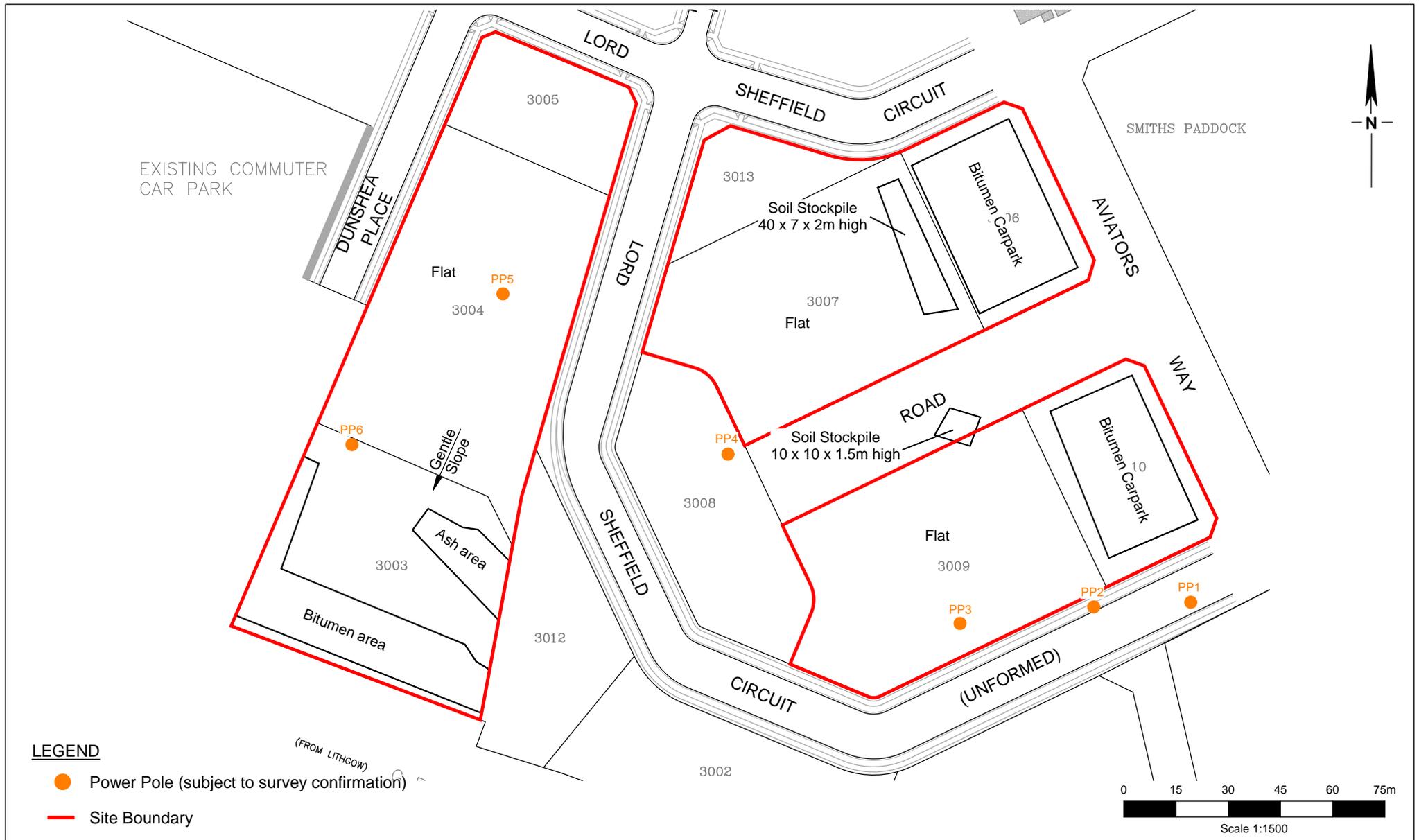
Protection of the Environment Operations Act 1997

Waste Classification Guidelines Part 1: Classifying Waste – NSW DECCW 2009

ATTACHMENT A

DRAWINGS

<i>13217/1-AA1</i>	<i>Site Features</i>
<i>13217/1-AA2</i>	<i>Test Pit, Borehole & Sample Locations</i>
<i>13217/1-AA3</i>	<i>Locations of Fill, Bitumen, Asphaltic Concrete Fragments, Ash and Charcoal of Concern</i>




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NOTES

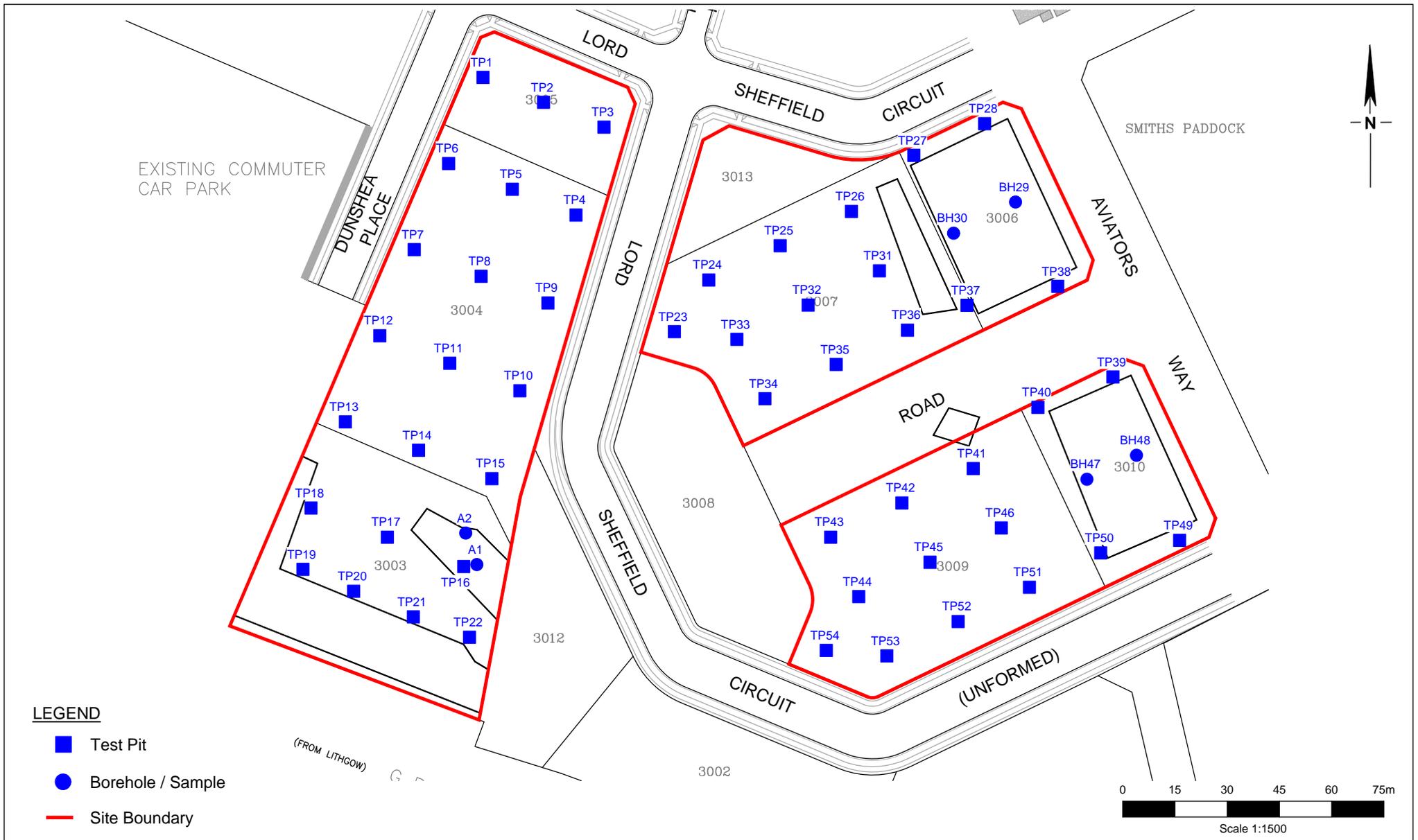
1. Site features are indicative and are not to scale.
2. This drawing has been produced using a base plan provided by others to which additional information e.g test pits, borehole locations or notes have been added. Some or all of the plan may not be relevant at the time of producing this drawing

