

Central Coast Council

Preliminary Site Contamination Assessment

Proposed Multistorey Apartment Building Development

23-25 Ashton Avenue, The Entrance NSW

Report No. RGS50080.2-AB

6 December 2023



RGS50080.2-AB

6 December 2023

Central Coast Council
PO Box 20
WYONG NSW 2259

Attention: Breelle Varman

Dear Breelle,

RE: Proposed Multistorey Apartment Building Development – 23-25 Ashton Avenue, The Entrance NSW
Preliminary Site Contamination Assessment

As requested, Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken a Preliminary Site Investigation (PSI) contamination assessment for the proposed multistorey apartment building that is to be constructed at 23-25 Ashton Avenue, The Entrance NSW.

Based on the findings of the assessment it is recommended that a Detailed Site Investigation (DSI) to be undertaken.

The work presented herein was reviewed by Dr David Tully CEnvP SC. A copy of Dr Tully's letter pertaining to the review is appended to the report.

If you have any questions regarding this project, or require any additional consultations, please contact the undersigned.

For and on behalf of **Regional Geotechnical Solutions Pty Ltd**

Prepared by



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Senior Geotechnical Engineer

Reviewed by



Andrew Hills

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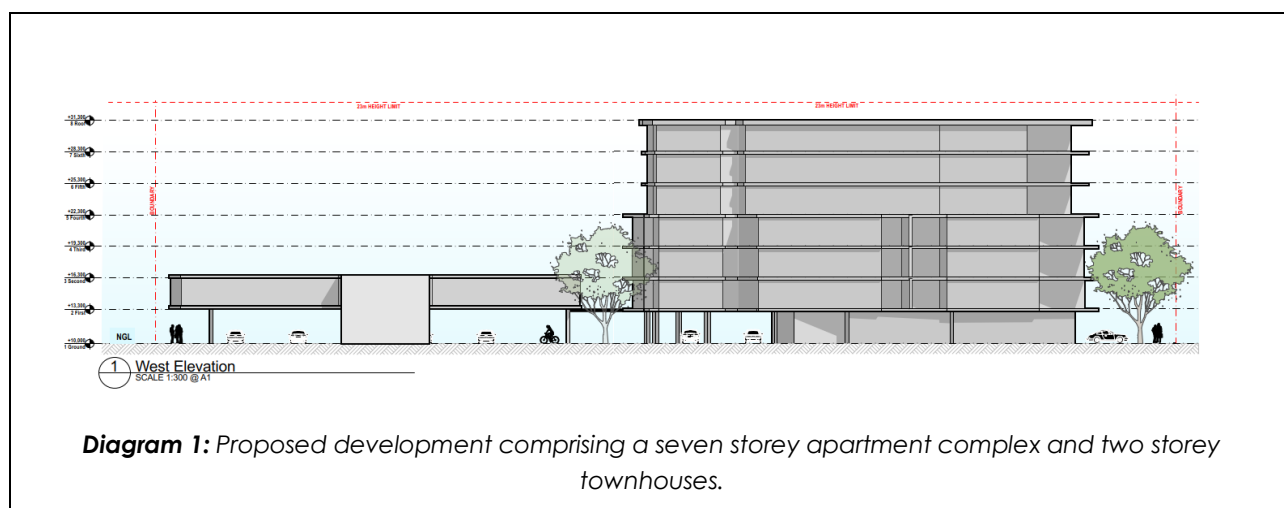
1 INTRODUCTION

1.1 Background

Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken a Preliminary Site Investigation (PSI) Contamination Assessment for the multistorey apartment building that is to be constructed at 23-25 Ashton Avenue, The Entrance NSW. A site location plan is attached as Figure 1. The location of each of the three lots that comprise the site is shown on Figure 2.

The property is currently owned by Central Coast Council (CCC), ownership is to be transferred to Pacific Link Housing (PLH) for the purpose of delivering affordable housing to the Central Coast region.

The future development will involve a seven storey apartment complex with a portion of two storey townhouses and an on grade carpark. The proposed development is illustrated below.



The site is identified as Lot 24 DP14230, Lot 36 DP14230, and Lot 37 DP14230 and occupies a combined area of approximately 2,320m². The current layout of the subject area is illustrated in Figure 2.

The PSI contamination assessment is required to evaluate past and present potentially contaminating activities and contamination types and to provide an initial assessment of the site from a contamination perspective prior to transfer of ownership from CCC to PLH.

1.2 Objectives

The objective of the PSI was to provide a preliminary assessment of the potential for soil contamination to be present on the site.

1.3 Scope of Works

In accordance with the relevant sections of the *National Environment Protection (Assessment of Site Contamination) Measure 1999 (Amended 2013)*, the assessment involved the following process:



- A brief study of site history, with the aim of identifying past activities on or near the site that might have the potential to cause contamination;
- Review of available recent and historical aerial photography from the last 70 years;
- A search of NSW EPA records, or contaminated land notifications on the site;
- Government records of groundwater bores in the area;
- Site walkover to assess visible surface conditions and identify evidence of contamination, or past activities that may cause contamination;
- Using the above information, characterise the site into Areas of Environmental Concern, in which the potential for contamination has been identified, and nominate Chemicals of Concern that might be associated with those activities;
- Undertake preliminary sampling and analysis at the selected Areas of Concern to initially evaluate the presence and extent of contamination (if any);
- Analyse samples for a suite of potential contaminants associated with the past activities; and
- Evaluate the results against industry accepted criteria for residential land use (Residential A land use guideline criteria have been adopted for this assessment).

1.4 Site Identification

General site information is provided below in Table 1. The site location is shown in Figure 1.

Table 1: Summary of Site Details

Site location:	23-25 Ashton Avenue, The Entrance
Approximate site area:	12,320m ²
Title Identification Details:	Lot 24 DP14230, Lot 36 DP14230, and Lot 37 DP14230
Current Ownership:	Central Coast Council
Current Landuse:	Unoccupied
Proposed Landuse:	Residential
Adjoining Site Uses:	• Church to the north; • A school to the south; and • Residential lots to the east and west.
Government Area:	Central Coast Council



2 SITE DESCRIPTION

2.1 Topography and Drainage

The site is situated within gently sloping residual topography and is currently unoccupied. The site is predominantly sealed with bitumen and appears to be generally used as an unofficial carpark.

The area along the east and west boundaries is grassed and there is a small tree near the centre of the western boundary.

2.2 Geology

The NSW Seamless Geology Map indicates that the site is underlain by coastal sand deposits.

The materials encountered during the investigation are summarised below. Further details are presented on the attached engineering logs (Appendix B).

- Fill:** Sandy GRAVEL, fine grained gravel, fine to coarse grained sand to depths of up to 0.25m; overlying
- Fill:** Sandy CLAY, medium plasticity, fine grained sand to depths of up to 0.8m; overlying
- Alluvial Soil:** Sandy SILT, fine to medium grained sand to depths of up to 1.4m; overlying
- Residual Soil:** Sandy CLAY and Silty CLAY, medium plasticity, stiff to hard; overlying
- Extremely Weathered Sandstone:** Sandy CLAY, medium plasticity, hard / friable;
- Highly Weathered to Fresh Sandstone:** SANDSTONE, fine grained, fractured, low to high strength.

2.3 Hydrogeology

A groundwater bore search on the NSW Water Information website, <http://waterinfo.nsw.gov.au/gw/> indicates that there is a groundwater bore (GW201976) located at The Entrance Public School approximately 100m southwest of the site. The records for GW201976 indicated it was extended to a depth of 60m and had a water bearing zone of 30m to 36m.

During the current investigation groundwater inflows were encountered at a depth of 1m in borehole BH101 and 2.2m in borehole BH202. Groundwater was not recorded in the other boreholes during the investigation fieldwork. No long term groundwater monitoring was undertaken.



Diagram 2: Satellite photograph showing the location of groundwater bore GW201976 to the southwest of the site.

2.4 Acid Sulfate Soils

An Acid Sulfate Soil (ASS) assessment was undertaken on the site as part of the geotechnical assessment with results present in report RGS50080.2 – AC dated 4 December 2023.

The results of the assessment are summarised below:

- The net acidity in all samples tested from BH101 to BH104 is below the adopted volume based action criteria except sample BH102 0.9 to 1.0m;
- KCL-extractable sulfur was present in sample BH101 2.9 to 3.0m at a level well above the adopted volume based action criteria;
- Based on the above sample BH101 2.9 to 3.0m is considered to be actual ASS, and sample BH102 0.9 to 1.0m is considered to be Potential Acid Sulfate Soil (PASS); and
- All other samples tested are not considered to be either actual or potential ASS.

Based on the above an Acid Sulfate Soil Management Plan (ASSMP) will be required for the site.



2.5 Site History

2.5.1 Historical Aerial Photography

Available aerial photographs of the site were reviewed to assist in identifying past land uses that may contribute to site contamination. The results of the review are summarised in Table 2.

Table 2 - Aerial Photograph Summary

Year	Site	Surrounding Land
1954	There are houses on all three lots. The lots are separated by fences. Vegetation appears to comprise grass and some trees.	Residential or commercial buildings to the north, south, east and west.
1965	The house on Lot 24 has been demolished and removed. Lot 36 and 37 are similar to the previous image.	New development (possibly the Church) to the north and to the east of Lot 37.
1976	All structures demolished and removed from all lots. Appears to be a hardstand over the whole site.	Minor residential developments.
1990	Hardstand over whole site. The site is being used as a carpark.	Structure to the east of Lot 37 has been demolished and removed. Minor residential developments to the west.
2002	Similar to previous image.	Minor residential developments to the east and west.
2013 (Google Earth)	Similar to previous image.	Similar to previous image.
2022 (Google Earth)	Similar to previous image.	Similar to previous image.

2.5.2 Site Observations

Field work was undertaken on 7 and 8 November 2023. Observations from a contamination perspective made during the site visit are summarised below:

- The site is covered by a hardstand comprising bitumen and gravel across the whole site except the eastern and western boundaries;
- Various items have been dumped across the site including concrete, tiles, old mattresses, and car tyres;



- Some potential Asbestos Containing Materials (ACM) that appeared to have been broken from neighbouring sites were scattered across the site;
- The site is sporadically accessed by cars and other vehicles as a carpark and to access neighbouring properties; and
- No hydrocarbon staining or odours were observed.

A selection of images of the site is presented below.



Looking north over Lot 24.



Looking southeast over Lot 36 and 37.



Potential ACM on surface of the site.



Potential ACM on surface of the site.



*Broken wall on neighbouring site to the east,
potential source of scattered building material on
the site.*



*Broken wall on neighbouring site to the west,
potential source of scattered building material on
the site.*



*Dumped bucket on the site with broken concrete
and tiles.*



Dumped mattress on the site.

2.5.3 NSW EPA Records

A check with the NSW Office of Environment and Heritage website (www.environment.nsw.gov.au) revealed that no notices have been issued on the site under the Contaminated Land Management Act (1997).



2.5.4 Land Title Search

A list of past registered proprietors and trustees of the site was obtained from the Land Titles Office. A summary of the title details is included in Appendix A.

The title history search revealed the following:

Lot 24 DP 14230	
Year Acquired	Owner
28 Oct 1965 to present	The Council of the Shire of Wyong
15 Jul 1964	Doris Mary Folini Enid Lucy Davis
15 Apr 1957	Doris Mary Folini, widow Enid Lucy Davis, married woman Valentine Martin Folini, contractor
26 Aug 1952	Joseph Valentine Folini, contractor
10 Jul 1952	Public Trustee
10 Feb 1927	The Commonwealth Land and Agency Company Limited
Lot 36 DP 14230	
09 Apr 1988 to present	The Council of the Shire of Wyong
08 Feb 1966	The Council of the Shire of Wyong
07 Aug 1959	Ernest Hill, foreman manager
19 Dec 1955	Clifford Alfred Pye, dry cleaning agent Alice Joyce Pye, his wife
27 Apr 1937	Edna Lillian Tobin, shopkeeper, married woman
25 Sep 1936	Elizabeth Jane Weston, spinster
10 Feb 1927	The Commonwealth Land and Agency Company Limited



Lot 37 DP 14230	
06 Apr 1966 to present	The Council of the Shire of Wyong
03 Apr 1964	Lillian Marguerite Burns, married woman
14 Aug 1934	Alice Riordan, wife of Cornelius Augustine Riordan, estate agent
10 Feb 1927	The Commonwealth Land and Agency Company Limited

2.5.5 Site History Summary

Based on available data the chronological development of the site is summarised below:

- All lots were previously owned by The Commonwealth Land and Agency Company Limited;
- The two front lots (Lot 36 and 37) appear to have been acquired for private residence in the 1930s although may also have operated as commercial premises as Lot 36 was owned by a shopkeeper from 1937 to 1955 and then a dry cleaning agent from 1955 to 1957 and Lot 37 was owned by an estate agent from 1934 to 1964;
- The rear lot (Lot 24) appears to have been acquired for private residence in the 1950s;
- Council acquired all three lots between 1965 and 1966;
- The lots were cleared and a hardstand was placed between 1965 and 1976, and they have remained in a similar state to present time;
- The site appears to have been used as a carpark since at least 1976; and
- Although Lot 36 was only owned by a dry cleaning agent for a relatively short period of time (just over 18 months) it is not known what if any, type of shop operated on the premises previously from 1937. It cannot be ruled out at this stage that a shop also operated as a commercial dry cleaner. Dry cleaning can be a significantly contaminating activity, for example, through release of dry cleaning solvents such as white spirit, benzene, carbon tetrachloride, trichloroethene and tetrachloroethene.

3 FIELD AND LABORATORY INVESTIGATIONS

3.1 Sampling Plan

For the PSI, limited soil sampling was undertaken in targeted areas at the site.

18 soil samples (9 jar samples and 9 bag samples) were collected from 9 locations at the site within key areas of concern identified from the site history assessment. Additionally, two samples of potential ACM were collected.



3.2 Field Work

Field work for the assessment was undertaken on 7 and 8 November 2023 and included:

- Site walkover to assess visible surface conditions and identify evidence of contamination, or past activities that may cause contamination (if any); and
- The excavation of shallow test pits to allow for the collection of jar and bag soil samples. Additional samples were collected from boreholes that were drilled with a truck mounted drill rig.

8 boreholes were drilled across the site as part of the geotechnical assessment, the borehole logs are provided in Appendix B.

The locations of the preliminary sampling points are shown on Figure 3. They were obtained on site and recorded with a hand held GPS device.

Soil samples were taken from the soil profile using disposable gloves sampling shallow test pits and the boreholes. The sampling tools used to excavate the test pits were decontaminated between sampling points using Decon90 detergent. The samples were collected in acid-rinsed 250mL glass jars and zip lock bags and placed in an ice-chilled cooler box.

3.2.1 Laboratory Analysis

Samples were transported under chain-of-custody conditions to ALS Laboratory Group, a NATA accredited specialist chemical testing laboratory, to be analysed for the following suite of contaminants:

- Polycyclic Aromatic Hydrocarbons (PAH);
- Total Recoverable Hydrocarbons (TRH);
- Benzene, Toluene, Ethyl-benzene, Xylenes (BTEX);
- Organochlorine and Organophosphorus Pesticides (OC/OPs);
- Heavy metals (arsenic, cadmium, chromium, cobalt, copper, lead, mercury, and zinc);
- Polychlorinated Biphenyls (PCB); and
- Presence of asbestos.