Lord Sheffield Circuit
North Penrith

Site Features

Drawing No: 13217/1-AA1
Job No: 13217/1
Drawn By: MH
Date: 17 July 2014
Checked By: JX

File No: 13217-1
Layers: 0, AA1




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NOTES

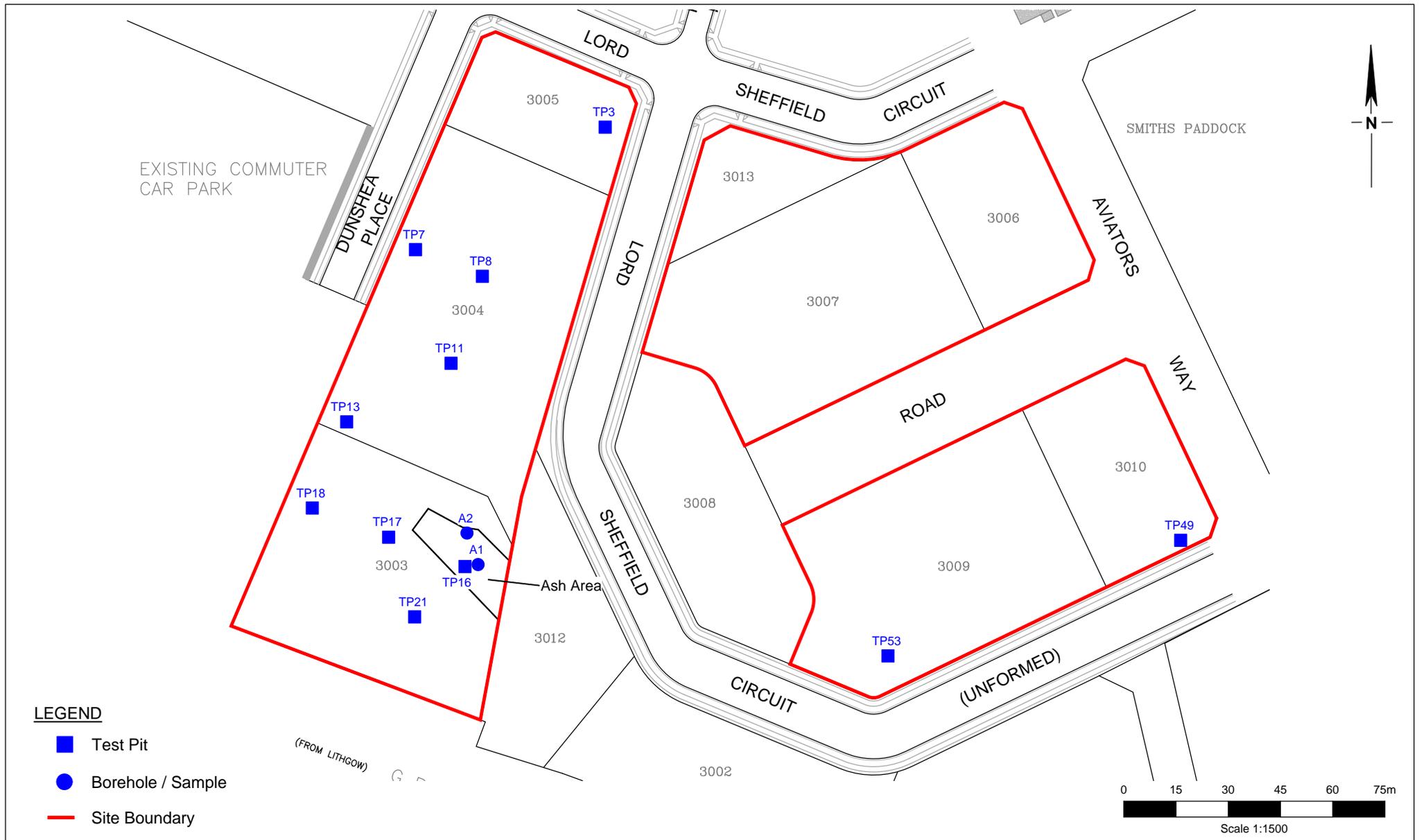
1. Site features are indicative and are not to scale.
2. This drawing has been produced using a base plan provided by others to which additional information e.g test pits, borehole locations or notes have been added. Some or all of the plan may not be relevant at the time of producing this drawing

Lord Sheffield Circuit
North Penrith

Test Pit, Borehole & Sample Locations

Drawing No: 13217/1-AA2
Job No: 13217/1
Drawn By: MH
Date: 17 July 2014
Checked By: JX

File No: 13217-1
Layers: 0, AA2




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NOTES

1. Site features are indicative and are not to scale.
2. This drawing has been produced using a base plan provided by others to which additional information e.g test pits, borehole locations or notes have been added. Some or all of the plan may not be relevant at the time of producing this drawing

**Lord Sheffield Circuit
 North Penrith**

Locations of Fill, Bitumen, Asphaltic Concrete Fragments,
 Ash and Charcoal of Concern

Drawing No: 13217/1-AA3
 Job No: 13217/1
 Drawn By: MH
 Date: 18 July 2014
 Checked By: JX

File No: 13217-1
 Layers: 0, AA3

ATTACHMENT B

**TABLE 1
SAMPLE DESCRIPTIONS**

Project	Proposed Residential Development	Job No	13217/1
Location	Lord Sheffield Circuit, North Penrith	Refer to Drawing No	13217/1-AA2
		Logged & Sampled by	AN

TABLE 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*	
TP1	0-0.7	0-0.3	01/07/2014		FILL; Silty Clay, high plasticity, brown, trace of gravel		
		0.5-0.7			FILL; Silty Clay, high plasticity, brown, trace of gravel		
		NS			(CH) Silty CLAY, high plasticity, brown then grey		
TP2	0-0.6	0-0.3	01/07/2014		FILL; Silty Clay, high plasticity, brown, trace of gravel		
		0.6-1.1			NS		(CH) Silty CLAY, high plasticity, brown then grey
TP3	0-0.2	0-0.2	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey brown, with gravel		
		0.2-0.3			NS		Bitumen layer
		0.3-0.8			NS		(CH) Silty CLAY, high plasticity, brown then grey
TP4	0-1.2	0-0.3	01/07/2014		FILL; Silty Clay, high plasticity, brown, trace of gravel		
		0.5-0.8			FILL; Silty Clay, high plasticity, brown, trace of gravel		
		1.0-1.2			FILL; Silty Clay, high plasticity, brown, trace of gravel		
		1.2-1.5			FILL; Silty Clay, low to medium plasticity, grey brown, with gravel		
		1.5-2.0			NS		(CH) Silty CLAY, high plasticity, brown then grey
TP5	0-0.15	0-0.15	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel		
		0.15-0.4			0.15-0.4		FILL; Silty Clay, high plasticity, brown, trace of gravel
		0.4-0.9			NS		(CH) Silty CLAY, high plasticity, brown then grey
TP6	0-0.15	0-0.15	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel		
		0.15-0.7			0.15-0.45		FILL; Silty Clay, high plasticity, brown, trace of gravel
		0.7-1.2			NS		(CH) Silty CLAY, high plasticity, brown then grey

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) PID reading etc.