The results are presented in Appendix C.

3.3 Data Quality Objectives

The Data Quality Objectives (DQOs) are presented in Table 3.



Table 3 – Data Quality Objectives

DQO	Details of Process
State the Problem	PSI is required to assess the suitability of the site for the transferring of ownership from a contamination perspective.
Identify the Decision	The principal study questions that are: • What is the nature and extent of soil contamination on the subject land (if any)?; and • Is the land suitable for the proposed development from a contamination viewpoint?
Identify Inputs to the Decision	The primary inputs are: • Site history study; • Site walkover assessment; • Chemical analysis of selected soil samples; and • Results summary.
Define the Boundary of the Assessment	• The spatial boundaries are limited to the lot boundaries as shown on Figure 2; • The investigation and screening levels for a Residential A land use scenario due to the proposed future residential use which includes town houses.
Develop a Decision Rule	The decision rules for the investigation are: • If concentrations of contaminants in soil exceed the adopted investigation and screening levels for a Residential A land use scenario, then further assessment may be required; Decision criteria for QA/QC measures are defined in Section 5. A decision on the acceptance of analytical data will be made on the basis of the data quality indicators (DQIs) in the context of precision, accuracy, representativeness, completeness and comparability (PARCC) parameters as follows: • Precision: NATA registered laboratories were used following industry accepted test methods. An appropriate number of intra-laboratory samples were collected and analysed (following ASC NEPM guidance), the results of which are considered satisfactory; • Accuracy: The laboratory limit or reporting (LOR) was appropriate for the screening criteria utilised. NATA registered laboratories were used following industry standard test methods including appropriate method blanks, laboratory control samples, laboratory spikes and duplicates the results of which are considered to be satisfactory.



	• Representativeness – The samples were received by the laboratories in good condition. The data obtained is considered to be representative of the soils present on site; • Completeness – Experienced field staff were utilised to undertake the sampling and keep appropriate documentation. Samples were in proper custody between the field and reaching the laboratory. The laboratories performed the tests requested. The data obtained from the field investigations is considered to be relevant and usable; and • Comparability – Sample holding times were met and samples were properly and adequately preserved. Field sampling and handling procedures were followed. The data collected is considered to be comparable.
Specify Acceptable Limits on Decision Errors	• Acceptable limits for QA/QC measures are defined in Section 5; • Acceptable investigation and screening levels are those for a Residential A land use scenario; and • Specific limits are in accordance with the appropriate NSW EPA guidelines including indicators of data quality and standard procedures for field sampling and handling.
Optimise the Design for Obtaining Data	Based on the above steps of the DQO process. The design for obtaining the required data (i.e., proposed field and laboratory investigations) is presented in Section 3.1.

4 GUIDELINES AND ASSESSMENT CRITERIA

Assessment as outlined in NSW EPA *Guidelines for Consultants Reporting on Contaminated Land (2020)*.

To evaluate results, and for guidance on assessment requirements, the assessment adopted the guidelines provided in the *National Environment Protection (Assessment of Site Contamination) Measure as amended in 2013 (NEPM 2013)*. The NEPM document provides a range of guidelines for assessment of contaminants for various land use scenarios.

The proposed future land use is for multiple residences which will include a multistorey apartment block and townhouses, as such, comparison with the NEPM guideline Health Investigation and Screening Levels for Residential A (residential with assessable soil) land use is considered appropriate for this site as soil contact by future residents may be feasible. In accordance with the NEPM guideline the following criteria were adopted for this assessment:

- Health Investigation Levels (HILs) for Residential 'A' land use (HIL-A) were used to assess the potential human health impact of heavy metals and polycyclic aromatic hydrocarbons (PAHs);
- Health Screening Levels (HSLs) for coarse textured (sand) or fine textured (silt and clay) soils on a Residential A site were adopted as appropriate for the soils encountered to assess the potential human health impact of petroleum hydrocarbons and benzene, toluene, ethylbenzene and xylene (BTEX) compounds;



- Ecological Investigation Levels (EILs) for urban residential and public open space land use were used for evaluation of the potential ecological / environmental impact of heavy metals. Due to the preliminary nature of this investigation soil specific EILs for chromium, copper, nickel and zinc were not determined;
- Ecological Screening Levels (ESLs) for coarse textured (sand) soils or fine textured (silt and clay) soils on a Residential A land use site were adopted as appropriate for the soils encountered, to assess the potential ecological / environmental impact of petroleum hydrocarbons, BTEX compounds and benzo(a)pyrene.

In accordance with NEPM 2013, exceedance of the respective criteria does not necessarily deem that remediation or clean-up is required but is a trigger for further assessment of the extent of contamination and associated risks. The adopted criteria are presented in the results summary table in Appendix C.

5 QUALITY ASSURANCE / QUALITY CONTROL

Samples were obtained using industry accepted protocols for sample treatment, preservation, and equipment decontamination. Sampling equipment was decontaminated between sample locations and a clean pair of nitrile gloves used for the collection of each sample into laboratory supplied glass sampling jars.

Samples were placed on ice on-site and maintained on ice during transport to the testing laboratories. One duplicate sample was collected and submitted to the laboratory for analysis for quality control purposes as follows:

- Duplicate (D101) – Replicate of primary sample S103.

The Relative Percent Differences (RPDs) were calculated for the duplicate samples and are presented in the results summary table in Appendix C.

The duplicate RPDs were within the control limit of 40% and indicated good correlation between the primary and duplicate samples.

In addition to the field quality control procedures, the laboratory conducted internal quality control testing including surrogates, blanks, and laboratory duplicate samples. The results are presented with the laboratory test results in Appendix C.

All laboratory quality control data is within acceptable limits for the tests carried out. Therefore, on the basis of the results of the field and laboratory quality control procedures and testing, the data is considered to reasonably represent the concentrations of contaminants in the soils at the sample locations at the time of sampling and the results can be adopted for this assessment.

6 RESULTS

6.1.1 Subsurface Conditions

The soil types recorded in surface samples are summarised below in Table 4.

Table 4: Summary of Subsurface Conditions

Sample ID	Sample Depth (m)	Description
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S101	0.0 - 0.1	Fill: Sandy CLAY
S102	0.0 - 0.1	Fill: Sandy CLAY
S103	0.0 - 0.1	Fill: Gravelly SAND
S104	0.0 - 0.1	Fill: Gravelly SAND
S105	0.0 - 0.1	Topsoil: Silty SAND
S106	0.0 - 0.1	Fill: Clayey GRAVEL
S107	0.4 – 0.5	Alluvium: Sandy SILT
S108	0.1 – 0.2	Alluvium: Sandy SILT
S109	0.2 – 0.3	Alluvium: Sandy SILT

6.1.2 Laboratory Results

An appraisal of the laboratory test results presented in Appendix C is provided below with reference to the adopted soil investigation and screening levels discussed in Section 4.

- Concentrations of heavy metals were either below the laboratory limit of reporting or below the adopted health investigation criteria for a Residential A site in each of the samples analysed;
- Concentrations of TRH, PAH, BTEX and OP pesticides were below the laboratory limit of reporting in each of the samples analysed except TRH in sample S102;
- S102 revealed levels of 1,950mg/kg of TRH >C₁₀-C₁₆ fraction, 3,080mg/kg of TRH >C₁₆-C₃₄ fraction, and 110mg/kg of TRH >C₃₄-C₄₀ fraction. The levels of TRH >C₁₀-C₁₆ and >C₁₆-C₃₄ fractions significantly exceeded adopted thresholds;
- Asbestos was not detected in each of the soil samples tested; and
- Organic fibre board was detected in the potential ACM grab samples, however, no asbestos was detected.

6.2 Conceptual Site Model

Based on the site observations and knowledge obtained about site activities as outlined above, a conceptual site model (CSM) has been developed as set out below.

6.2.1 Potential Sources of Contamination

Potential Areas of Environmental Concern (AECs) and Chemicals of Concern (COCs) identified for the assessment are outlined in Table 5.

Table 5: Potential AECs and COCs



AEC	Mode of Potential Contamination	Potential COCs	Likelihood of Contamination
AEC1: Soils in the vicinity of parked cars	Oil / fuel spills and leaks from storage containers	Heavy Metals, TRH, BTEX, PAH, PCB, OC/OPP and asbestos	Low to moderate
AEC2: Fill placed across the site	Importation of potentially contaminated fill	Heavy Metals, TRH, BTEX, PAH, PCB, OC/OPP and asbestos	Low to moderate
AEC3: Soils in the vicinity of previous structures.	Hazardous materials remaining following demolition	Asbestos, lead	Low to moderate
AEC4: Dumped building materials	Hazardous materials	Asbestos, lead	Low to moderate
AEC5: Vegetated areas	Pesticides used to control pests.	OC/OPP	Low to moderate
AEC6: Soils in the vicinity of Lot 36	Loss of dry cleaning solvents	TRH, BTEX, VOCs	Moderate
AEC7: Groundwater beneath whole of site and surrounding properties hydraulically down gradient of the site	Loss of dry cleaning solvents	TRH, BTEX, VOCs	Moderate
Heavy Metals - Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc BTEX - Benzene, Toluene, Ethylbenzene and Xylene TRH - Total Recoverable Hydrocarbons PAH - Polycyclic Aromatic Hydrocarbons PCB - Polychlorinated Biphenyls OC/OPP - Organochlorine and Organophosphorus Pesticides VOCs - Volatile organic compounds			

The approximate locations of the AEC's are shown on Figure 3.

6.2.2 Potential Exposure Pathways and Receptors

Based on the site observations and knowledge obtained about site activities as outlined above, potential exposure pathways and receptors identified for the assessment are summarised in Table 6.



Table 6: Potential Exposure Pathways and Receptors

Chemicals of Concern	Key Pathways	Key Receptors
Asbestos, heavy metals	Generation of dust during earthworks which is inhaled	Onsite - Construction and site workers Offsite - Adjacent sites
Asbestos, heavy metals, TRH, BTEX, VOCs, PAH, PCB, OC/OPP	Inhalation of vapours. Skin contact / ingestion, plant uptake	Onsite - Construction and site workers, future residents, future maintenance workers, vegetation in landscaped areas
Heavy Metals, TRH, BTEX, VOCs, PAH, PCB, OC/OPP	Surface runoff and leaching of soils. Inhalation of vapours from hydrocarbon impacted groundwater.	Onsite - Construction and site workers, future residents, future maintenance workers Offsite – Residents, future maintenance workers. Surface water ecosystems and users
<i>Heavy Metals - Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc</i> <i>BTEX - Benzene, Toluene, Ethylbenzene and Xylene</i> <i>TRH - Total Recoverable Hydrocarbons</i> <i>PAH – Polycyclic Aromatic Hydrocarbons</i> <i>PCB – Polychlorinated Biphenyls</i> <i>OC/OPP – Organochlorine and Organophosphorus Pesticides</i>		

6.3 Discussion

A PSI contamination assessment was required to evaluate past and present potentially contaminating activities and contamination types from a contamination perspective prior to transfer of ownership of the site from CCC to PLH.

The site history study indicates that several structures occupied the site until they were demolished between 1965 and 1976. Since this time the site has predominately been used as a carpark.

Lot 36 may have operated as commercial premises it was owned by a shopkeeper from 1937 to 1955 and then a dry cleaning agent from 1955 to 1957. Although Lot 36 was only owned by a dry cleaning agent for a relatively short period of time (just over 18 months) it is not known what if any, type of shop operated on the premises previously from 1937. It cannot be ruled out at this stage that a shop also operated as a commercial dry cleaner. Dry cleaning can be a significantly contaminating activity, for example, through release of dry cleaning solvents such as white spirit, benzene, carbon tetrachloride, trichloroethene and tetrachloroethene. Soil impacts associated with losses of dry cleaning solvents commonly occur towards the rear of a dry cleaning premises where dry cleaning activities and solvent storage generally take place. The TRH soil impacts identified during the preliminary investigation (at S102) are noted to be situated at the rear of the former building that occupied this Lot and on this basis could be associated with dry cleaning activities.

Identified AEC's included soils in the vicinity of parked cars and previous structures, fill placed across the site, dumped material, and vegetated areas where pesticides may have been used.



No oil staining or odours observed in the areas where cars have been parked.

The results of laboratory analysis of subsurface soil samples collected from targeted locations, revealed concentrations of the chemicals of concern were either below the laboratory reporting limit, or below the adopted health investigation criteria for a Residential A site for each of the samples tested, except sample S102 that revealed levels of C₁₀-C₁₆ and C₁₆-C₃₄ fractions that exceed the adopted thresholds for an urban residential development.

Asbestos was not detected in each of the soil or grab samples tested.

6.4 Site Assessment Conclusions and Recommendations

Based on the above and the findings of the PSI presented herein, the soils tested do not meet the requirements for a Residential A site as detailed in the NEPM 2013 guidelines due to the elevated TRH levels in sample S102. On this basis and due to the possibility that there may have been an operational dry cleaning facility on Lot 36 in the 1950s and potentially earlier. It is recommended that a Detailed Site Investigation is undertaken in accordance with the NEPM 2013 guideline. This should include, as a minimum, additional soil sampling at Lot 36 and groundwater monitoring/sampling.

Bulk earthworks plans have not been provided at this stage, however, in consideration of the existing fill that extends to depths of up to 0.8m likely being classified as 'uncontrolled fill' it is likely that contaminated fill will be excavated and disposed of offsite as part of the development.

All material that is to be exported off site as part of the development it should be assessed in accordance with EPA guidelines for Excavated Natural Material (ENM) and Virgin Excavated Natural Material (VENM). In view of the impacts identified during the preliminary investigation, further testing would be required in order to provide an appropriate classification for these materials. The natural alluvial and residual soils not impacted by contamination would likely be classified as VENM subject to an assessment by a suitably qualified environmental consultant.

It is noted that Acid Sulfate Soils have been detected isolated areas of the site. Actual and Potential Acid Sulfate Soils were encountered with BH101 and BH102 and an Acid Sulfate Management Plan is to be prepared for the proposed development. Where acid sulfate soils are encountered, it is recommended to reuse the material onsite following treatment. Any acid sulfate soil that is to be disposed of off site must be treated and disposal to a licensed landfill facility.

Subject to amendment on the basis of the proposed DSI, a preliminary guide for waste classification is provided in Section 7.

7 DISPOSAL OF MATERIALS

7.1 Waste Classification

Waste classification for excavated materials to facilitate off-site disposal to a licensed landfill in accordance with NSW EPA (2014) *Waste Classification Guidelines* would be required if offsite disposal to land fill is required.

Table 2 of the '*Waste Classification Guidelines (2014)*' nominates a suite of analytes to be tested (Column 1) and also provides the maximum concentration (CT1) allowable within the soil for classification without the need for additional toxicity characteristics leaching procedure (TCLP) testing for both general solid waste (Column 2) and restricted solid waste (Column 3) for each analyte. Should the CT1 values be exceeded, the guidelines provide a Specific Contaminant



Concentration (SCC) value to allow further evaluation of contaminant concentrations in conjunction with TCLP testing.

An evaluation of the laboratory test results for sampled soils against the waste classification guidelines outlined above are presented in the summary table in Appendix C.

Based on the results of the PSI, the soil tested would currently be classified as Restricted Solid Waste due to elevated nickel levels, however, the material may be reclassified as general solid waste if leachate testing is undertaken and no additional impacts are identified during the proposed DSI. Further testing is required when total volumes are known.

8 LIMITATIONS

This report comprises the results of an investigation carried out for a specific purpose and client as defined in the document. The report should not be used by other parties or for purposes or projects other than those assumed and stated within the report, as it may not contain adequate or appropriate information for applications other than those assumed or advised at the time of its preparation. The contents of the report are for the sole use of the client and no responsibility or liability will be accepted to any third party. The report should not be reproduced either in part or in full, without the express permission of Regional Geotechnical Solutions Pty Ltd.

Contaminated site investigations are based on data collection, judgment, experience, and opinion. By nature, these investigations are less exact than other engineering disciplines. The findings presented in this report and used as the basis for the recommendations presented herein were obtained using normal, industry accepted practises and standards. To our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points.

Recommendations regarding ground conditions referred to in this report are estimates based on the information available at the time of its writing. Estimates are influenced and limited by the fieldwork method and testing carried out in the site investigation, and other relevant information as has been made available. In cases where information has been provided to Regional Geotechnical Solutions for the purposes of preparing this report it has been assumed that the information is accurate and appropriate for such use. No responsibility is accepted by Regional Geotechnical Solutions for inaccuracies within any data supplied by others.

If site conditions encountered during construction vary significantly from those discussed in this report, Regional Geotechnical Solutions Pty Ltd should be contacted for further advice.

This report alone should not be used by contractors as the basis for preparation of tender documents or project estimates. Contractors using this report as a basis for preparation of tender documents should avail themselves of all relevant background information regarding the site before deciding on selection of construction materials and equipment.



If you have any questions regarding this project, or require any additional consultations, please contact the undersigned.

For and on behalf of **Regional Geotechnical Solutions Pty Ltd**

Prepared by

Louis Davidson

Senior Geotechnical Engineer

Reviewed by

Andrew Hills

Associate Environmental Engineer



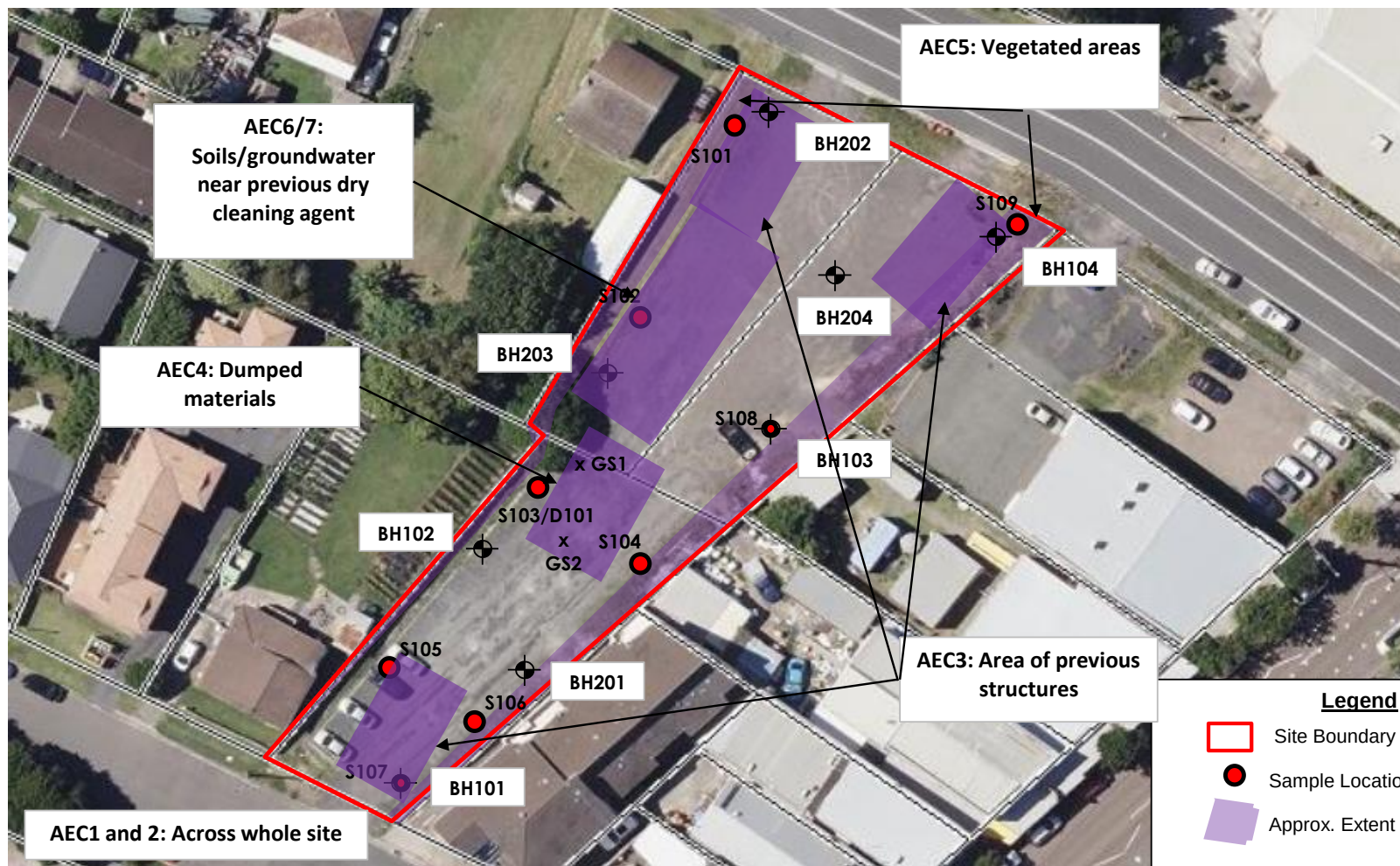
Figures



 REGIONAL GEOTECHNICAL SOLUTIONS	Client:	Central Coast Council	Job No.	RGS50080.2
	Project:	Proposed Multistorey Apartment Building Development	Drawn By:	LD
		23-25 Ashton Avenue, The Entrance	Scale:	NTS
	Title:	Site Location Plan	Date:	30-Nov-23
			Drawing No.	Figure 1



Client:	Central Coast Council	Job No.	RGS50080.2
Project:	Proposed Multistorey Apartment Building Development	Drawn By:	LD
	23-25 Ashton Avenue, The Entrance	Scale:	NTS
		Date:	30-Nov-23
Title:	Site Layout Plan	Drawing No.	Figure 2



Client:	Central Coast Council	Job No.	RGS50080.2
	Project:	Drawn By:	LD
		Scale:	NTS
		Date:	30-Nov-23
Title:	Site Layout Plan	Drawing No.	Figure 3



Appendix A

Site History Documentation

1954



1965



1976



1990



2002



2012



2023



	Status	Surv/Comp	Purpose
DP10294 Lot(s): 54, 55			
 DP1290370	REGISTERED	COMPILATION	EASEMENT
DP14230 Lot(s): 75, 76, 77 Section : 1			
 DP1237260	REGISTERED	SURVEY	EASEMENT
 DP1261741	REGISTERED	SURVEY	REDEFINITION
DP738473 Lot(s): 460			
 DP1101070	REGISTERED	SURVEY	SURVEY INFORMATION ONLY
 DP1298097	REGISTERED	SURVEY	EASEMENT
DP1011600 Lot(s): 681, 682			
 DP14230	HISTORICAL	SURVEY	UNRESEARCHED
DP1012389 Lot(s): 691, 692			
 DP14230	HISTORICAL	SURVEY	UNRESEARCHED
DP1014430 Lot(s): 6021, 6022			
 DP629916	HISTORICAL	COMPILATION	SUBDIVISION
DP1020271 Lot(s): 100			
 DP14230	HISTORICAL	SURVEY	UNRESEARCHED
 DP150732	HISTORICAL	COMPILATION	UNRESEARCHED
 DP627949	HISTORICAL	COMPILATION	SUBDIVISION
DP1053921 Lot(s): 1			
 DP409694	HISTORICAL	SURVEY	UNRESEARCHED
 DP663701	HISTORICAL	COMPILATION	DEPARTMENTAL
DP1063335 Lot(s): 2			
 DP701832	HISTORICAL	COMPILATION	SUBDIVISION
 DP702574	HISTORICAL	COMPILATION	SUBDIVISION
DP1113954 Lot(s): 100			
 DP14230	HISTORICAL	SURVEY	UNRESEARCHED
DP1137107 Lot(s): 1			
 DP376799	HISTORICAL	SURVEY	UNRESEARCHED
DP1162334 Lot(s): 16			
 NSW GAZ. CLOSED ROAD LOT 16 DP1162334	10-06-2011		Folio : 3493
DP1261763 Lot(s): 1			
 DP14230	HISTORICAL	SURVEY	UNRESEARCHED
SP61330			
 DP14230	HISTORICAL	SURVEY	UNRESEARCHED
 DP1133611	REGISTERED	COMPILATION	EASEMENT
SP74051			
 DP629540	HISTORICAL	COMPILATION	SUBDIVISION
 DP631216	HISTORICAL	SURVEY	SUBDIVISION
 DP700191	HISTORICAL	SURVEY	SUBDIVISION
 DP1063335	HISTORICAL	SURVEY	CONSOLIDATION
SP77340			
 DP22914	HISTORICAL	SURVEY	UNRESEARCHED
 DP340280	HISTORICAL	COMPILATION	UNRESEARCHED
 DP1073720	HISTORICAL	SURVEY	CONSOLIDATION

Caution: This information is provided as a searching aid only. Whilst every endeavour is made to ensure that current map, plan and titling information is accurately reflected, the Registrar General cannot guarantee the information provided. For **ALL** **ACTIVITY PRIOR TO SEPTEMBER 2002** you must refer to the RGs Charting and Reference Maps.

	Status	Surv/Comp	Purpose
SP85455			
 DP14230	HISTORICAL	SURVEY	UNRESEARCHED
 DP1165574	HISTORICAL	SURVEY	CONSOLIDATION
SP101809			
 DP14230	HISTORICAL	SURVEY	UNRESEARCHED
 DP1261741	HISTORICAL	SURVEY	REDEFINITION
Road			
Polygon Id(s): 105193992			
 DP1289113	REGISTERED	SURVEY	SUBDIVISION
Polygon Id(s): 105029985, 105182706, 105239698, 105392677, 105458497, 105692021			
 DP1257310	REGISTERED	SURVEY	SURVEY INFORMATION ONLY
Polygon Id(s): 105001503, 105029985, 105058535, 105182706, 105199703, 105234004, 105239698, 105392677, 105596734			
 DP1224169	REGISTERED	SURVEY	SURVEY INFORMATION ONLY

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Plan	Surv/Comp	Purpose
DP10294	SURVEY	UNRESEARCHED
DP14230	SURVEY	UNRESEARCHED
DP22134	SURVEY	UNRESEARCHED
DP22914	SURVEY	UNRESEARCHED
DP328897	COMPILATION	UNRESEARCHED
DP332233	SURVEY	UNRESEARCHED
DP340280	COMPILATION	UNRESEARCHED
DP363850	SURVEY	UNRESEARCHED
DP371527	SURVEY	UNRESEARCHED
DP377416	SURVEY	UNRESEARCHED
DP388421	SURVEY	UNRESEARCHED
DP390893	SURVEY	UNRESEARCHED
DP392342	SURVEY	UNRESEARCHED
DP395963	SURVEY	UNRESEARCHED
DP419453	SURVEY	UNRESEARCHED
DP438600	SURVEY	UNRESEARCHED
DP508972	SURVEY	SUBDIVISION
DP513994	SURVEY	SUBDIVISION
DP519690	SURVEY	SUBDIVISION
DP536668	SURVEY	SUBDIVISION
DP574667	SURVEY	SUBDIVISION
DP620550	SURVEY	SUBDIVISION
DP620713	COMPILATION	SUBDIVISION
DP631996	COMPILATION	SUBDIVISION
DP632150	COMPILATION	SUBDIVISION
DP633647	COMPILATION	SUBDIVISION
DP703997	COMPILATION	SUBDIVISION
DP710417	COMPILATION	CONSOLIDATION
DP716415	SURVEY	RESUMPTION OR ACQUISITION
DP738473	SURVEY	SUBDIVISION
DP748196	SURVEY	CONSOLIDATION
DP866376	SURVEY	SUBDIVISION
DP872820	SURVEY	SUBDIVISION
DP1011600	SURVEY	SUBDIVISION
DP1012389	SURVEY	SUBDIVISION
DP1014430	SURVEY	SUBDIVISION
DP1020271	SURVEY	CONSOLIDATION
DP1053921	SURVEY	CONSOLIDATION
DP1063335	SURVEY	CONSOLIDATION
DP1113954	SURVEY	CONSOLIDATION
DP1137107	SURVEY	REDEFINITION
DP1162334	COMPILATION	ROADS ACT, 1993
DP1261763	SURVEY	CONSOLIDATION
SP17576	COMPILATION	STRATA PLAN
SP30332	COMPILATION	STRATA PLAN
SP33242	COMPILATION	STRATA PLAN
SP40135	COMPILATION	STRATA PLAN
SP41813	COMPILATION	STRATA PLAN
SP61330	COMPILATION	STRATA PLAN
SP74051	COMPILATION	STRATA PLAN
SP77340	COMPILATION	STRATA PLAN
SP85455	COMPILATION	STRATA PLAN
SP85455	UNRESEARCHED	STRATA PLAN
SP101809	COMPILATION	STRATA PLAN

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ACTIVITY PRIOR TO SEPTEMBER 2002 you must refer to the RGs Charting and Reference Maps.