Form No 0009-Rev7 Jun 2014

Project	Proposed Residential Development	Job No	13217/1
Location	Lord Sheffield Circuit, North Penrith	Refer to Drawing No	13217/1-AA2
		Logged & Sampled by	AN

TABLE 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP7	0-0.15	0-0.15	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.15-0.4	0.15-0.4			FILL; Silty Clay, high plasticity, brown, trace of gravel	
	0.4-0.7	0.4-0.7			FILL; Silty Sand, fine grained, orange	
	0.7-1.0	0.7-1.0			FILL; Silty Clay, medium plasticity, dark grey, with ash	
	1.0-1.5	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP8	0-1.3	0-0.3	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel and trace of bitumen	
		0.5-0.8			FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel and trace of bitumen	
		1.0-1.3			FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel and trace of bitumen	
	1.3-1.8	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP9	0-0.4	0-0.3	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.4-0.8	0.4-0.7			FILL; Silty Clay, high plasticity, brown, trace of gravel	
	0.8-1.3	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP10	0-0.3	0-0.3	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.3-0.6	0.3-0.6			FILL; Silty Sand, fine grained, orange	
	0.6-1.0	0.6-0.9			FILL; Silty Clay, high plasticity, brown, trace of gravel	
	1.0-1.5	NS			(CH) Silty CLAY, high plasticity, brown then grey	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) PID reading etc.

Form No 0009-Rev7 Jun 2014

Project	Proposed Residential Development	Job No	13217/1
Location	Lord Sheffield Circuit, North Penrith	Refer to Drawing No	13217/1-AA2
		Logged & Sampled by	AN

TABLE 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP11	0-0.6	0-0.3	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel and trace of bitumen	
	0.6-0.9	0.6-0.9			FILL; Silty Clay, high plasticity, brown, trace of gravel	
	0.9-1.4	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP12	0-0.15	0-0.15	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel and recycled concrete	
	0.15-0.65	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP13	0-0.3	0-0.3	01/07/2014		FILL; Silty Sand, fine grained, yellow, with crushed sandstone	Scattered asphaltic concrete fragments on surface
	0.3-0.8	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP14	0-0.4	0-0.3	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.4-0.65	NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone	
	0.65-0.9	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP15	0-0.25	0-0.25	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey brown, with gravel	
	0.25-0.5	NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone	
	0.5-0.75	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP16	0-0.2	0-0.2	01/07/2014		FILL; Silty Clay, medium plasticity, dark grey, with ash	
	0.2-0.4	NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone	
	0.4-0.7	NS			(CH) Silty CLAY, high plasticity, brown then grey	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) PID reading etc.

Form No 0009-Rev7 Jun 2014

Project	Proposed Residential Development	Job No	13217/1
Location	Lord Sheffield Circuit, North Penrith	Refer to Drawing No	13217/1-AA2
		Logged & Sampled by	AN

TABLE 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP17	0-0.3	0-0.3	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	Scattered asphaltic concrete fragments on surface
	0.3-0.45	NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone	
	0.45-0.8	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP18	0-0.2	0-0.2	01/07/2014		FILL; Silty Clay, medium plasticity, dark grey, with ash	
	0.2-0.5	NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone	
	0.5-0.7	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP19	0-0.1	0-0.1	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.1-0.25	0.1-0.25			FILL; Silty Sand, fine grained, orange	
	0.25-0.75	NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone	
TP20	0-0.3	0-0.3	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.3-0.6	NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone	
	0.6-0.8	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP21	0-0.4	0-0.3	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel and trace of ash	
	0.4-0.55	NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone	
	0.55-0.9	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP22	0-0.4	0-0.3	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.4-0.6	NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone	
	0.6-0.9	NS			(CH) Silty CLAY, high plasticity, brown then grey	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) PID reading etc.

Form No 0009-Rev7 Jun 2014

Project	Proposed Residential Development	Job No	13217/1
Location	Lord Sheffield Circuit, North Penrith	Refer to Drawing No	13217/1-AA2
		Logged & Sampled by	AN

TABLE 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP23	0-0.2	0-0.2	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.2-0.4	NS		(ML) Clayey SILT, low plasticity, grey or brown, with ironstone		
	0.4-0.7	NS		(CH) Silty CLAY, high plasticity, brown then grey		
TP24	0-0.15	0-0.15	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.15-0.65	NS		(CH) Silty CLAY, high plasticity, brown then grey		
TP25	0-0.3	0-0.3	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.3-0.8	NS		(CL-CI) Silty CLAY, low to medium plasticity, brown		
TP26	0-0.3	0-0.3	01/07/2014		FILL; Silty Clay, low to medium plasticity, grey brown, with gravel	
	0.3-0.8	NS		(CH) Silty CLAY, high plasticity, brown then grey		
TP27	0-0.2	0-0.2	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.2-0.7	NS		(CH) Silty CLAY, high plasticity, brown then grey		
TP28	0-0.2	0-0.2	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.2-0.7	NS		(CH) Silty CLAY, high plasticity, brown then grey		
Borehole BH29	0-0.01	NS	02/07/2014		ASPHATIC SEAL	
	0.01-0.15	NS		FILL; Recycled Concrete		
	0.15-0.65	0.2-0.3		(CH) Silty CLAY, high plasticity, brown then grey		
BH30	0-0.01	NS	02/07/2014		ASPHATIC SEAL	
	0.01-0.35	NS		FILL; Recycled Concrete		
	0.35-0.85	0.4-0.5		(CH) Silty CLAY, high plasticity, brown then grey		

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) PID reading etc.

Form No 0009-Rev7 Jun 2014

Project	Proposed Residential Development	Job No	13217/1
Location	Lord Sheffield Circuit, North Penrith	Refer to Drawing No	13217/1-AA2
		Logged & Sampled by	AN

TABLE 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP31	0-0.3	0-0.3	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.3-0.5	NS			(CL-CI) Silty CLAY, low to medium plasticity, brown	
	0.5-0.8	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP32	0-0.4	0-0.3	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.4-0.9	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP33	0-0.15	0-0.15	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.15-0.45	NS			(CL-CI) Silty CLAY, low to medium plasticity, brown	
	0.45-0.65	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP34	0-0.25	0-0.25	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.25-0.45	NS			(CL-CI) Silty CLAY, low to medium plasticity, brown	
	0.45-0.75	NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone	
TP35	0-0.2	0-0.2	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.2-0.4	NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone	
	0.4-0.6	NS			(CL-CI) Silty CLAY, low to medium plasticity, brown	
	0.6-0.9	NS			(CH) Silty CLAY, high plasticity, brown then grey	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) PID reading etc.

Form No 0009-Rev7 Jun 2014

Project	Proposed Residential Development	Job No	13217/1
Location	Lord Sheffield Circuit, North Penrith	Refer to Drawing No	13217/1-AA2
		Logged & Sampled by	AN

TABLE 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP36	0-0.25	0-0.25	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.25-0.4	NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone	
	0.4-0.6	NS			(CL-CI) Silty CLAY, low to medium plasticity, brown	
	0.6-0.9	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP37	0-0.2	0-0.2	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.2-0.4	NS			(CL-CI) Silty CLAY, low to medium plasticity, brown	
	0.4-0.7	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP38	0-0.01	NS	02/07/2014		FILL; Recycled Concrete	
	0.01-0.15	0.01-0.15			FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.15-0.65	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP39	0-0.01	NS	02/07/2014		FILL; Recycled Concrete	
	0.01-0.15	0.01-0.15			FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.15-0.65	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP40	0-0.02	NS	02/07/2014		FILL; Recycled Concrete	
	0.02-1.3	0.02-0.3			FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel and sand	
		0.5-0.8			FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
		1.0-1.3			FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	1.3-1.8	NS			(CH) Silty CLAY, high plasticity, brown then grey	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) PID reading etc.

Form No 0009-Rev7 Jun 2014

Project	Proposed Residential Development	Job No	13217/1
Location	Lord Sheffield Circuit, North Penrith	Refer to Drawing No	13217/1-AA2
		Logged & Sampled by	AN

TABLE 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP41	0-0.4	0-0.3	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.4-0.55	NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone	
	0.55-0.7	NS			(CL-CI) Silty CLAY, low to medium plasticity, brown	
	0.7-0.9	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP42	0-0.1	0-0.1	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.1-0.35	0.1-0.35			FILL; Silty Sand, fine grained, yellow, with crushed sandstone	
	0.35-0.8	0.35-0.8			FILL; Silty Clay, low to medium plasticity, grey brown, with gravel	
	0.8-1.3	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP43	0-0.55	0-0.3	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.55-0.7	0.55-0.7			FILL; Silty Sand, fine grained, yellow, with crushed sandstone	
	0.7-1.2	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP44	0-0.7	0-0.3	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
		0.5-0.7			FILL; Silty Clay, low to medium plasticity, grey brown, with gravel	
	0.7-1.2	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP45	0-0.5	0-0.3	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey brown, with gravel	
	0.5-0.8	NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone	
	0.8-1.0	NS			(CH) Silty CLAY, high plasticity, brown then grey	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) PID reading etc.

Form No 0009-Rev7 Jun 2014

Project	Proposed Residential Development	Job No	13217/1
Location	Lord Sheffield Circuit, North Penrith	Refer to Drawing No	13217/1-AA2
		Logged & Sampled by	AN

TABLE 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*		
TP46	0-0.55	0-0.3	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel			
	0.55-1.05	NS			(CH) Silty CLAY, high plasticity, brown then grey			
	Borehole BH47	0-0.01			NS		02/07/2014	ASPHATIC SEAL
		0.01-0.15			NS			FILL; Recycled Concrete
		0.15-0.35			0.15-0.35			FILL; Silty Sand, fine grained, yellow, with crushed sandstone
		0.35-0.65			NS			(ML) Clayey SILT, low plasticity, grey or brown, with ironstone
0.6-0.85	NS	(CH) Silty CLAY, high plasticity, brown then grey						
BH48	0-0.01	NS	02/07/2014	ASPHATIC SEAL				
	0.01-0.2	NS		FILL; Recycled Concrete				
	0.25-0.7	0.25-0.35		(CH) Silty CLAY, high plasticity, brown then grey				
TP49	0-0.01	NS	02/07/2014	FILL; Recycled Concrete				
	0.01-0.6	0.01-0.3		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel				
	0.6-0.75	0.6-0.75		FILL; Ash, dark grey				
	0.75-1.25	NS		(CH) Silty CLAY, high plasticity, brown then grey				
TP50	0-0.5	0-0.3	02/07/2014	FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel				
	0.5-0.8	NS		(ML) Clayey SILT, low plasticity, grey or brown, with ironstone				
	0.8-1.0	NS		(CH) Silty CLAY, high plasticity, brown then grey				
TP51	0-0.6	0-0.3	02/07/2014	FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel				
	0.6-1.1	NS		(CH) Silty CLAY, high plasticity, brown then grey				

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) PID reading etc.

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Project	Proposed Residential Development	Job No	13217/1
Location	Lord Sheffield Circuit, North Penrith	Refer to Drawing No	13217/1-AA2
		Logged & Sampled by	AN

TABLE 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Time	Material Description	Remarks*
TP52	0-0.6	0-0.3	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.6-1.1	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP53	0-0.5	0-0.3	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey brown, with gravel and trace of bitumen	
	0.5-1.0	NS			(CH) Silty CLAY, high plasticity, brown then grey	
TP54	0-0.5	0-0.3	02/07/2014		FILL; Silty Clay, low to medium plasticity, grey, brown, with gravel	
	0.5-1.0	NS			(CH) Silty CLAY, high plasticity, brown then grey	
Sample A1	0-0.1	0-0.1	02/07/2014		FILL; Silty Sand, fine grained, dark grey, with ash and charcoal	
A2	0-0.1	0-0.1	02/07/2014		FILL; Silty Sand, fine grained, dark grey, with ash and charcoal	

NS = No Sample

*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) PID reading etc.

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ATTACHMENT C

LABORATORY ANALYTICAL RESULTS SUMMARY TABLES A TO I AND

TABLE A	<i>Rinsate Samples</i>
TABLE B	<i>Trip Spike Samples</i>
TABLE C1	<i>Duplicate Sample</i>
TABLE C2	<i>Duplicate Sample</i>
TABLE D1	<i>Split Sample</i>
TABLE D2	<i>Split Sample</i>
TABLE E1	<i>Metals, Cation Exchange Capacity (CEC), pH& Total Organic Carbon (TOC) Test Results – Discrete Samples</i>
TABLE E2	<i>Metals, Cation Exchange Capacity (CEC), pH& Total Organic Carbon (TOC) Test Results – Discrete Samples</i>
TABLE E3	<i>Metals, Cation Exchange Capacity (CEC), pH& Total Organic Carbon (TOC) Test Results – Discrete Samples</i>
TABLE F	<i>Total Petroleum Hydrocarbons and BTEX Results – Discrete Samples</i>
TABLE G	<i>Benzo(a)Pyrene, Polycyclic Aromatic Hydrocarbons (PAH) Test Result – Discrete Samples</i>
TABLE H	<i>Organochlorine Pesticides (OCP) & Polychlorinated Biphenyls (PCB) Test Result – Discrete Samples</i>
TABLE I	<i>Asbestos Test Results – Discrete Samples</i>

TABLE A
RINSATE SAMPLES
(Ref No: 13217/1-AA)