Municipality of
Shire of ~~Erina~~ WYONG
B437277 25. 11. 26

D.P. 14230

(E)

PLAN

OF

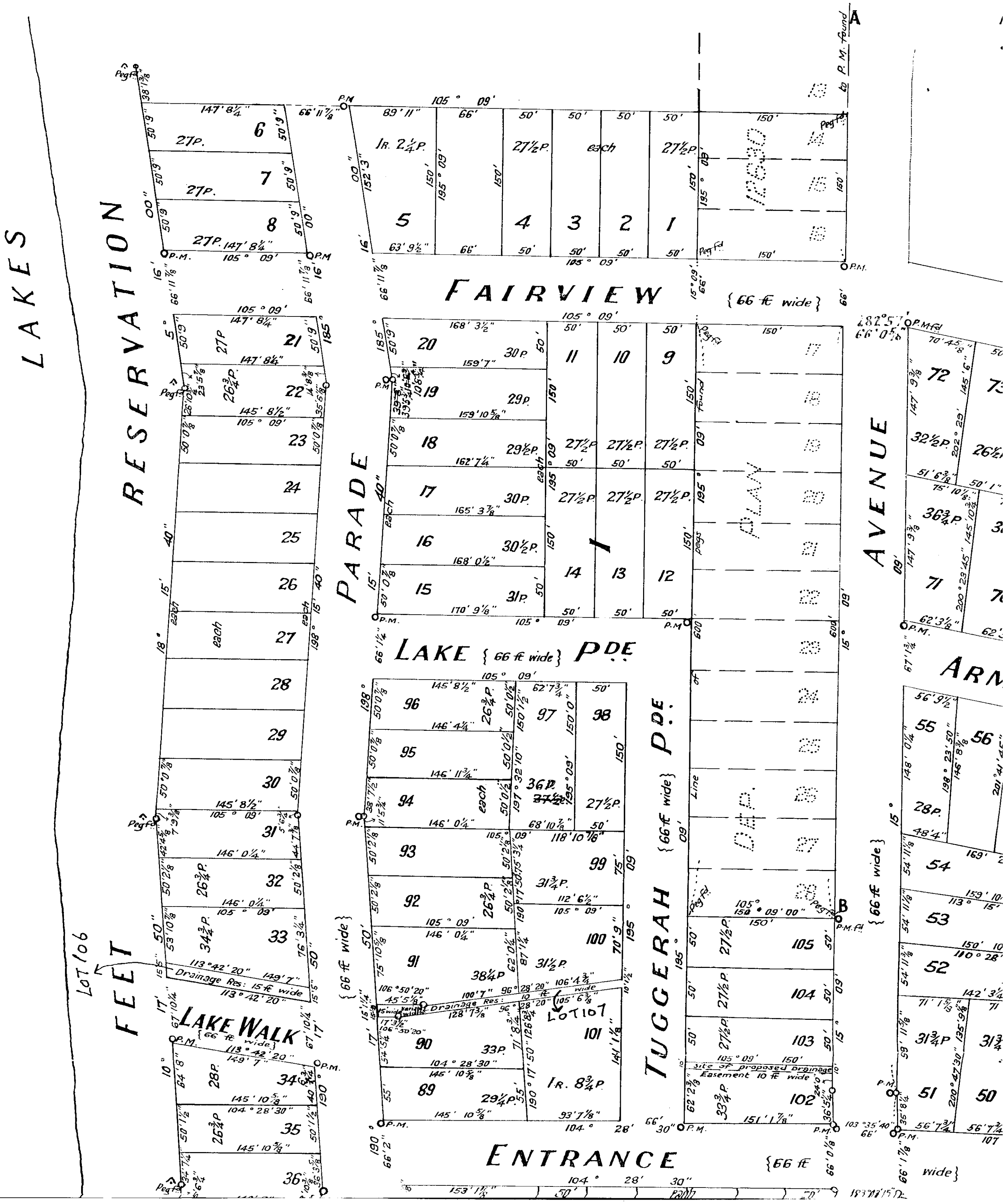
ENTRANCE TOWNSHIP

a subdivision of the whole of the land in Cert. of Title Vol. 3814 Fol. 60 and part

PARISH OF TUGGERAH

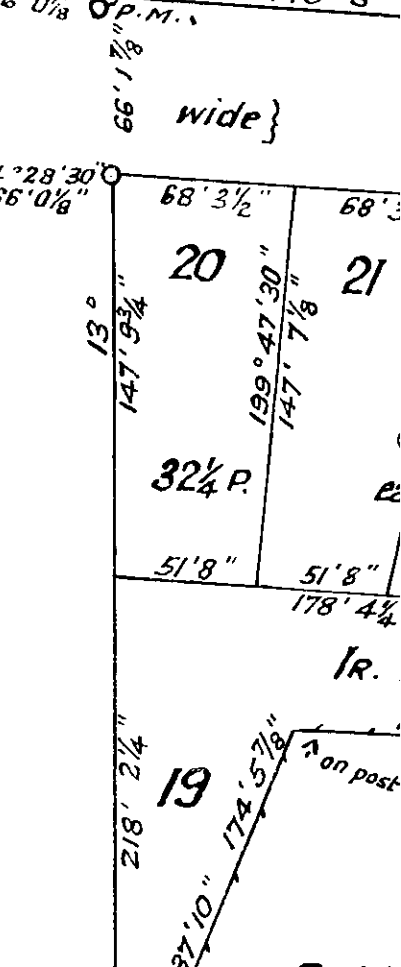
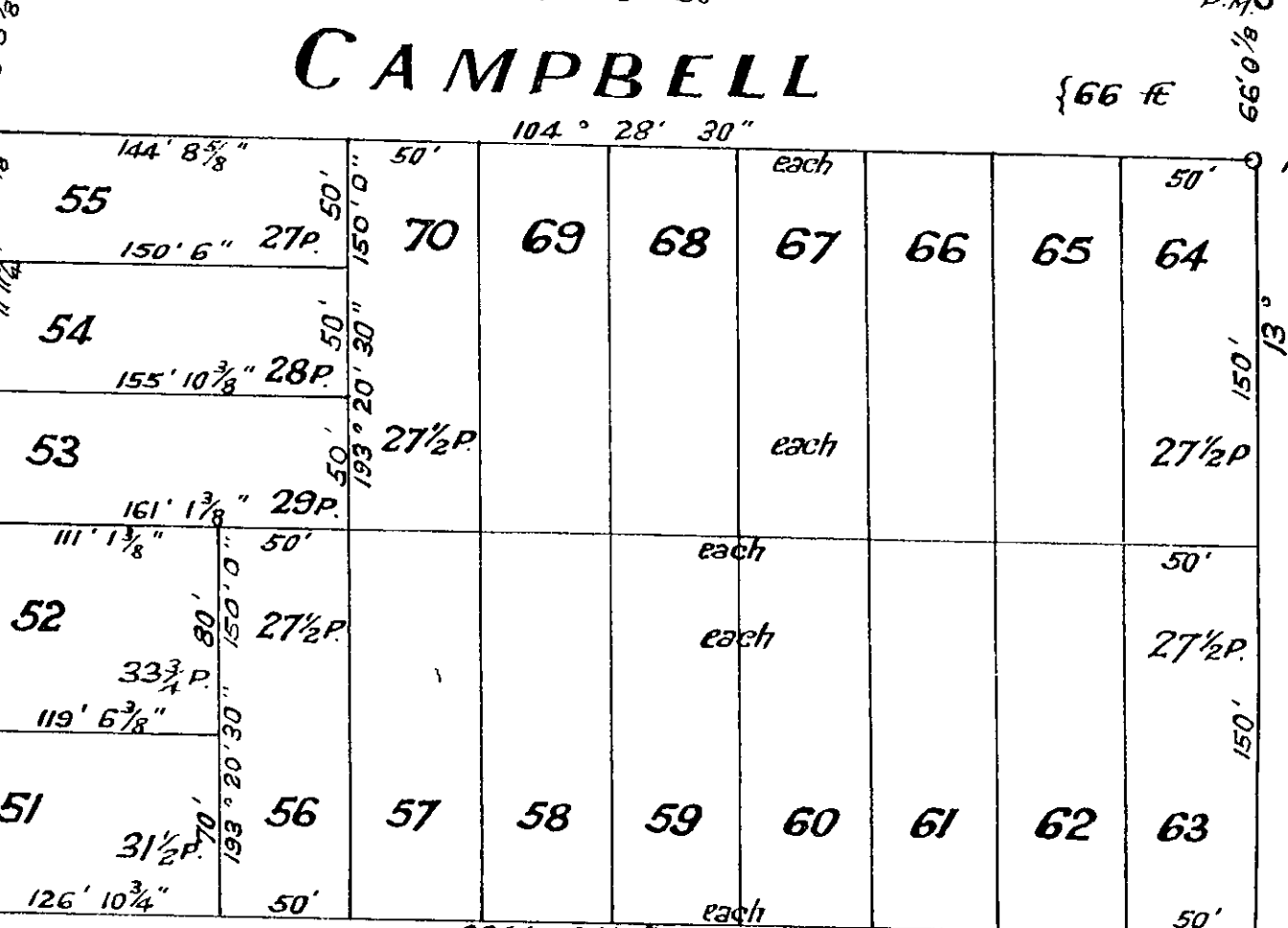
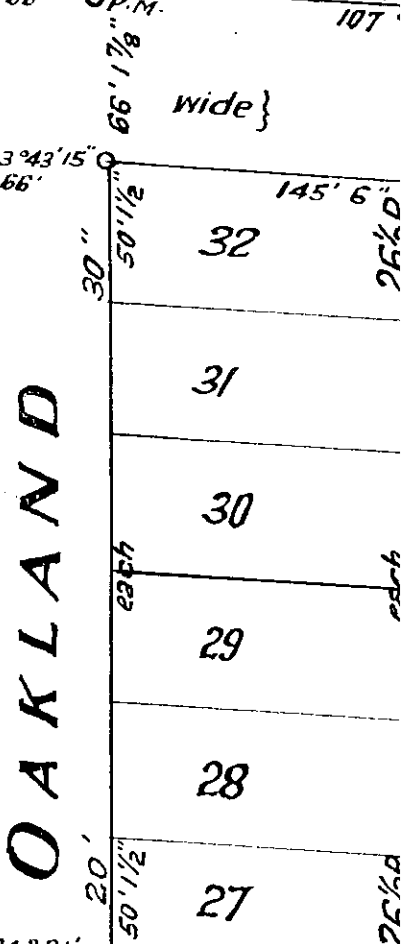
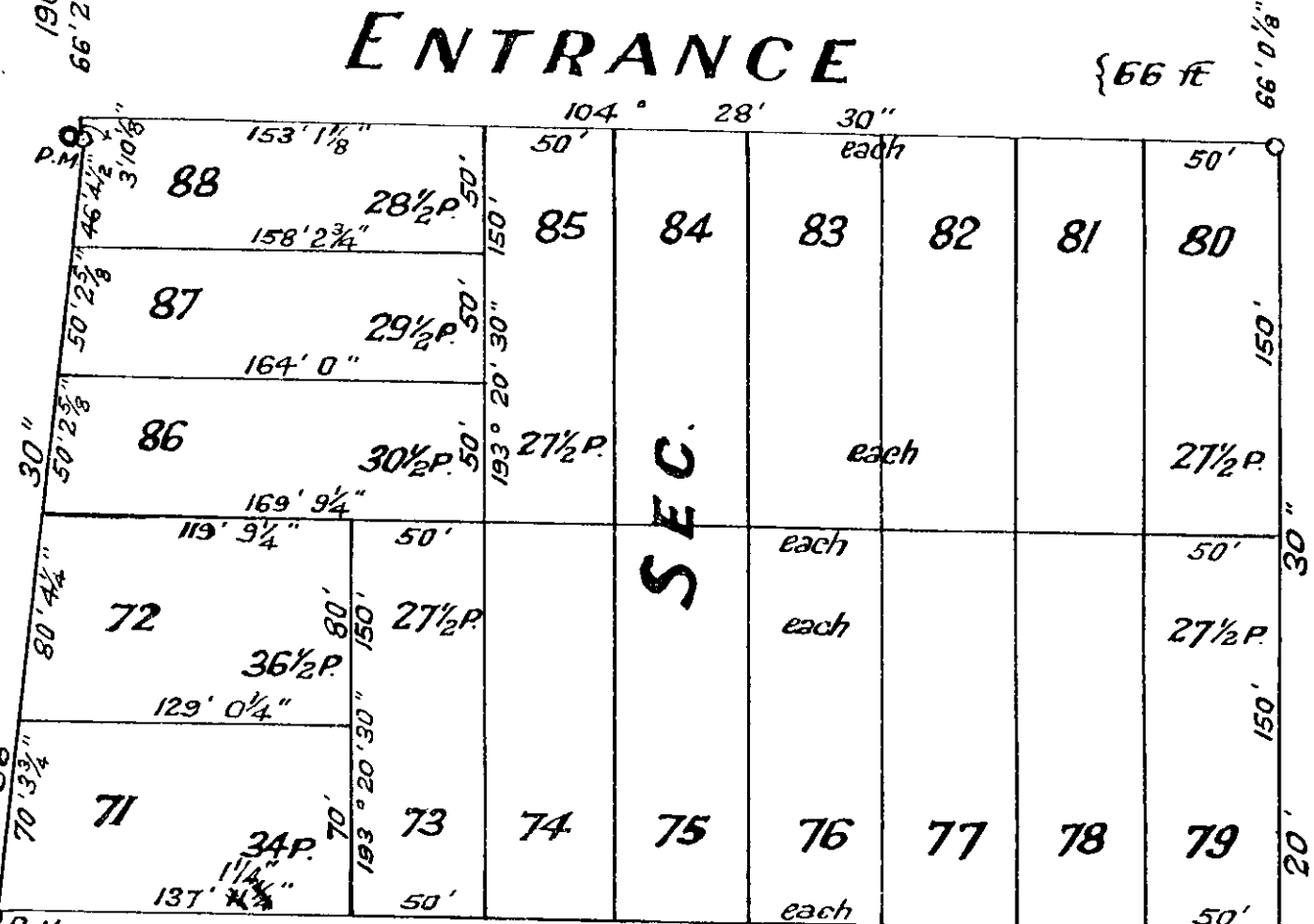
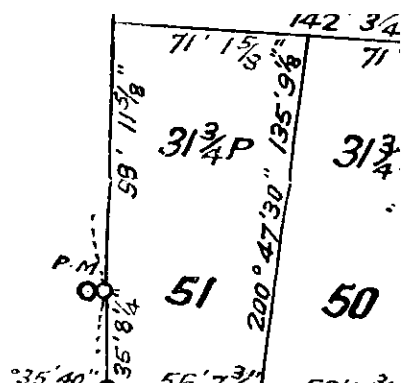
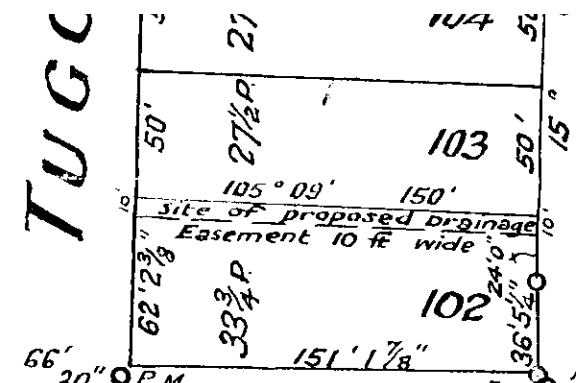
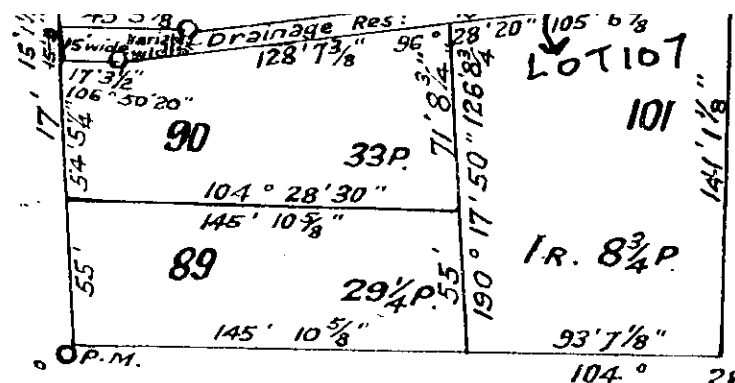
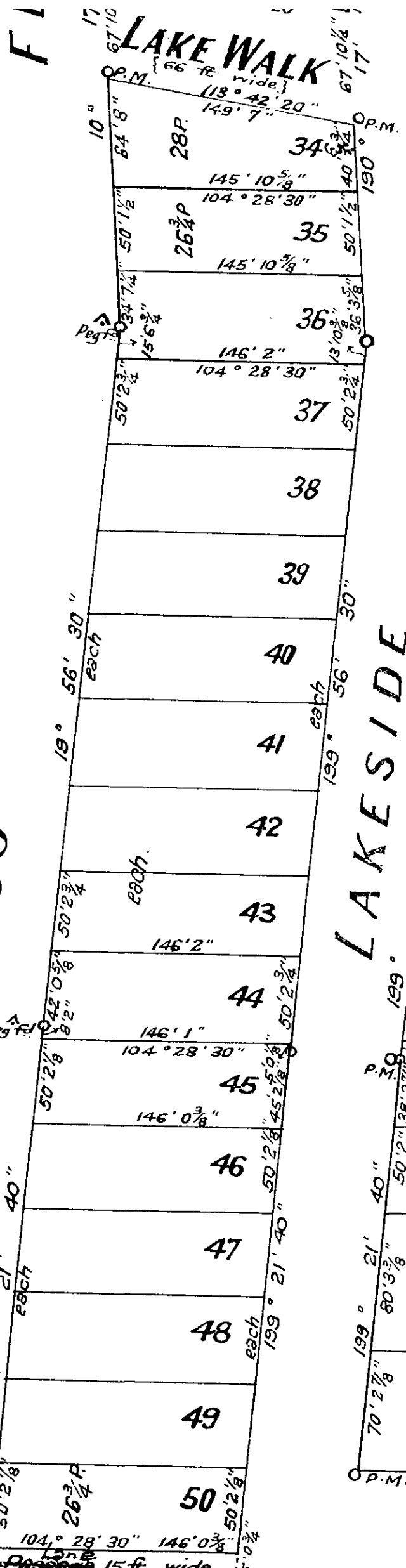
COUNTY OF

Scale 100 feet to an inch



TUGGERAH

100



LYNWOOD AVENUE

Restrictive Covenants, if any, will be embodied in transfers of Lots herein.
 It is intended to dedicate the new Streets, Avenues, Parades, Lake Walk and
 It is intended that the Drainage Reserves shall vest in the Council and that eas
 to the Council over the sites of proposed drainage easements.
 Permanent Marks placed where shown thus O P.M.