ANALYTES	Rinsate R1 01.07.2014	Rinsate R2 02.07.2014
TOTAL PETROLEUM HYDROCARBONS (TPH)	(µg/L)	(µg/L)
F1 (C6-C10 less BTEX)	<50	<50
F2 (>C10-C16)	<60	<60
F3 (>C16-C34)	<500	<500
F4 (>C34-C40)	<500	<500
BTEX	(µg/L)	(µg/L)
Benzene	<0.5	<0.5
Toluene	<0.5	<0.5
Ethyl Benzene	<0.5	<0.5
Xylenes	<1.5	<1.5
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)	(µg/L)	(µg/L)
Total PAH	<1	<1
Naphthalene	<0.1	<0.1
Benzo(a)Pyrene	<0.1	<0.1

TABLE B
TRIP SPIKE SAMPLES
(Ref No: 13217/1-AA)

ANALYTES	Trip Spike TS1	Trip Spike TS2
BTEX		
Benzene	97%	100%
Toluene	91%	89%
Ethyl Benzene	88%	83%
Xylenes	87%	82%

Note : results are reported as percentage recovery of known spike concentrations

TABLE C1
DUPLICATE SAMPLE
(Ref No: 13217/1-AA)

ANALYTES	TP2 0-0.3 m mg/kg	Duplicate D1 mg/kg	RELATIVE PERCENTAGE DIFFERENCES (RPD) %
METALS			
Arsenic	5	5	0
Cadmium	<0.3	<0.3	-
Chromium	11	10	10
Copper	21	22	5
Lead	12	12	0
Mercury	0.01	0.02	67
Nickel	5.0	4.1	20
Zinc	19	16	17
TOTAL PETROLEUM HYDROCARBONS (TPH)			
F1 (C6-C10 less BTEX)	<25	<25	-
F2 (>C10-C16)	<25	<25	-
F3 (>C16-C34)	<90	<90	-
F4 (>C34-C40)	<120	<120	-
BTEX			
Benzene	<0.1	<0.1	-
Toluene	<0.1	<0.1	-
Ethyl Benzene	<0.1	<0.1	-
Xylenes	<0.3	<0.3	-
POLYCYCLIC AROMATIC HYDROCARBONS			
Benzo(a)Pyrene TEQ	<0.3	<0.3	-
Total PAH	<0.8	<0.8	-
Naphthalene	<0.1	<0.1	-
Benzo(a)Pyrene	<0.1	<0.1	-
ORGANOCHLORINE PESTICIDES (OCP)			
Hexachlorobenzene (HCB)	<0.1	<0.1	-
Heptachlor	<0.1	<0.1	-
Aldrin+Dieldrin	<0.15	<0.15	-
Endrin	<0.2	<0.2	-
Methoxychlor	<0.1	<0.1	-
Mirex	<0.1	<0.1	-
Endosulfan (alpha, beta & sulphate)	<0.5	<0.5	-
DDD+DDE+DDT	<0.6	<0.6	-
Chlordane (alpha & gamma)	<0.2	<0.2	-
POLYCHLORINATED BIPHENYLS (PCB)			
Total PCB	<1	<1	-

TABLE C2
DUPLICATE SAMPLE
(Ref No: 13217/1-AA)

ANALYTES	TP25 0-0.3 m mg/kg	Duplicate D2 mg/kg	RELATIVE PERCENTAGE DIFFERENCES (RPD) %
METALS			
Arsenic	7	7	0
Cadmium	<0.3	<0.3	-
Chromium	13	17	27
Copper	28	29	4
Lead	27	26	4
Mercury	0.04	0.03	29
Nickel	14	25	56
Zinc	68	63	8
TOTAL PETROLEUM HYDROCARBONS (TPH)			
F1 (C6-C10 less BTEX)	<25	<25	-
F2 (>C10-C16)	<25	<25	-
F3 (>C16-C34)	<90	97	-
F4 (>C34-C40)	<120	<120	-
BTEX			
Benzene	<0.1	<0.1	-
Toluene	<0.1	<0.1	-
Ethyl Benzene	<0.1	<0.1	-
Xylenes	<0.3	<0.3	-
POLYCYCLIC AROMATIC HYDROCARBONS			
Benzo(a)Pyrene TEQ	<0.3	<0.3	-
Total PAH	0.9	<0.8	-
Naphthalene	<0.1	<0.1	-
Benzo(a)Pyrene	<0.1	<0.1	-
ORGANOCHLORINE PESTICIDES (OCP)			
Hexachlorobenzene (HCB)	<0.1	<0.1	-
Heptachlor	<0.1	<0.1	-
Aldrin+Dieldrin	<0.15	<0.15	-
Endrin	<0.2	<0.2	-
Methoxychlor	<0.1	<0.1	-
Mirex	<0.1	<0.1	-
Endosulfan (alpha, beta & sulphate)	<0.5	<0.5	-
DDD+DDE+DDT	<0.6	<0.6	-
Chlordane (alpha & gamma)	<0.2	<0.2	-
POLYCHLORINATED BIPHENYLS (PCB)			
Total PCB	<1	<1	-

TABLE D1
SPLIT SAMPLE
(Ref No: 13217/1-AA)

ANALYTES	TP16 0-0.2 m mg/kg (SGS)	Split Sample S1 mg/kg (ENVIROLAB)	RELATIVE PERCENTAGE DIFFERENCES (RPD) %
METALS			
Arsenic	11	8	32
Cadmium	<0.3	<0.4	-
Chromium	9.2	9	2
Copper	170	110	43
Lead	290	170	52
Mercury	0.21	0.1	71
Nickel	9.6	10	4
Zinc	93	74	23
TOTAL PETROLEUM HYDROCARBONS (TPH)			
F1 (C6-C10 less BTEX)	<25	<25	-
F2 (>C10-C16)	<25	<50	-
F3 (>C16-C34)	150	<100	-
F4 (>C34-C40)	<120	<100	-
BTEX			
Benzene	<0.1	<0.2	-
Toluene	<0.1	<0.5	-
Ethyl Benzene	<0.1	<1	-
Xylenes	<0.3	<3	-
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)			
Benzo(a)Pyrene TEQ	1.7	1.0	52
Total PAH	13	7.42	55
Naphthalene	<0.1	<0.1	-
Benzo(a)Pyrene	1.2	0.72	50
ORGANOCHLORINE PESTICIDES (OCP)			
Hexachlorobenzene (HCB)	<0.1	<0.1	-
Heptachlor	<0.1	<0.1	-
Aldrin+Dieldrin	<0.15	<0.2	-
Endrin	<0.2	<0.1	-
Methoxychlor	<0.1	<0.1	-
Endosulfan (alpha (I), beta (II) & sulphate)	<0.5	<0.3	-
DDD+DDE+DDT	<0.6	<0.3	-
Chlordane (alpha & gamma)	<0.2	<0.2	-
POLYCHLORINATED BIPHENYLS (PCB)			
Total PCB	<1	<0.7	-

TABLE D2
SPLIT SAMPLE
(Ref No: 13217/1-AA)

ANALYTES	TP53 0-0.3 m mg/kg (SGS)	Split Sample S3 mg/kg (ENVIROLAB)	RELATIVE PERCENTAGE DIFFERENCES (RPD) %
METALS			
Arsenic	6	5	18
Cadmium	<0.3	<0.4	-
Chromium	9.4	19	68
Copper	40	23	54
Lead	17	19	11
Mercury	0.04	<0.1	-
Nickel	17	9	62
Zinc	43	39	10
TOTAL PETROLEUM HYDROCARBONS (TPH)			
F1 (C6-C10 less BTEX)	<25	<25	-
F2 (>C10-C16)	<25	<50	-
F3 (>C16-C34)	<90	<100	-
F4 (>C34-C40)	<120	<100	-
BTEX			
Benzene	<0.1	<0.2	-
Toluene	<0.1	<0.5	-
Ethyl Benzene	<0.1	<1	-
Xylenes	<0.3	<3	-
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)			
Benzo(a)Pyrene TEQ	<0.3	<0.5	-
Total PAH	<0.8	<1.6	-
Naphthalene	<0.1	<0.1	-
Benzo(a)Pyrene	<0.1	0.07	-
ORGANOCHLORINE PESTICIDES (OCP)			
Hexachlorobenzene (HCB)	<0.1	<0.1	-
Heptachlor	<0.1	<0.1	-
Aldrin+Dieldrin	<0.15	<0.2	-
Endrin	<0.2	<0.1	-
Methoxychlor	<0.1	<0.1	-
Endosulfan (alpha (I), beta (II) & sulphate)	<0.5	<0.3	-
DDD+DDE+DDT	<0.6	<0.3	-
Chlordane (alpha & gamma)	<0.2	<0.2	-
POLYCHLORINATED BIPHENYLS (PCB)			
Total PCB	<1	<0.7	-

TABLE E1
METALS, CATION EXCHANGE CAPACITY (CEC), pH & TOTAL ORGANIC CARBON (TOC) TEST RESULTS
DISCRETE SAMPLES
(Ref No: 13217/1-AA)

Sample Location	Depth (m)	METALS (mg/kg)								CEC (cmol/kg)	pH	TOC (%)
		ARSENIC	CADMIUM	CHROMIUM (Total)	COPPER	LEAD	MERCURY	NICKEL	ZINC			
TP2	0-0.3	5	<0.3	11	21	12	0.01	5.0	19	14	5.2	0.35
TP4	0-0.3	8	<0.3	18	20	28	0.03	8.7	46	-	-	-
TP6	0.15-0.45	<3	<0.3	6.5	12	7	<0.01	2.1	8.6	-	-	-
TP7	0.4-0.7	5	<0.3	19	12	12	0.02	6.3	21	-	-	-
TP8	0-0.3	6	<0.3	15	26	25	0.03	11	56	21	7.5	1.5
TP10	0.3-0.6	11	<0.3	17	15	24	0.04	5.3	31	20	6.2	0.69
TP11	0-0.3	6	<0.3	13	30	28	0.02	12	83	-	-	-
TP12	0-0.15	4	<0.3	14	14	14	0.02	7.5	32	-	-	-
TP17	0-0.3	7	<0.3	8.9	34	21	0.05	13	60	-	-	-
TP18	0-0.2	6	<0.3	13	22	26	0.04	6.3	44	-	-	-
TP19	0.1-0.25	7	<0.3	24	9.7	17	0.01	5.9	21	-	-	-
TP21	0-0.3	8	<0.3	9.2	43	25	0.06	16	64	-	-	-
TP25	0-0.3	7	<0.3	13	28	27	0.04	14	68	15	6.3	2.0
TP28	0-0.2	14	<0.3	19	30	30	0.04	12	67	-	-	-
TP34	0-0.25	7	<0.3	13	33	30	0.03	20	72	-	-	-
TP36	0-0.25	16	0.4	13	36	44	0.04	13	83	-	-	-
TP40	0.02-0.3	8	<0.3	17	30	36	0.03	16	77	17	7.7	0.73
TP42	0.1-0.35	5	<0.3	7.6	16	21	0.02	8.6	32	7.9	6.4	0.76
TP43	0.55--0.7	5	<0.3	10	13	23	0.01	7.0	40	-	-	-
TP45	0-0.3	8	<0.3	21	29	34	0.03	13	63	-	-	-
BH47	0.15-0.35	12	<0.3	51	26	26	0.01	4.7	23	-	-	-
TP49	0.6-0.75	4	0.4	4.8	16	16	0.10	14	100	9.0	7.2	1.5
TP51	0-0.3	7	<0.3	11	21	19	0.02	5.9	24	-	-	-
TP53	0-0.3	6	<0.3	9.4	40	17	0.04	17	43	-	-	-
A1	0-0.1	18	0.3	13	45	74	0.04	14	260	8.7	6.5	4.2
A2	0-0.1	10	<0.3	15	44	47	0.05	19	95	-	-	-
Limits of Reporting (LOR)		1	0.3	0.5	0.5	1	0.05	0.5	2	0.02	-	0.05
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)												
Health-based Investigation Levels (HIL) ^a A - Residential A		100	20	100 ^f	6000	300	10 ^d	400	7400			
Ecological Investigation Levels (EIL) ^b Urban residential		100 ^e	-	400 ^f	55	1100 ^g	-	100	280			
GUIDELINES FOR THE NSW SITE AUDITOR SCHEME (2006)												
Provisional Phytotoxicity-Based Investigation Levels (PIL)		3			1							

- Notes:
- a: Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake (no poultry)), also includes childcare centres, preschools and primary schools.
 - b: EIL of aged copper, nickel & zinc were derived from calculation spreadsheet developed by CSIRO for NEPC; old NSW suburb with low traffic volume; the lowest CEC=7.9 cmol/kg; pH=5.2 and TOC=0.35 % were selected for derivation of EIL.
 - c: Chromium (VI)
 - d: Methyl Mercury
 - e: Generic EIL for aged arsenic
 - f: Chromium (III), clay content was assumed =10%, a conservative assumption
 - g: Generic EIL for aged lead

TABLE E2
METALS, CATION EXCHANGE CAPACITY (CEC), pH & TOTAL ORGANIC CARBON (TOC) TEST RESULTS
DISCRETE SAMPLES
(Ref No: 13217/1-AA)

Sample Location	Depth (m)	METALS (mg/kg)								CEC (cmolc/kg)	pH	TOC (%)
		ARSENIC	CADMIUM	CHROMIUM (Total)	COPPER	LEAD	MERCURY	NICKEL	ZINC			
TP7	0.7-1.0	6	0.3	19	61	48	0.02	7.9	35	-	-	-
TP16	0-0.2	11	<0.3	9.2	170	290	0.21	9.6	93	9.7	6.4	3.0
Limits of Reporting (LOR)		1	0.3	0.5	0.5	1	0.05	0.5	2	0.02	-	0.05
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)												
Health-based Investigation Levels (HIL) ^a A - Residential A		100	20	100 ^c	6000	300	10 ^d	400	7400			
Ecological Investigation Levels (EIL) ^b Urban residential		100 ^e	-	400 ^f	200	1100 ^g	-	160	470			
GUIDELINES FOR THE NSW SITE AUDITOR SCHEME (2006)												
Provisional Phytotoxicity-Based Investigation Levels (PIL)			3				1					

- Notes:
- a: Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake (no poultry)), also includes childcare centres, preschools and primary schools.
 - b: EIL of aged copper, nickel & zinc were derived from calculation spreadsheet developed by CSIRO for NEPC; old NSW suburb with low traffic volume; the lowest CEC=9.7 cmolc/kg; pH=6.4 and TOC=3% were selected for derivation of EIL.
 - c: Chromium (VI)
 - d: Methyl Mercury
 - e: Generic EIL for aged arsenic
 - f: Chromium (III), clay content was assumed =10%, a conservative assumption
 - g: Generic EIL for aged lead