The Common Seal of the Commonwealth
 Land and Agency Company Limited was
 hereto affixed in the presence of

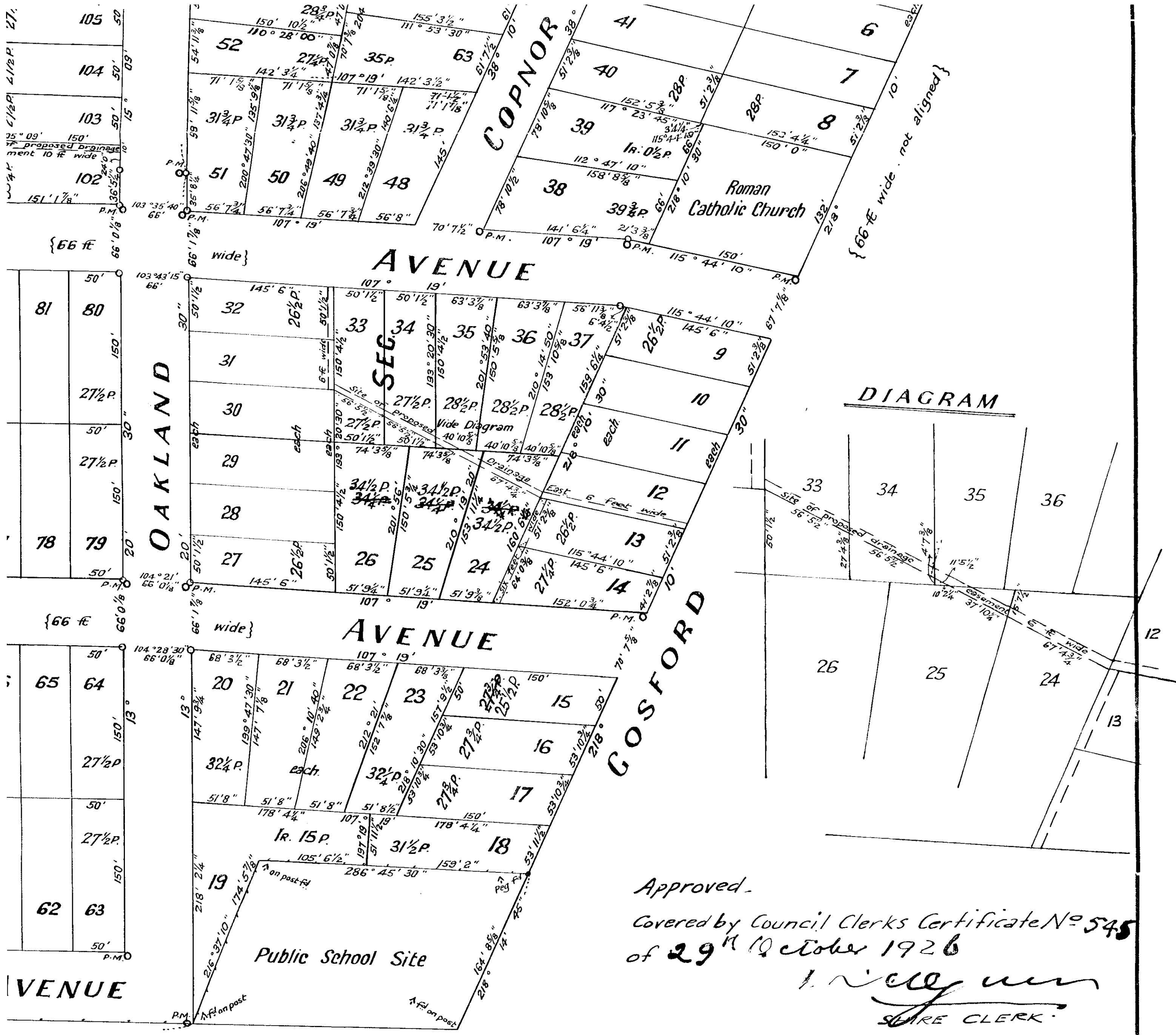
R. B. Taylor
 R. B. Taylor

Acting Secretary
 P. W. Shepherd

D.P. 14230 (E)

Datum line of Azimuth A-B.

DP 14230



Approved.
Covered by Council Clerks Certificate No 545
of 29th October 1926
W. J. J. J.
SHIRE CLERK.

ed in transfers of Lots herein.
enues, Parades, Lake Walk and ~~passage~~ to the Public,
If vest in the Council and that easements shall be granted
in age easements.

), P.M.
W. J. J. J.
Directors
Commonwealth
Limited was
ence of

Acting Secretary
W. J. J. J.

Gosford
Subscribed and declared before me at Sydney
this First day of October A.D. 1926.

W. J. J. J.
PRESIDENT
W. J. J. J.
SHIRE CLERK

D.P. 14230 (E)

I George Alexander Harrison of 10 Bligh St Sydney
Licensed Surveyor specially licensed under the Real Property Act, 1900, do hereby
solemnly and sincerely declare (a) that all boundaries and measurements shown on
this plan are correct, (b) that all survey marks found and relevant physical objects on
or adjacent to the boundaries are correctly represented, (c) that all physical objects
indicated actually exist in the positions shown, (d) that the whole of the material facts
in relation to the land are correctly represented, (e) that the survey has been made
under my immediate supervision, and I make this solemn declaration conscientiously
believing the same to be true, and by virtue of the provisions of the Oaths Act, 1900.

G. A. Harrison
Licensed Surveyor.

W. J. J. J.

Date of Survey October-December 1925

*Add here by me or under my immediate supervision as the case may be.

PLAN AMENDED IN LIO 5-7-93.

DP 14230 (E)

OF

⑤

3968 31

COUNTY OF NORTHUMBERLAND

100 feet to an inch

*Alterations and additions in red made
in this Dept^t see sheets 687 M.P.D.P.
and papers 1926 M9661.*

Acting Supervising Surveyor
2nd Div. 1927



CONVERSION TABLE ADDED IN
REGISTRAR GENERAL'S DEPARTMENT

DP 14230	FEET INCHES	METRES
-	0 7/8	0.02
3	4 1/4	1.02
3	10 1/8	1.17
3	10 3/8	1.18
4	7 3/8	1.405
4	7 3/8	1.405
5	0 1/8	1.525
5	3 5/8	1.615
5	6 3/4	1.695
6	-	1.83
6	4 1/2	1.945
7	9 3/8	2.37
8	0 3/8	2.45
8	2	2.49
10	-	3.05
10	1 1/2	3.085
10	2 1/4	3.105
10	8 3/4	3.27
11	5 1/2	3.49
11	5 3/4	3.5
11	11 1/4	3.64
12	-	3.66
13	10 3/8	4.225
14	3 1/8	4.345
14	7 1/8	4.45
14	8 3/8	4.48
14	8 5/8	4.485
14	9	4.495
15	-	4.57
15	0 3/4	4.59
15	4 1/2	4.685
15	5	4.7
15	6 3/4	4.745
15	7 1/2	4.76
16	0 3/4	4.895
16	1 1/4	4.91
17	3 1/2	5.27
17	5 1/4	5.315
20	-	6.095
21	3 3/8	6.485
21	3 5/8	6.495
22	3 1/4	6.79
22	3 1/2	6.795
23	5 7/8	7.16
24	-	7.315
26	10 3/4	8.2
27	4 1/8	8.335
27	4 3/8	8.34
28	5 1/4	8.67
32	5 1/2	9.695
34	4 3/4	10.485
34	7 1/4	10.545
35	6 1/8	10.825
35	7 3/4	10.865
35	8 1/4	10.875
36	3 5/8	11.065
36	5 1/4	11.07
36	5 1/4	11.105
37	10 1/4	11.54
38	1 3/8	11.615
38	2 7/8	11.655
38	7 1/2	11.775
39	5 3/4	12.035
40	6 3/4	12.365
40	10 3/8	12.455
40	10 5/8	12.46
40	10 7/8	12.47
41	2 7/8	12.57
42	0 5/8	12.81
42	0 5/8	12.815
42	4 3/8	12.915
42	5 5/8	12.945
44	7 3/8	13.6
44	7 3/8	13.6
45	2 1/8	13.77
45	5 1/8	13.845
46	4 1/2	14.135

CONVERSION TABLE ADDED IN
REGISTRAR GENERAL'S DEPARTMENT

DP 14230	FEET INCHES	METRES
47	0 7/8	14.35
47	6 5/8	14.73
49	6 5/8	15.105
50	-	15.24
50	0 1/2	15.255
50	0 7/8	15.26
50	1 1/2	15.265
50	1 3/4	15.28
50	2	15.285
50	2 1/8	15.295
50	2 3/8	15.305
50	2 3/4	15.31
50	2 7/8	15.315
50	9	15.47
51	2 3/8	15.605
51	2 3/4	15.615
51	5 5/8	15.68
51	6 3/8	15.705
51	8	15.75
51	8 1/2	15.76
51	9 1/4	15.78
51	9 3/8	15.785
51	9 1/2	15.785
51	11 1/2	15.835
53	10 3/4	16.425
53	10 7/8	16.43
53	11 1/2	16.445
54	9 1/4	16.59
54	11 1/8	16.74
54	11 3/8	16.75
55	-	16.765
56	5 1/2	17.21
56	7 3/4	17.265
56	8	17.27
56	9 1/2	17.31
56	10 1/4	17.33
56	11 3/8	17.36
60	9	18.515
61	7 1/2	18.785
62	0 1/4	18.905
62	2 3/8	18.96
62	3 1/8	18.975
62	3 1/4	18.98
62	7 3/4	19.095
63	5 7/8	19.3
63	9 1/2	19.445
64	0 3/8	19.515
64	8	19.71
66	-	20.115
66	0 1/8	20.12
66	0 5/8	20.135
66	1 1/4	20.15
66	1 3/8	20.16
66	1 5/8	20.165
66	1 7/8	20.17
66	3 5/8	20.21
66	11 7/8	20.42
67	1 3/4	20.465
67	4 3/4	20.54
67	7 1/8	20.6
67	10 1/4	20.66
68	3 1/2	20.815
68	3 1/2	20.815
68	10 7/8	21.335
70	-	21.41
70	2 7/8	21.43
70	3 3/4	21.445
70	4 3/8	21.455
70	4 5/8	21.52
70	7 1/4	21.525
70	7 3/8	21.525
70	7 1/2	21.53
70	7 5/8	21.565
9	-	21.565

CONVERSION TABLE ADDED IN
REGISTRAR GENERAL'S DEPARTMENT

DP 14230	FEET INCHES	METRES
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71	1 7/8	21.69
71	6 3/8	21.865
74	3 5/8	22.645
75	-	22.86
75	3 1/4	23.15
75	10 1/8	23.12
75	10 1/4	23.125
75	10 3/8	23.13
75	10 5/8	23.145
76	3 1/4	23.245
76	10 1/2	24.04
76	10 5/8	24.045
80	-	24.385
80	3 5/8	24.47
80	4 1/8	24.49
80	4 1/4	24.49
87	1 1/4	26.55
88	7 1/2	27.015
89	11	27.405
93	7 1/8	28.585
98	11 5/8	30.165
99	11 5/8	30.465
99	11 5/8	30.47
100	7	30.66
105	6 3/8	32.165
105	6 1/2	32.17
106	4 3/4	32.45
111	3 3/8	33.67
112	6 1/2	34.305
113	9	34.67
116	10 7/8	36.245
119	6 3/8	36.455
126	8 5/4	38.625
126	10 3/4	38.68
126	7 3/8	39.2
128	7 5/8	39.2
129	0 1/4	39.325
132	-	40.235
135	9 1/8	41.38
137	1 1/4	41.79
137	4 3/4	42.83
140	6 1/4	42.83
141	1 1/8	43.005
141	6 1/4	43.135
142	3 1/4	43.365
144	8 5/8	44.11
145	-	44.195
145	0 1/4	44.2
145	3 1/4	44.28
145	6	44.35
145	6 1/2	44.36
145	7 3/4	44.395
145	8 1/2	44.41
145	9 5/8	44.44
145	10 5/8	44.46
145	10 5/4	44.47
145	0 1/4	44.505
146	0 5/8	44.51
146	1	44.525
146	1 1/2	44.55
146	3 1/2	44.59
146	4 1/4	44.61
146	8 3/8	44.715
146	8 5/8	44.72
146	11 3/4	44.8
147	4 3/4	44.925
147	7 1/8	44.985
147	8 1/4	45.015
147	9 3/8	45.045
148	0 1/4	45.115
149	-	45.415
149	2 3/4	45.485