TABLE E3
METALS, CATION EXCHANGE CAPACITY (CEC), pH & TOTAL ORGANIC CARBON (TOC) TEST RESULTS
DISCRETE SAMPLE
(Ref No: 13217/1-AA)

Sample Location	Depth (m)	METALS (mg/kg)								CEC (cmol/kg)	pH	TOC (%)
		ARSENIC	CADMIUM	CHROMIUM (Total)	COPPER	LEAD	MERCURY	NICKEL	ZINC			
TP13	0-0.3	<3	<0.3	4.5	3.7	9	<0.01	2.2	15	1.3	4.5	0.15
Limits of Reporting (LOR)		1	0.3	0.5	0.5	1	0.05	0.5	2	0.02	-	0.05
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)												
Health-based Investigation Levels (HIL) ^a - Residential A		100	20	100 ^c	6000	300	10 ^d	400	7400			
Ecological Investigation Levels (EIL) ^b - Urban residential		100 ^e	-	400 ^f	25	1100 ^g	-	6	110			
GUIDELINES FOR THE NSW SITE AUDITOR SCHEME (2006)												
Provisional Phytotoxicity-Based Investigation Levels (PIL)			3				1					

- Notes:
- a: Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake (no poultry)), also includes childcare centres, preschools and primary schools.
 - b: EIL of aged copper, nickel & zinc were derived from calculation spreadsheet developed by CSIRO for NEPC; old NSW suburb with low traffic volume; the lowest CEC=1.3 cmol/kg; pH=4.5 and TOC=0.13 % were selected for derivation of EIL.
 - c: Chromium (VI)
 - d: Methyl Mercury
 - e: Generic EIL for aged arsenic
 - f: Chromium (III), clay content was assumed =10%, a conservative assumption
 - g: Generic EIL for aged lead

TABLE G
POLYCYCLIC AROMATIC HYDROCARBONS (PAH) TEST RESULTS
DISCRETE SAMPLES
(Ref No: 13217/1-AA)

		NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)									
Sample Location	Depth (m)	Soil type	PAH (mg/kg)				Health-based Investigation Levels (HL) A ^a Residential A		Health Screening Level (HSL) A - Low density residential	Generic Ecological Investigation Level (EL) - Urban residential	Ecological Screening Level (ESL) - Urban residential
			BaP TEQ	TOTAL PAHs	NAPHTHALENE	BENZO(a)PYRENE (BaP)	BaP TEQ	TOTAL PAHs	NAPHTHALENE	NAPHTHALENE	BENZO(a)PYRENE (BaP)
TP2	0-0.3	clay	<0.3	<0.8	<0.1	<0.1	3	300	5	170	0.7
TP4	0-0.3	clay	<0.3	<0.8	<0.1	<0.1	3	300	5	170	0.7
TP6	0.15-0.45	clay	<0.3	<0.8	<0.1	<0.1	3	300	5	170	0.7
TP7	0.4-0.7	sand	<0.3	<0.8	<0.1	<0.1	3	300	3	170	0.7
TP7	0.7-1.0	clay	2.7	24	<0.1	1.8	3	300	5	170	0.7
TP8	0-0.3	clay	<0.3	0.9	<0.1	<0.1	3	300	5	170	0.7
TP10	0.3-0.6	sand	0.3	1.4	<0.1	0.2	3	300	3	170	0.7
TP11	0-0.3	clay	<0.3	1.3	<0.1	0.1	3	300	5	170	0.7
TP12	0-0.15	clay	<0.3	<0.8	<0.1	<0.1	3	300	5	170	0.7
TP13	0-0.3	sand	<0.3	<0.8	<0.1	<0.1	3	300	3	170	0.7
TP16	0-0.2	clay	1.7	13	<0.1	1.2	3	300	5	170	0.7
TP17	0-0.3	clay	<0.3	1.2	<0.1	0.1	3	300	5	170	0.7
TP18	0-0.2	clay	0.4	1.9	<0.1	0.2	3	300	5	170	0.7
TP19	0.1-0.25	sand	<0.3	<0.8	<0.1	<0.1	3	300	3	170	0.7
TP21	0-0.3	clay	0.8	5.4	<0.1	0.5	3	300	5	170	0.7
TP25	0-0.3	clay	<0.3	0.9	<0.1	<0.1	3	300	5	170	0.7
TP28	0-0.2	clay	<0.3	1.6	<0.1	0.1	3	300	5	170	0.7
TP34	0-0.25	clay	<0.3	1.4	<0.1	0.1	3	300	5	170	0.7
TP36	0-0.25	clay	<0.3	1.2	<0.1	0.1	3	300	5	170	0.7
TP40	0.02-0.3	clay	<0.3	1.2	<0.1	<0.1	3	300	5	170	0.7
TP42	0.1-0.35	sand	<0.3	<0.8	<0.1	<0.1	3	300	3	170	0.7
TP43	0.55-0.7	sand	0.6	3.7	<0.1	0.4	3	300	3	170	0.7
TP45	0-0.3	clay	<0.3	1.0	<0.1	0.1	3	300	5	170	0.7
BH47	0.15-0.35	sand	<0.3	<0.8	<0.1	<0.1	3	300	3	170	0.7
TP49	0.6-0.75	sand	<0.3	1.9	<0.1	<0.1	3	300	3	170	0.7
TP51	0-0.3	clay	<0.3	<0.8	<0.1	<0.1	3	300	5	170	0.7
TP53	0-0.3	clay	<0.3	<0.8	<0.1	<0.1	3	300	5	170	0.7
A1	0-0.1	sand	0.4	4.6	<0.1	0.2	3	300	3	170	0.7
A2	0-0.1	sand	0.5	4.2	<0.1	0.3	3	300	3	170	0.7
Limits of Reporting (LOR)			0.2	0.8	0.1	0.1					

Notes: a: Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake (no poultry)), also includes childcare centres, preschools and primary schools.
NL: Not Limiting

TABLE H
ORGANOCHLORINE PESTICIDES (OCP) & POLYCHLORINATED BIPHENYLS (PCB) TEST RESULTS
DISCRETE SAMPLES
(Ref No: 13217/1-AA)

Sample Location	Depth (m)	OCP (mg/kg)										PCB (mg/kg)
		HEXACHLOROBENZENE (HCB)	HEPTACHLOR	ALDRIN+DIELDRIN	ENDRIN	METHOXYCHLOR	MIREX	ENDOSULFAN (alpha, beta & sulphate)	DDD+DDE+DDT	DDT	CHLORDANE (alpha & gamma)	
TP2	0-0.3	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP4	0-0.3	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP6	0.15-0.45	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP7	0.4-0.7	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP7	0.7-1.0	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP8	0-0.3	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP10	0.3-0.6	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP11	0-0.3	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP12	0-0.15	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP13	0-0.3	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP16	0-0.2	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP17	0-0.3	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP18	0-0.2	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP19	0.1-0.25	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP21	0-0.3	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP25	0-0.3	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP28	0-0.2	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP34	0-0.25	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP36	0-0.25	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP40	0.02-0.3	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP42	0.1-0.35	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP43	0.55-0.7	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP45	0-0.3	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
BH47	0.15-0.35	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP49	0.6-0.75	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP51	0-0.3	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
TP53	0-0.3	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
A1	0-0.1	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
A2	0-0.1	<0.1	<0.1	<0.15	<0.2	<0.1	<0.1	<0.5	<0.6	<0.2	<0.2	<1
Limits of Reporting (LOR)		0.1	0.1	0.15	0.2	0.1	0.1	0.5	0.6	0.2	0.2	1
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)												
Health-based Investigation Levels (HIL) ^a - Residential A		10	6	6	10	300	10	270	240		50	1
Ecological Investigation Levels (EIL) - Urban residential											180 ^b	