CONVERSION TABLE ADDED IN
REGISTRAR GENERAL'S DEPARTMENT

DP 14230	FEET INCHES	METRES
149	7	45.595
150	-	45.72
150	1 1/2	45.76
150	1 5/8	45.76
150	2 5/8	45.78
150	3 5/4	45.815
150	4 1/2	45.835
150	5 5/8	45.865
150	5 3/4	45.865
150	6	45.87
150	10 1/2	45.985
151	1 5/8	46.065
151	1 7/8	46.07
151	0 5/4	46.35
152	3	46.405
152	5 5/8	46.465
152	7 7/8	46.53
153	1 1/8	46.665
153	4 1/4	46.74
153	10 5/8	46.9
153	10 1/2	46.92
153	11 1/4	47.335
155	3 1/2	47.505
155	10 3/8	48.095
157	9 1/2	48.23
158	2 5/4	48.375
158	8 5/8	48.515
159	2	48.62
159	6 1/4	48.64
159	7	48.72
159	10 1/8	48.725
159	10 3/8	48.735
159	10 5/8	48.74
160	6	48.92
161	1 3/8	49.11
162	7 1/4	49.56
162	-	49.56
164	8 5/8	49.985
164	164	50.21
165	3 7/8	50.39
165	4 7/8	50.42
166	0 1/2	51.22
168	3 1/2	51.3
169	2	51.56
169	9 1/4	51.75
170	9 1/8	52.05
174	5 7/8	53.18
176	4 1/4	54.36
200	-	60.96
218	2 1/4	66.5
300	-	91.44
566	8	172.72
661	5 5/8	201.51
812	1 1/2	247.54
1458	0 1/4	444.4

CONVERSION TABLE ADDED IN
REGISTRAR GENERAL'S DEPARTMENT

DP 14230	AC RD P	SQ M
-	30 3/4	777.8
-	31	784.1
-	31 1/2	796.7
-	31 3/4	803
-	32 1/4	815.7
-	32 1/2	822
-	33	834.7
-	33 3/4	853.6
-	34	860
-	34 1/2	872.6
-	34 3/4	885.2
-	35	897.9
-	36	910.5
-	36 1/2	923.2
-	36 3/4	929.5
-	38 1/4	967.5
-	38 3/4	980.1
-	39 3/4	1005
-	1 2 1/4	1024
-	1 8 3/4	1069
-	1 15	1233
-	-	1391



NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 24/2/14230

SEARCH DATE	TIME	EDITION NO	DATE
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9/11/2023	12:07 PM	-	-

VOL 6531 FOL 49 IS THE CURRENT CERTIFICATE OF TITLE

LAND

LOT 24 OF SECTION 2 IN DEPOSITED PLAN 14230
LOCAL GOVERNMENT AREA CENTRAL COAST
PARISH OF TUGGERAH COUNTY OF NORTHUMBERLAND
TITLE DIAGRAM DP14230

FIRST SCHEDULE

THE COUNCIL OF THE SHIRE OF WYONG (T K143629)

SECOND SCHEDULE (2 NOTIFICATIONS)

- 1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- 2 C107071 EASEMENT FOR DRAINAGE AFFECTING PART OF THE LAND
ABOVE SHOWN SO BURDENED IN VOL 6531 FOL 49

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

advlegs

PRINTED ON 9/11/2023



NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 36/2/14230

SEARCH DATE	TIME	EDITION NO	DATE
9/11/2023	12:07 PM	-	-

VOL 4836 FOL 150 IS THE CURRENT CERTIFICATE OF TITLE

LAND

LOT 36 OF SECTION 2 IN DEPOSITED PLAN 14230
LOCAL GOVERNMENT AREA CENTRAL COAST
PARISH OF TUGGERAH COUNTY OF NORTHUMBERLAND
TITLE DIAGRAM DP14230

FIRST SCHEDULE

THE COUNCIL OF THE SHIRE OF WYONG (T K237678)

SECOND SCHEDULE (1 NOTIFICATION)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

advlegs

PRINTED ON 9/11/2023



NEW SOUTH WALES LAND REGISTRY SERVICES - TITLE SEARCH

FOLIO: 37/2/14230

SEARCH DATE	TIME	EDITION NO	DATE
9/11/2023	12:07 PM	-	-

VOL 4640 FOL 163 IS THE CURRENT CERTIFICATE OF TITLE

LAND

LOT 37 OF SECTION 2 IN DEPOSITED PLAN 14230
LOCAL GOVERNMENT AREA CENTRAL COAST
PARISH OF TUGGERAH COUNTY OF NORTHUMBERLAND
TITLE DIAGRAM DP14230

FIRST SCHEDULE

THE COUNCIL OF THE SHIRE OF WYONG (T K291813)

SECOND SCHEDULE (2 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 C265257 COVENANT

NOTATIONS

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

advlegs

PRINTED ON 9/11/2023



Appendix B

Results of Field Investigations

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: BH101

CLIENT: Central Coast Council

PAGE: 1 of 1

PROJECT NAME: Proposed Multi-Storey Apartment Building Development

JOB NO: RGS50080.2

SITE LOCATION: 23-25 Ashton Avenue, The Entrance

LOGGED BY: LD

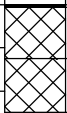
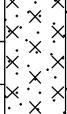
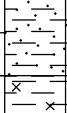
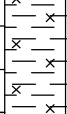
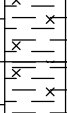
TEST LOCATION: Refer to Figure 1

DATE: 8/11/23

DRILL TYPE: Truck Mounted

EASTING:
SURFACE RL:
BOREHOLE DIAMETER:
INCLINATION: 90°

NORTHING:
DATUM:
AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result		
AD/T		0.30m				GP	0.01m BITUMEN	D	$M < w_p$	S - F	HP	100	WEARING SURFACE FILL
		0.40m		CI		0.25m FILL: Sandy GRAVEL, fine grained, grey, fine to coarse grained sand, with some clay, medium plasticity	$M > w_p$	F - St					RESIDUAL
		0.40m		ML		0.50m FILL: Sandy CLAY, medium plasticity, orange-brown, fine grained sand, with some gravel, fine to medium grained, angular Sandy SILT: Low plasticity, black, fine to medium grained sand							
		0.90m		1.0		CI	1.40m Sandy CLAY: Medium plasticity, grey, fine to medium grained sand	$M < w_p$	St - VSt	HP	250	200	
		1.00m				CH	2.00m Silty CLAY: Medium to high plasticity, pale grey, pale brown, with some sand, fine to medium grained						
		ES											
		SPT		2.0		CI	3.60m Silty CLAY: Medium plasticity, red-brown, with a trace of sand, fine grained	H	HP	550	>600		
		2.2.0											
		1.40m											
		1.50m		3.0		CI	4.45m						
	1.55m												
	ES												
	2.50m		4.0										
	SPT												
	2.5.6												
	N=11		4.45m										
	4.00m												
	SPT												
	7.10.11												
	N=21												
	4.45m												
</													

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition
Water		U ₅₀ 50mm Diameter tube sample		VS	Very Soft	<25	D Dry
 Water Level (Date and time shown)		CBR Bulk sample for CBR testing		S	Soft	25 - 50	M Moist
 Water Inflow		E Environmental sample		F	Firm	50 - 100	W Wet
 Water Outflow		ASS Acid Sulfate Soil Sample		St	Stiff	100 - 200	W _p Plastic Limit
Strata Changes		B Bulk Sample		VSt	Very Stiff	200 - 400	W _L Liquid Limit
--- Gradational or transitional strata		Field Tests		H	Hard	>400	
— Definitive or distinct strata change		PID Photoionisation detector reading (ppm)		Fb	Friable		
		DCP(x-y) Dynamic penetrometer test (test depth interval shown)		Density		V Very Loose	Density Index <15%
		HP Hand Penetrometer test (UCS kPa)		L Loose		MD Medium Dense	Density Index 15 - 35%
				D Dense		D Dense	Density Index 35 - 65%
				VD Very Dense		VD Very Dense	Density Index 65 - 85%
							Density Index 85 - 100%

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: BH102

CLIENT: Central Coast Council

PAGE: 1 of 1

PROJECT NAME: Proposed Multi-Storey Apartment Building Development

JOB NO: RGS50080.2

SITE LOCATION: 23-25 Ashton Avenue, The Entrance

LOGGED BY: LD

TEST LOCATION: Refer to Figure 1

DATE: 8/11/23

DRILL TYPE: Truck Mounted

EASTING:
SURFACE RL:
BOREHOLE DIAMETER:
INCLINATION: 90°

NORTHING:
DATUM:
AHD

Drilling and Sampling					Material description and profile information						Field Test		Structure and additional observations																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)		Moisture Condition	
Water		U ₅₀ 50mm Diameter tube sample		VS	Very Soft	<25		D	Dry
Water Level (Date and time shown)		CBR Bulk sample for CBR testing		S	Soft	25 - 50		M	Moist
Water Inflow		E Environmental sample		F	Firm	50 - 100		W	Wet
Water Outflow		ASS Acid Sulfate Soil Sample		St	Stiff	100 - 200		w _p	Plastic Limit
Strata Changes		B Bulk Sample		VSt	Very Stiff	200 - 400		w _L	Liquid Limit
Gradational or transitional strata		Field Tests		H	Hard	>400			
Definitive or distinct strata change		PID Photoionisation detector reading (ppm)		Fb	Friable				
		DCP(x-y) Dynamic penetrometer test (test depth interval shown)		Density	V	Very Loose	Density Index <15%		
		HP Hand Penetrometer test (UCS kPa)			L	Loose	Density Index 15 - 35%		
					MD	Medium Dense	Density Index 35 - 65%		
					D	Dense	Density Index 65 - 85%		
					VD	Very Dense	Density Index 85 - 100%		



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH103**

CLIENT: Central Coast Council

PAGE: 1 of 1

PROJECT NAME: Proposed Multi-Storey Apartment Building Development

JOB NO: RGS50080.2

SITE LOCATION: 23-25 Ashton Avenue, The Entrance

LOGGED BY: LD

TEST LOCATION: Refer to Figure 1

DATE: 8/11/23

DRILL TYPE: Truck Mounted

EASTING:

SURFACE RL:

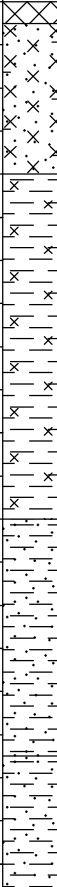
BOREHOLE DIAMETER:

INCLINATION: 90°

NORTHING:

DATUM:

AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations			
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result				
AD/T	Not Encountered	0.10m				CI	0.10m FILL: Sandy Gravelly CLAY, medium plasticity, pale brown, fine to coarse grained sand, fine grained angular gravel Sandy Clayey SILT: Low plasticity, black	M > w _p	F	HP	190	FILL ALLUVIUM			
		ML													
		1.00m				CH	0.80m Silty CLAY: Medium to high plasticity, pale grey, red-brown, pale brown	St - VSt	HP			270			
		SPT 3,3,6 N=9													
		1.45m				2.40m	CI	2.40m Sandy CLAY: Medium plasticity, orange-brown, grey	M < w _p			H / Fr	HP	>600	EXTREMELY WEATHERED SANDSTONE
		2.00m													
		2.10m ES													
		2.50m													
		SPT 10,18,17 N=35				3.50m	CI	3.50m Sandy CLAY: Medium plasticity, grey							
		2.95m													
4.00m	4.15m		4.15m Hole Terminated at 4.15 m												
SPT 25 N=R															
4.15m															

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)		Moisture Condition	
Water		U ₅₀ 50mm Diameter tube sample		VS	Very Soft	<25		D	Dry
Water Level (Date and time shown)		CBR Bulk sample for CBR testing		S	Soft	25 - 50		M	Moist
Water Inflow		E Environmental sample		F	Firm	50 - 100		W	Wet
Water Outflow		ASS Acid Sulfate Soil Sample		St	Stiff	100 - 200		w _p	Plastic Limit
Strata Changes		B Bulk Sample		VSt	Very Stiff	200 - 400		w _L	Liquid Limit
Gradational or transitional strata		Field Tests		H	Hard	>400			
Definitive or distinct strata change		PID Photoionisation detector reading (ppm)		Fb	Friable				
		DCP(x-y) Dynamic penetrometer test (test depth interval shown)		Density	V	Very Loose	Density Index <15%		
		HP Hand Penetrometer test (UCS kPa)			L	Loose	Density Index 15 - 35%		
					MD	Medium Dense	Density Index 35 - 65%		
					D	Dense	Density Index 65 - 85%		
					VD	Very Dense	Density Index 85 - 100%		

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: BH201

CLIENT: Central Coast Council

PAGE: 1 of 3

PROJECT NAME: Proposed Multi-Storey Apartment Building Development

JOB NO: RGS50080.2

SITE LOCATION: 23-25 Ashton Avenue, The Entrance

LOGGED BY: LD

TEST LOCATION: Refer to Figure 1

DATE: 7/11/23

DRILL TYPE: Truck Mounted

EASTING:
SURFACE RL:
BOREHOLE DIAMETER: 100 mm

INCLINATION: 90°

NORTHING:
DATUM: AHD

Drilling and Sampling				Material description and profile information				Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	
AD/T	Not Encountered	0.20m				SP	FILL: Gravelly SAND, fine to coarse grained, orange-brown, fine to medium grained, subangular gravel, with a trace of clay	M		FILL
		0.30m ES				ML	FILL: Silty SAND, fine to medium grained, black			
		0.50m								
		B				CI	Silty CLAY: Medium plasticity, pale grey, pale brown, with a trace of sand, fine grained	M > w _p	F - St	ALLUVIAL
		0.90m		1.0						
		1.00m								
		SPT 1,2,3 N=5							HP	120 - 150
		1.45m								
		2.00m		2.0		CI	Silty CLAY: Medium plasticity, pale grey, pale brown, with a trace of sand, fine grained	M < w _p	St - VSt	RESIDUAL
		2.10m ES								
		2.50m								
		SPT 3,4,5 N=9							HP	250
		2.95m		3.0						
		4.00m		4.0		CI	Silty CLAY: Medium plasticity, red-brown, with a trace of gravel, fine to medium grained, angular			
		SPT 4,9,13 N=22				CI	Silty CLAY: Medium plasticity, pale grey, pale brown, with red-brown bands	VSt - H	HP	450
		4.45m				CI	Sandy CLAY: Medium plasticity		HP	320
		5.50m		5.0						
		SPT 25/90mm N=R				CI	Sandy CLAY: Medium plasticity, grey	H / Fr		EXTREMELY WEATHERED SANDSTONE
		5.59m								

LEGEND:
Water

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes

- Gradational or transitional strata
- Definitive or distinct strata change

Notes, Samples and Tests

- U₅₀ 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample
- ASS Acid Sulfate Soil Sample
- B Bulk Sample

Field Tests

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency

- VS Very Soft <25
- S Soft 25 - 50
- F Firm 50 - 100
- St Stiff 100 - 200
- VSt Very Stiff 200 - 400
- H Hard >400
- Fb Friable

Density

- V Very Loose
- L Loose
- MD Medium Dense
- D Dense
- VD Very Dense

UCS (kPa)

- <25
- 25 - 50
- 50 - 100
- 100 - 200
- 200 - 400
- >400

Moisture Condition

- D Dry
- M Moist
- W Wet
- W_p Plastic Limit
- W_L Liquid Limit

- Density Index <15%
- Density Index 15 - 35%
- Density Index 35 - 65%
- Density Index 65 - 85%
- Density Index 85 - 100%



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: BH201

CLIENT: Central Coast Council
PROJECT NAME: Proposed Multi-Storey Apartment Building Development
SITE LOCATION: 23-25 Ashton Avenue, The Entrance
TEST LOCATION: Refer to Figure 1

PAGE: 2 of 3
JOB NO: RGS50080.2
LOGGED BY: LD
DATE: 7/11/23

DRILL TYPE: Truck Mounted
BOREHOLE DIAMETER: 100 mm
INCLINATION: 90°
EASTING:
NORTHING:
SURFACE RL: AHD
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
AD/T	Not Encountered					CI	Sandy CLAY: Medium plasticity, grey (continued) 6.90m Auger refusal at 6.8m Continued as Cored Drill Hole	M < w _p	H / Fr			
				7.0								
				8.0								
				9.0								
				10.0								
				11.0								

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition	
Water		U ₅₀ 50mm Diameter tube sample		VS	Very Soft	<25	D	Dry
Water Level (Date and time shown)		CBR Bulk sample for CBR testing		S	Soft	25 - 50	M	Moist
Water Inflow		E Environmental sample		F	Firm	50 - 100	W	Wet
Water Outflow		ASS Acid Sulfate Soil Sample		St	Stiff	100 - 200	W _p	Plastic Limit
Strata Changes		B Bulk Sample		VSt	Very Stiff	200 - 400	W _L	Liquid Limit
Gradational or transitional strata		Field Tests		H	Hard	>400		
Definitive or distinct strata change		PID Photoionisation detector reading (ppm)		Fb	Friable			
		DCP(x-y) Dynamic penetrometer test (test depth interval shown)		Density	V	Very Loose	Density Index <15%	
		HP Hand Penetrometer test (UCS kPa)			L	Loose	Density Index 15 - 35%	
					MD	Medium Dense	Density Index 35 - 65%	
					D	Dense	Density Index 65 - 85%	
					VD	Very Dense	Density Index 85 - 100%	



ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH202**

CLIENT: Central Coast Council

PAGE: 1 of 3

PROJECT NAME: Proposed Multi-Storey Apartment Building Development

JOB NO: RGS50080.2

SITE LOCATION: 23-25 Ashton Avenue, The Entrance

LOGGED BY: LD

TEST LOCATION: Refer to Figure 1

DATE: 7/11/23

DRILL TYPE: Truck Mounted

EASTING:

SURFACE RL:

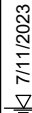
BOREHOLE DIAMETER: 100 mm

INCLINATION: 90°

NORTHING:

DATUM:

AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
AD/T	 7/11/2023					SM	FILL: Silty SAND, fine to coarse grained, black, fine to coarse grained	M				FILL
						CH	0.50m FILL: Sandy CLAY, medium to high plasticity, dark brown, fine grained sand	M > w _p	F			
		1.00m		1.0		CI	0.80m Silty CLAY: Medium plasticity, pale grey, pale brown		St - VSt			RESIDUAL
		1.10m U										
		1.40m										
		SPT 3,6,6 N=12		2.0			1.50m Sandy CLAY: Medium plasticity, grey, pale brown, fine grained sand	M < w _p	H / Fr	HP	380	
		1.85m								HP	>600	
		2.50m										
		SPT 4,3,22 N=25		3.0		2.80m Sandy CLAY: Medium plasticity, grey, fine grained sand						EXTREMELY WEATHERED SANDSTONE SPT bouncing from 2.85m
		2.95m										
		4.00m		4.0		4.10m	Continued as Cored Drill Hole					
		SPT 25/10mm N=R 4.01m		5.0								

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: BH203

CLIENT: Central Coast Council

PAGE: 1 of 1

PROJECT NAME: Proposed Multi-Storey Apartment Building Development

JOB NO: RGS50080.2

SITE LOCATION: 23-25 Ashton Avenue, The Entrance

LOGGED BY: LD

TEST LOCATION: Refer to Figure 1

DATE: 7/11/23

DRILL TYPE: Truck Mounted

EASTING:
SURFACE RL:
BOREHOLE DIAMETER: 100 mm

INCLINATION: 90°

NORTHING:
DATUM: AHD

Drilling and Sampling				Material description and profile information				Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (Not measured)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	
AD/T	Not Encountered					CI	0.02m BITUMEN 0.40m FILL: Sandy Gravelly CLAY, medium plasticity, pale brown	D		WEARING SURFACE FILL
		1.00m		1.0		ML	Sandy Clayey SILT: Low plasticity, black	M > w _p	F - St	ALLUVIUM
		SPT 2,2,3 N=5				CH	1.10m Silty CLAY: Medium to high plasticity, grey, pale brown, with a trace of sand, fine grained			RESIDUAL
		1.45m		2.0					HP	130 - 160
		2.50m SPT 17,25/130mm N=R				CI	2.40m Sandy CLAY: Medium plasticity, red-brown, pale brown	M < w _p	H / Fr	EXTREMELY WEATHERED SANDSTONE
		2.78m		3.0			3.00m Hole Terminated at 3.00 m			
				4.0						
				5.0						

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition	
Water		U ₅₀ 50mm Diameter tube sample		VS	Very Soft	<25	D	Dry
Water Level (Date and time shown)		CBR Bulk sample for CBR testing		S	Soft	25 - 50	M	Moist
Water Inflow		E Environmental sample		F	Firm	50 - 100	W	Wet
Water Outflow		ASS Acid Sulfate Soil Sample		St	Stiff	100 - 200	w _p	Plastic Limit
Strata Changes		B Bulk Sample		VSt	Very Stiff	200 - 400	w _L	Liquid Limit
--- Gradational or transitional strata		Field Tests		H	Hard	>400		
— Definitive or distinct strata change		PID Photoionisation detector reading (ppm)		Fb	Friable			
		DCP(x-y) Dynamic penetrometer test (test depth interval shown)		Density	V	Very Loose	Density Index <15%	
		HP Hand Penetrometer test (UCS kPa)			L	Loose	Density Index 15 - 35%	
					MD	Medium Dense	Density Index 35 - 65%	
					D	Dense	Density Index 65 - 85%	
					VD	Very Dense	Density Index 85 - 100%	

BOREHOLE NO: **BH204**

CLIENT: Central Coast Council

PAGE: 1 of 1

PROJECT NAME: Proposed Multi-Storey Apartment Building Development

JOB NO: RGS50080.2

SITE LOCATION: 23-25 Ashton Avenue, The Entrance

LOGGED BY: LD

TEST LOCATION: Refer to Figure 1

DATE: 7/11/23

DRILL TYPE: Truck Mounted

EASTING:

SURFACE RL:

BOREHOLE DIAMETER: 100 mm

INCLINATION: 90°

NORTHING:

DATUM: AHD

[illegible]

LEGEND:

Water

-  Water Level
 (Date and time shown)
 Water Inflow
 Water Outflow

Strata Changes

- — Gradational or transitional strata
— Definitive or distinct strata change

Notes, Samples and Tests

- | | |
|-----------------|-----------------------------|
| U ₅₀ | 50mm Diameter tube sample |
| CBR | Bulk sample for CBR testing |
| E | Environmental sample |
| ASS | Acid Sulfate Soil Sample |
| B | Bulk Sample |

Field Tests

- | | |
|----------|---|
| PID | Photoionisation detector reading (ppm) |
| DCP(x-y) | Dynamic penetrometer test (test depth interval shown) |
| HP | Hand Penetrometer test (UCS kPa) |

Consistency

- | | |
|-----|------------|
| VS | Very Soft |
| S | Soft |
| F | Firm |
| St | Stiff |
| VSt | Very Stiff |
| H | Hard |
| Eh | Eriable |

UCS (kPa)
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800
2900
3000
3100
3200
3300
3400
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4000
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4200
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8500
8600
8700
8800
8900
9000
9100
9200
9300
9400
9500
9600
9700
9800
9900
10000

- <25
25 - 50
50 - 100
100 - 200
200 - 400
>400

Moisture Condition

- | | |
|-------|---------------|
| D | Dry |
| M | Moist |
| W | Wet |
| W_p | Plastic Limit |
| W_L | Liquid Limit |

Density

- | Density | | | |
|---------|--------------|-------------------------|--|
| V | Very Loose | Density Index <15% | |
| L | Loose | Density Index 15 - 35% | |
| MD | Medium Dense | Density Index 35 - 65% | |
| D | Dense | Density Index 65 - 85% | |
| VD | Very Dense | Density Index 85 - 100% | |



Appendix C

Laboratory Test Result Sheets



CERTIFICATE OF ANALYSIS

Work Order : **ES2339275**
Client : **REGIONAL GEOTECHNICAL SOLUTION**
Contact : LOUIS DAVIDSON
Address : 2 Murray Dwyer Cct
Mayfield West 2304
Telephone : +61 02 6553 5641
Project : RGS50080.2 Apartment Development
Order number : ----
C-O-C number : ----
Sampler : ----
Site : The Entrance
Quote number : EN/222
No. of samples received : 14
No. of samples analysed : 12

Page : 1 of 14
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 13-Nov-2023 16:11
Date Analysis Commenced : 14-Nov-2023
Issue Date : 21-Nov-2023 14:17



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Alana Smylie	Team Leader - Asbestos	Newcastle - Asbestos, Mayfield West, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Brendan Schrader	Laboratory Technician	Newcastle - Asbestos, Mayfield West, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG005T: Poor precision was obtained for Nickel on sample ES2339194 # 009. Confirmed by re-digestion and reanalysis.
- EP071: Results of sample S102 have been confirmed by re-extraction and re-analysis.
- **EA200 Legend**
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Analysis of asbestos from swabs and tapes is not covered under the current scope of NATA accreditation.
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.
- EA200: N/A - Not Applicable



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S101 DEPTH - 0.05-0.1	S102 DEPTH - 0.05-0.1	S103 DEPTH - 0.05-0.1	S104 DEPTH - 0.05-0.1	S105 DEPTH - 0.05-0.1
Sampling date / time				07-Nov-2023 00:00	07-Nov-2023 00:00	07-Nov-2023 16:30	07-Nov-2023 16:55	07-Nov-2023 17:10
Compound	CAS Number	LOR	Unit	ES2339275-001	ES2339275-002	ES2339275-003	ES2339275-004	ES2339275-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	6.3	4.4	7.8	11.7	12.4
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No
Asbestos (Trace)	1332-21-4	-	-	No	No	No	No	No
Asbestos Type	1332-21-4	-	--	-	-	-	-	-
Synthetic Mineral Fibre	----	-	--	No	No	No	No	No
Organic Fibre	----	-	--	No	No	No	No	No
Sample weight (dry)	----	0.01	g	216	309	350	324	248
APPROVED IDENTIFIER:	----	-	--	A. SMYLYE	A. SMYLYE	A. SMYLYE	A. SMYLYE	A. SMYLYE
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	56	33	12	13	7
Copper	7440-50-8	5	mg/kg	51	27	26	11	13
Lead	7439-92-1	5	mg/kg	<5	<5	17	5	19
Nickel	7440-02-0	2	mg/kg	85	53	37	13	10
Zinc	7440-66-6	5	mg/kg	44	35	44	49	59
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S101 DEPTH - 0.05-0.1	S102 DEPTH - 0.05-0.1	S103 DEPTH - 0.05-0.1	S104 DEPTH - 0.05-0.1	S105 DEPTH - 0.05-0.1
Sampling date / time				07-Nov-2023 00:00	07-Nov-2023 00:00	07-Nov-2023 16:30	07-Nov-2023 16:55	07-Nov-2023 17:10
Compound	CAS Number	LOR	Unit	ES2339275-001	ES2339275-002	ES2339275-003	ES2339275-004	ES2339275-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S101 DEPTH - 0.05-0.1	S102 DEPTH - 0.05-0.1	S103 DEPTH - 0.05-0.1	S104 DEPTH - 0.05-0.1	S105 DEPTH - 0.05-0.1
Sampling date / time				07-Nov-2023 00:00	07-Nov-2023 00:00	07-Nov-2023 16:30	07-Nov-2023 16:55	07-Nov-2023 17:10
Compound	CAS Number	LOR	Unit	ES2339275-001	ES2339275-002	ES2339275-003	ES2339275-004	ES2339275-005
				Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued								
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S101 DEPTH - 0.05-0.1	S102 DEPTH - 0.05-0.1	S103 DEPTH - 0.05-0.1	S104 DEPTH - 0.05-0.1	S105 DEPTH - 0.05-0.1
Sampling date / time				07-Nov-2023 00:00	07-Nov-2023 00:00	07-Nov-2023 16:30	07-Nov-2023 16:55	07-Nov-2023 17:10
Compound	CAS Number	LOR	Unit	ES2339275-001	ES2339275-002	ES2339275-003	ES2339275-004	ES2339275-005
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	620	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	4350	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	4970	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	1950	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	3080	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	110	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	5140	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	1950	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S101 DEPTH - 0.05-0.1	S102 DEPTH - 0.05-0.1	S103 DEPTH - 0.05-0.1	S104 DEPTH - 0.05-0.1	S105 DEPTH - 0.05-0.1
Sampling date / time					07-Nov-2023 00:00	07-Nov-2023 00:00	07-Nov-2023 16:30	07-Nov-2023 16:55	07-Nov-2023 17:10
Compound	CAS Number	LOR	Unit	ES2339275-001	ES2339275-002	ES2339275-003	ES2339275-004	ES2339275-005	
				Result	Result	Result	Result	Result	
EP080: BTEXN - Continued									
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1	
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%	82.9	86.6	76.5	78.0	75.8	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%	96.3	97.2	92.4	93.7	96.5	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%	78.6	76.4	85.3	89.3	84.0	
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%	82.0	86.0	84.0	83.2	80.8	
2-Chlorophenol-D4	93951-73-6	0.5	%	81.2	81.6	83.7	81.2	81.2	
2,4,6-Tribromophenol	118-79-6	0.5	%	79.0	85.8	80.0	89.6	81.7	
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%	89.5	84.2	89.8	91.3	89.2	
Anthracene-d10	1719-06-8	0.5	%	97.1	95.5	98.5	96.1	105	
4-Terphenyl-d14	1718-51-0	0.5	%	102	102	103	103	102	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	90.9	86.4	87.4	82.2	86.6	
Toluene-D8	2037-26-5	0.2	%	86.8	84.5	84.5	82.4	82.5	
4-Bromofluorobenzene	460-00-4	0.2	%	101	97.7	99.3	94.7	94.5	