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

b: Generic EIL for DDT

TABLE I
ASBESTOS TEST RESULTS
DISCRETE SAMPLES
(Ref No: 13217/1-AA)

Sample Location	Depth (m)	ASBESTOS
TP2	0-0.3	No Asbestos Found
TP4	0-0.3	No Asbestos Found
TP6	0.15-0.45	No Asbestos Found
TP7	0.4-0.7	No Asbestos Found
TP7	0.7-1.0	No Asbestos Found
TP8	0-0.3	No Asbestos Found
TP10	0.3-0.6	No Asbestos Found
TP11	0-0.3	No Asbestos Found
TP12	0-0.15	No Asbestos Found
TP13	0-0.3	No Asbestos Found
TP16	0-0.2	No Asbestos Found
TP17	0-0.3	No Asbestos Found
TP18	0-0.2	No Asbestos Found
TP19	0.1-0.25	No Asbestos Found
TP21	0-0.3	No Asbestos Found
TP25	0-0.3	No Asbestos Found
TP28	0-0.2	No Asbestos Found
TP34	0-0.25	No Asbestos Found
TP36	0-0.25	No Asbestos Found
TP40	0.02-0.3	No Asbestos Found
TP42	0.1-0.35	No Asbestos Found
TP43	0.55--0.7	No Asbestos Found
TP45	0-0.3	No Asbestos Found
BH47	0.15-0.35	No Asbestos Found
TP49	0.6-0.75	No Asbestos Found
TP51	0-0.3	No Asbestos Found
TP53	0-0.3	No Asbestos Found
A1	0-0.1	No Asbestos Found
A2	0-0.1	No Asbestos Found

ATTACHMENT D

ENVIRONMENTAL NOTES

IMPORTANT INFORMATION REGARDING YOUR ENVIRONMENTAL SITE ASSESSMENT

These notes have been prepared by Geotechnique Pty Ltd, using guidelines prepared by the ASFE (Associated Soil and Foundation Engineers). The notes are offered to assist in the interpretation of your environmental site assessment report.

REASONS FOR AN ENVIRONMENTAL ASSESSMENT

Environmental site assessments are typically, though not exclusively, performed in the following circumstances:

- As a pre-acquisition assessment on behalf of a purchaser or a vendor, when a property is to be sold
- As a pre-development assessment, when a property or area of land is to be redeveloped, or the land use has changed, e.g. from a factory to a residential subdivision
- As a pre-development assessment of greenfield sites, to establish baseline conditions and assess environmental, geological and hydrological constraints to the development of e.g. a landfill
- As an audit of the environmental effects of previous and present site usage

Each circumstance requires a specific approach to assessment of soil and groundwater contamination. In all cases the objective is to identify and if possible quantify the risks that unrecognised contamination poses to the ongoing proposed activity. Such risks may be financial (clean-up costs or limitations in site use) and physical (health risks to site users or the public).

ENVIRONMENTAL SITE ASSESSMENT LIMITATIONS

Although information provided by an environmental site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment can eliminate the risk. Even a rigorous professional assessment might not detect all contamination within a site. Contaminants could be present in areas that were not surveyed or sampled, or migrate to areas that did not show signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant that may occur; only the most likely contaminants are screened.

AN ENVIRONMENTAL SITE ASSESSMENT REPORT IS BASED ON A UNIQUE SET OF PROJECT SPECIFIC FACTORS

In the following events and in order to avoid cost problems, you should ask your consultant to assess any changes in the conclusion and recommendations made in the assessment:

- When the nature of the proposed development is changed e.g. if a residential development is proposed, rather than a commercial development
- When the size or configuration of the proposed development is altered e.g. if a basement is added
- When the location or orientation of the proposed structure is modified
- When there is a change of land ownership, or
- For application to an adjacent site

ENVIRONMENTAL SITE ASSESSMENT FINDINGS ARE PROFESSIONAL ESTIMATES

Site assessment identifies actual sub-surface conditions only at those points where samples are taken, when they are taken. Data obtained from the sampling and subsequent laboratory analyses are interpreted by geologists, engineers or scientists and opinions are drawn about the overall sub-surface conditions, the nature and extent of contamination, the likely impact on any proposed development and appropriate remediation measures. Actual conditions may differ from those inferred, because no professional, no matter how qualified and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, however, steps can be taken to help minimise the impact. For this reason site owners should retain the services of their consultants throughout the development stages of the project in order to identify variances, conduct additional tests that may be necessary and to recommend solutions to problems encountered on site.

Soil and groundwater contamination is a field in which legislation and interpretation of legislation by government departments is changing rapidly. Whilst every attempt is made by Geotechnique Pty Ltd to be familiar with current policy, our interpretation of the investigation findings should not be taken to be that of the relevant authority. When approval from a statutory authority is required for a project, approval should be directly sought.

Environmental Notes continued

STABILITY OF SUB-SURFACE CONDITIONS

Sub-surface conditions can change by natural processes and site activities. As an environmental site assessment is based on conditions existing at the time of the investigation, project decisions should not be based on environmental site assessment data that may have been affected by time. The consultant should be requested to advise if additional tests are required.

ENVIRONMENTAL SITE ASSESSMENTS ARE PERFORMED FOR SPECIFIC PURPOSES AND CLIENTS

Environmental site assessments are prepared in response to a specific scope of work required to meet the specific needs of specific individuals e.g. an assessment prepared for a consulting civil engineer may not be adequate to a construction contractor or another consulting civil engineer.

An assessment should not be used by other persons for any purpose or by the client for a different purpose. No individual, other than the client, should apply an assessment, even for its intended purpose, without first conferring with the consultant. No person should apply an assessment for any purpose other than that originally contemplated, without first conferring with the consultant.

MISINTERPRETATION OF ENVIRONMENTAL SITE ASSESSMENTS

Costly problems can occur when design professionals develop plans based on misinterpretation of an environmental site assessment. In order to minimise problems, the environmental consultant should be retained to work with appropriate design professionals, to explain relevant findings and to review the adequacy of plans and specifications relative to contamination issues.

LOGS SHOULD NOT BE SEPARATED FROM THE REPORT

Borehole and test pit logs are prepared by environmental scientists, engineers or geologists, based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these would not be redrawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however, contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. Should this occur, delays and disputes, or unanticipated costs may result.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of sub-surface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations, such as contractors.

READ RESPONSIBILITY CLAUSES CLOSELY

An environmental site assessment is based extensively on judgement and opinion; therefore, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. In order to aid in prevention of this problem, model clauses have been developed for use in written transmittals. These are definitive clauses, designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment and you are encouraged to read them closely. Your consultant will be happy to give full and frank answers to any questions you may have.