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S106 DEPTH - 0.05-0.1	S107 DEPTH - 0.4-0.5	S108 DEPTH - 0.1-0.2	S109 DEPTH - 0.2-0.3	D101 DEPTH - 0.05-0.1
Sampling date / time				07-Nov-2023 17:20	08-Nov-2023 08:00	08-Nov-2023 11:15	08-Nov-2023 12:20	07-Nov-2023 16:30
Compound	CAS Number	LOR	Unit	ES2339275-006	ES2339275-007	ES2339275-008	ES2339275-009	ES2339275-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	3.0	19.5	10.8	11.6	22.1
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	----
Asbestos (Trace)	1332-21-4	-	-	No	No	No	No	----
Asbestos Type	1332-21-4	-	--	-	-	-	-	----
Synthetic Mineral Fibre	----	-	--	No	No	No	No	----
Organic Fibre	----	-	--	No	No	No	No	----
Sample weight (dry)	----	0.01	g	430	238	154	262	----
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	15	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	20	<2	8	5	15
Copper	7440-50-8	5	mg/kg	41	<5	14	<5	25
Lead	7439-92-1	5	mg/kg	<5	6	57	<5	24
Nickel	7440-02-0	2	mg/kg	63	<2	8	<2	37
Zinc	7440-66-6	5	mg/kg	30	232	90	16	37
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S106 DEPTH - 0.05-0.1	S107 DEPTH - 0.4-0.5	S108 DEPTH - 0.1-0.2	S109 DEPTH - 0.2-0.3	D101 DEPTH - 0.05-0.1
Sampling date / time				07-Nov-2023 17:20	08-Nov-2023 08:00	08-Nov-2023 11:15	08-Nov-2023 12:20	07-Nov-2023 16:30
Compound	CAS Number	LOR	Unit	ES2339275-006	ES2339275-007	ES2339275-008	ES2339275-009	ES2339275-010
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S106 DEPTH - 0.05-0.1	S107 DEPTH - 0.4-0.5	S108 DEPTH - 0.1-0.2	S109 DEPTH - 0.2-0.3	D101 DEPTH - 0.05-0.1
Sampling date / time					07-Nov-2023 17:20	08-Nov-2023 08:00	08-Nov-2023 11:15	08-Nov-2023 12:20	07-Nov-2023 16:30
Compound	CAS Number	LOR	Unit	ES2339275-006	ES2339275-007	ES2339275-008	ES2339275-009	ES2339275-010	
				Result	Result	Result	Result	Result	
EP068B: Organophosphorus Pesticides (OP) - Continued									
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S106 DEPTH - 0.05-0.1	S107 DEPTH - 0.4-0.5	S108 DEPTH - 0.1-0.2	S109 DEPTH - 0.2-0.3	D101 DEPTH - 0.05-0.1
Sampling date / time				07-Nov-2023 17:20	08-Nov-2023 08:00	08-Nov-2023 11:15	08-Nov-2023 12:20	07-Nov-2023 16:30
Compound	CAS Number	LOR	Unit	ES2339275-006	ES2339275-007	ES2339275-008	ES2339275-009	ES2339275-010
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	0.6	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S106 DEPTH - 0.05-0.1	S107 DEPTH - 0.4-0.5	S108 DEPTH - 0.1-0.2	S109 DEPTH - 0.2-0.3	D101 DEPTH - 0.05-0.1
Sampling date / time					07-Nov-2023 17:20	08-Nov-2023 08:00	08-Nov-2023 11:15	08-Nov-2023 12:20	07-Nov-2023 16:30
Compound	CAS Number	LOR	Unit	ES2339275-006	ES2339275-007	ES2339275-008	ES2339275-009	ES2339275-010	
				Result	Result	Result	Result	Result	
EP080: BTEXN - Continued									
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1	
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%	77.7	73.6	74.7	78.4	87.8	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%	100	87.1	92.4	100	107	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%	85.9	82.3	85.6	87.6	83.9	
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%	83.3	85.1	85.0	90.8	102	
2-Chlorophenol-D4	93951-73-6	0.5	%	87.2	85.8	82.7	93.7	94.5	
2,4,6-Tribromophenol	118-79-6	0.5	%	75.4	73.3	88.3	87.0	87.3	
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%	85.3	83.2	89.6	104	101	
Anthracene-d10	1719-06-8	0.5	%	94.1	98.0	94.4	102	110	
4-Terphenyl-d14	1718-51-0	0.5	%	107	108	103	85.1	96.6	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	88.5	83.6	92.2	93.9	83.2	
Toluene-D8	2037-26-5	0.2	%	78.3	79.8	88.8	84.9	74.6	
4-Bromofluorobenzene	460-00-4	0.2	%	96.2	91.6	104	104	92.0	



Analytical Results

Sub-Matrix: SOLID (Matrix: SOLID)				Sample ID	GS1	GS2	----	----	----
Sampling date / time					08-Nov-2023 00:00	08-Nov-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2339275-013	ES2339275-014	-----	-----	-----
					Result	Result	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos Detected	1332-21-4	0.1	g/kg		No	No	----	----	----
Asbestos Type	1332-21-4	-	--		-	-	----	----	----
Asbestos (Trace)	1332-21-4	-	-		No	No	----	----	----
Sample weight (dry)	----	0.01	g		31.8	26.3	----	----	----
Synthetic Mineral Fibre	----	-	-		No	No	----	----	----
Organic Fibre	----	-	-		Yes	Yes	----	----	----
APPROVED IDENTIFIER:	----	-	--		J. Page	J. Page	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: SOIL		
Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	S101DEPTH - 0.05-0.1 - 07-Nov-2023 00:00	Soil sample.
EA200: Description	S102DEPTH - 0.05-0.1 - 07-Nov-2023 00:00	Soil sample.
EA200: Description	S103DEPTH - 0.05-0.1 - 07-Nov-2023 16:30	Soil sample.
EA200: Description	S104DEPTH - 0.05-0.1 - 07-Nov-2023 16:55	Soil sample.
EA200: Description	S105DEPTH - 0.05-0.1 - 07-Nov-2023 17:10	Soil sample.
EA200: Description	S106DEPTH - 0.05-0.1 - 07-Nov-2023 17:20	Soil sample.
EA200: Description	S107DEPTH - 0.4-0.5 - 08-Nov-2023 08:00	Soil sample.
EA200: Description	S108DEPTH - 0.1-0.2 - 08-Nov-2023 11:15	Soil sample.
EA200: Description	S109DEPTH - 0.2-0.3 - 08-Nov-2023 12:20	Soil sample.

Sub-Matrix: SOLID		
Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples		
EA200: Description	GS1 - 08-Nov-2023 00:00	Several pieces of organic fibre board.
EA200: Description	GS2 - 08-Nov-2023 00:00	Several pieces of organic fibre board.



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2,4,6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	63	125
Toluene-D8	2037-26-5	67	124
4-Bromofluorobenzene	460-00-4	66	131

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry) 9854 (Biology).

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

(SOLID) EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples



QUALITY CONTROL REPORT

Work Order	: ES2339275	Page	: 1 of 12
Client	: REGIONAL GEOTECHNICAL SOLUTION	Laboratory	: Environmental Division Sydney
Contact	: LOUIS DAVIDSON	Contact	: Customer Services ES
Address	: 2 Murray Dwyer Cct Mayfield West 2304	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 6553 5641	Telephone	: +61-2-8784 8555
Project	: RGS50080.2 Apartment Development	Date Samples Received	: 13-Nov-2023
Order number	: ----	Date Analysis Commenced	: 14-Nov-2023
C-O-C number	: ----	Issue Date	: 21-Nov-2023
Sampler	: ----		
Site	: The Entrance		
Quote number	: EN/222		
No. of samples received	: 14		
No. of samples analysed	: 12		



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Alana Smylie	Team Leader - Asbestos	Newcastle - Asbestos, Mayfield West, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Brendan Schrader	Laboratory Technician	Newcastle - Asbestos, Mayfield West, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Laboratory Duplicate (DUP) Report

Sub-Matrix: SOIL

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 5429371)									
ES2339194-009	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	13	11	21.6	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	48	# 61	23.8	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	22	19	18.3	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	12	11	9.1	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	75	64	15.4	0% - 50%
ES2339275-003	S103 DEPTH - 0.05-0.1	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	12	10	17.1	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	37	34	6.7	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	26	25	3.9	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	17	12	37.6	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	44	36	21.6	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 5426712)									
ES2338897-001	Anonymous	EA055: Moisture Content	----	0.1	%	32.2	31.7	1.6	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 5429383)									
ES2339194-013	Anonymous	EA055: Moisture Content	----	0.1 (1.0)*	%	2.5	2.8	8.6	No Limit
ES2339275-003	S103 DEPTH - 0.05-0.1	EA055: Moisture Content	----	0.1 (1.0)*	%	7.8	7.8	0.0	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 5429384)									



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 5429384) - continued									
ES2339278-002	Anonymous	EA055: Moisture Content	----	0.1 (1.0)*	%	7.7	7.4	3.4	No Limit
ES2339620-002	Anonymous	EA055: Moisture Content	----	0.1 (1.0)*	%	46.7	46.2	1.1	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 5429370)									
ES2339194-009	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.1	<0.1	0.0	No Limit
ES2339275-003	S103 DEPTH - 0.05-0.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 5421712)									
ES2339194-002	Anonymous	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2339275-008	S108 DEPTH - 0.1-0.2	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 5421713)									
ES2339194-002	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES2339275-008	S108 DEPTH - 0.1-0.2	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 5421713) - continued									
ES2339275-008	S108 DEPTH - 0.1-0.2	EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 5421713)									
ES2339194-002	Anonymous	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES2339275-008	S108 DEPTH - 0.1-0.2	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 5421713) - continued									
ES2339275-008	S108 DEPTH - 0.1-0.2	EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 5421711)									
ES2339194-002	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	0.7	0.6	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	0.7	0.6	15.4	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		ES2339275-008	S108 DEPTH - 0.1-0.2	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5
EP075(SIM): Acenaphthylene	208-96-8			0.5	mg/kg	<0.5	<0.5	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 5421711) - continued									
ES2339275-008	S108 DEPTH - 0.1-0.2	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5421710)									
ES2339194-002	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES2339275-008	S108 DEPTH - 0.1-0.2	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 5422966)									
ES2339194-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES2339275-001	S101 DEPTH - 0.05-0.1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5421710)									
ES2339194-002	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES2339275-008	S108 DEPTH - 0.1-0.2	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5422966)									
ES2339194-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit

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 Work Order : ES2339275
 Client : REGIONAL GEOTECHNICAL SOLUTION
 Project : RGS50080.2 Apartment Development



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 5422966) - continued									
ES2339275-001	S101 DEPTH - 0.05-0.1	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080: BTEXN (QC Lot: 5422966)									
ES2339194-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
ES2339275-001	S101 DEPTH - 0.05-0.1	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
		EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 5429371)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	110	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	102	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	116	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	111	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	101	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	91.6	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	89.5	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 5429370)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	96.0	70.0	125
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 5421712)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	91.0	62.0	126
EP068A: Organochlorine Pesticides (OC) (QCLot: 5421713)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	85.1	69.0	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	93.4	65.0	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	87.0	67.0	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	95.9	68.0	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	84.4	65.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	88.1	67.0	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	92.6	69.0	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	93.8	62.0	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	88.9	63.0	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	91.8	66.0	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	91.7	64.0	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	88.2	66.0	116
EP068: 4,4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	89.6	67.0	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.9	67.0	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	91.6	69.0	115
EP068: 4,4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	94.6	69.0	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	90.8	56.0	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	92.9	62.0	124



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP068A: Organochlorine Pesticides (OC) (QCLot: 5421713) - continued								
EP068: 4,4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	85.3	66.0	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	89.8	64.0	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	85.4	54.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 5421713)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	96.5	59.0	119
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	97.7	62.0	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	92.8	54.0	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	93.1	67.0	119
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	93.2	70.0	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	90.8	72.0	120
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	79.2	68.0	120
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	94.7	68.0	122
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	86.0	69.0	117
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	92.8	76.0	118
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	79.6	64.0	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	93.1	70.0	116
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	88.4	69.0	121
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	96.7	66.0	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	82.4	68.0	124
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	90.2	62.0	112
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	86.8	68.0	120
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	93.3	65.0	127
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	74.2	41.0	123
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 5421711)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	94.0	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	99.4	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	93.6	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	97.6	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	102	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	96.5	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	103	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	93.5	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	105	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	97.1	75.0	127



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP075(SIM): Polynuclear Aromatic Hydrocarbons (QCLot: 5421711) - continued								
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	6 mg/kg	92.5	68.0	116
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	99.0	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	95.3	70.0	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	79.9	61.0	121
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	76.6	62.0	118
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	71.6	63.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5421710)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	117	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	94.1	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	97.2	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5422966)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	83.2	72.2	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5421710)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	103	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	91.4	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	93.2	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5422966)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	78.9	72.4	133
EP080: BTEXN (QCLot: 5422966)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	85.2	76.0	124
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	79.4	78.5	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	78.8	77.4	121
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	81.7	78.2	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	91.3	81.3	121
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	102	78.8	122

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number			Low	High



Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 5429371)							
ES2339194-009	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	100.0	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	94.7	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	103	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	97.7	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	93.6	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	127	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	85.7	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 5429370)							
ES2339194-009	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	97.2	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 5421712)							
ES2339194-002	Anonymous	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	96.1	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 5421713)							
ES2339194-002	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	79.0	70.0	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	88.8	70.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	77.6	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	111	70.0	130
		EP068: Endrin	72-20-8	2 mg/kg	104	70.0	130
		EP068: 4,4'-DDT	50-29-3	2 mg/kg	82.4	70.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 5421713)							
ES2339194-002	Anonymous	EP068: Diazinon	333-41-5	0.5 mg/kg	99.8	70.0	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	86.4	70.0	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	95.0	70.0	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	83.3	70.0	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	77.7	70.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 5421711)							
ES2339194-002	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	98.5	70.0	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	93.6	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5421710)							
ES2339194-002	Anonymous	EP071: C10 - C14 Fraction	----	480 mg/kg	92.1	73.0	137
		EP071: C15 - C28 Fraction	----	3100 mg/kg	101	53.0	131
		EP071: C29 - C36 Fraction	----	2060 mg/kg	109	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 5422966)							
ES2339194-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	69.0	60.4	142
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5421710)							
ES2339194-002	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	96.9	73.0	137
		EP071: >C16 - C34 Fraction	----	4320 mg/kg	105	53.0	131



Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5421710) - continued							
ES2339194-002	Anonymous	EP071: >C34 - C40 Fraction	----	890 mg/kg	100	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 5422966)							
ES2339194-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	69.2	61.1	142
EP080: BTEXN (QCLot: 5422966)							
ES2339194-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	71.1	62.1	122
		EP080: Toluene	108-88-3	2.5 mg/kg	69.2	66.6	119
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	69.3	67.4	123
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	69.1	66.4	121
			106-42-3				
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	79.6	70.7	121
		EP080: Naphthalene	91-20-3	2.5 mg/kg	92.4	61.1	115



Appendix D

Letter from Dr David Tully CEnvP SC

Contaminated Land Solutions

7 December 2023

Ref: CLS0302.L01

Regional Geotechnical Solutions Pty Ltd
2 Murray Dwyer Circuit
Mayfield West
NSW 2304

For the attention of Louis Davidson

Dear Louis,

RE: Report Review: Preliminary Site Contamination Assessment – Proposed Multistorey Apartment Building Development 23-25 Ashton Avenue, The Entrance, NSW

I, Dr David Tully of Contaminated Land Solutions Pty Ltd, am a Certified Environmental Practitioner Site Contamination Specialist (General Certified Environmental Practitioner certification no. 1138 and Site Contamination Specialist certification no. SC40084).

I confirm I have reviewed the Regional Geotechnical Solutions report entitled "*Preliminary Site Contamination Assessment – Proposed Multistorey Apartment Building Development 23-25 Ashton Avenue, The Entrance, NSW*" (Ref: RGS50080.2-AB), dated 6 December 2023 and a copy of which I have retained.

I can confirm that on the basis of the information contained within the report, I support the conclusions and recommendations provided therein.

Should the client, regulator or local authority have any queries regarding the report review, I can be contacted by e-mail via david.tully@contaminatedlandsolutions.com.au. Specific queries regarding the content of the report should be addressed to Louis Davidson at Regional Geotechnical Solutions.

For and on behalf of

Contaminated Land Solutions Pty Ltd

Dr David Tully CEnvP SC
Director

Contaminated Land Solutions Pty Ltd



Contaminated Land Solutions Pty Ltd
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