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DETAILED SITE INVESTIGATION
&
REMEDIAL ACTION PLAN

LOTS 2 & 3 IN DP1115877 AND PART LOT 3 IN DP942319
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD

REPORT NO 20223/3-AA 14 MARCH 2024

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Job No: 20223/3
Our Ref: 20223/3-AA
14 March 2024

Sekisui House
C/- Willowtree Planning
Suite 1, Level 10, 56 Berry Street
NORTH SYDNEY NSW 2060
Email: cgray@willowtp.com.au

Attention: Mr C Gray

Dear Sir

Re: **Lots 2 & 3 in DP1115877 and Part Lot 3 in DP942319**
53A, 53B & 53 Warriewood Road, Warriewood
Detailed Site Investigation & Remedial Action Plan

Please find herewith our Detailed Site Investigation (DSI) and Remedial Action Plan (RAP) for the above site.

A brief of the outcome of the assessment was summarised in the Executive Summary.

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

Yours faithfully
GEOTECHNIQUE PTY LTD

ANWAR BARBHUYIA
Senior Associate
B.E (Civil), MEngSc (Enviro), MIEAust

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EXECUTIVE SUMMARY

Further to the following reports and documents:

- Phase 1 preliminary contamination assessment (PCA) report (Report No 13234/2-AA dated 25 August 2014), prepared by Geotechnique Pty Ltd (Geotechnique) for the property registered as Lots 2 and 3 in DP1115877 and Part Lot 3 in DP942319, located at 53A, 53B and 53 Warriewood Road, Warriewood
- Phase 2 contamination assessment (CA) report (Report No 13757/2-AA dated 27 June 2016) prepared by Geotechnique for a parcel of land currently registered as Lots 2 and 3 in DP1115877, located at 53A and 53B Warriewood Road, Warriewood
- Contamination assessment (CA) report update (Our Ref: 20223/1-AA dated 28 July 2022, prepared by Geotechnique for a parcel of land currently registered as Lot 2 in DP1115877, located at 53A Warriewood Road, Warriewood

This executive summary presents a synopsis of a Detailed Site Investigation (DSI) and Remedial Action Plan (RAP) for the parcel of land currently registered Lots 2 and 3 in DP1115877 and Part Lot 3 in DP942319, located at 53A, 53B and 53 Warriewood Road, Warriewood (hereafter referred as the site), indicated on Figure 1 (page 1 of the report).

It is understood that residential subdivision is the future use of the site.

The objective of the DSI was to delineate the extent of previously identified friable asbestos and PAH contamination. It also included contamination assessment of soil within Part Lot 3 in DP942319 (53 Warriewood Road), as no contamination assessment was carried out for this part of the site yet.

The objectives of the RAP were to provide methods of remediation that can be implemented and validated so that a statement can be made declaring the site environmentally suitable for the future use as residential subdivision, to ensure all remediation works are carried out with due regard to the protection of the environment; to ensure all remediation works comply with current regulations and guidelines; and to provide details of the validation processes to be adopted during and at completion of remediation.

To achieve the objectives of the DSI and RAP, the scope of works included review of the previous contamination assessment reports, detailed sampling and testing of soil in the vicinity of previously identified asbestos [asbestos fines (AF) and fibrous asbestos (FA)] contaminated soil in sample locations (TP14, TP25 & FCP2) and PAH contaminated soil in sample location (TP20) within Lots 2 and 3 in DP1115877 (53A & 53B Warriewood Road), systematic sampling at eight (8) sampling locations within part of Lot 3 in DP942319 (53 Warriewood Road), developing suitable remediation and validation strategies for the site and preparation of this report.

The general soil profile within the majority of the site comprised imported and site originated fill overlying natural clayey silt, sandy silt and clayey soil overlying natural sandy silt and/or clay or sandy clay at majority of the sample locations. Natural clayey silt or natural silty sandy clay or natural sandy silt with or without inclusions of root fibres was encountered in the remaining locations.

There were no obvious ash materials, fibro-cement pieces and odour in the test pits locations, with the exception of fibro-cement pieces within the fill profile in test pit TP25, FCP2-4, TP25-3, D101, D103, D112 and D113, and presence of one fibro-cement piece at the ground surface of each of two judgmental sampling locations (FCP1 and FCP2). Both fibro-cement pieces were sent to laboratory for asbestos analysis. No other fibro-cement pieces were found on the ground surface at FCP1 and FCP2. During Phase 2 CA and DSI, laboratory testing confirmed that the fibro-cement pieces observed on the ground surface at FCP1 and in the fill profile at TP25 (0.5-1.5m) and TP25-3 don't contain asbestos.

Based on the Phase 2 CA and DSI, eight locations contain asbestos (AF and FA or ACM fragments) contaminated fill materials, and one location contains Benzo(a)Pyrene TEQ contaminated fill with elevated Benzo(a)Pyrene (BaP) (isomers of PAH) within the site. Asbestos (AF and FA) present a risk of harm to human health present a risk of harm to human health due to the exceedance of relevant Health Screening Level for Residential setting, whilst Asbestos (ACM fragments) present a potential risk of harm to human health as these fragments, whose concentration exceeded of relevant Health Screening Level for Residential setting, may release asbestos dust or fibres if tooled, cut etc. Benzo(a)Pyrene TEQ presents a risk of harm to human health due to the exceedance of relevant Health Investigation Level (via vapour inhalation pathway). Elevated Benzo(a)Pyrene concentration might impact on terrestrial ecosystems due to the exceedance of relevant Ecological Screening Level. Therefore, remediation is deemed necessary.

Based on the contaminant concentrations and locations identified from the contamination assessments, eight indicative remediation areas (Area 1 to Area 8) have been developed and is shown on Drawing No 20223/3-AA3.

Based on the advantages, disadvantages, and risks of each of the remediation options, we consider that remediation by disposal of the asbestos (AF, FA and ACM fragments) contaminated fill materials in Areas 1 to 7 and PAH contaminated fill materials in Area 8 at an appropriately licensed landfill facility, as indicated on Drawing No 20223/2-AA3, is appropriate for the site.

This RAP has been prepared to provide guidance to contractor cleaning up / manage the contaminated soils within the site.

The contaminated soils are preliminary classified as:

- Asbestos waste for asbestos contaminated fill materials in Areas 1 to 7.
- General Solid Waste for PAH contaminated fill materials in Area 8.

Excavated soils from Areas 1 to 8 will be retested to confirm the final waste classification.

Due to the presence of asbestos within the site, the fill materials in Area 8 which is preliminary classified as "General Solid Waste" must be inspected by the appointed environmental consultant during excavation of fill materials from that area. If any asbestos-cement piece(s) is observed during excavation in Area 8, the final waste classification will be utilised for remediation of that area followed by appropriate validation where asbestos testing will be added with the already identified other contaminant(s).

As a precaution, it is recommended to excavate fill materials (about 1m x 1m x full depth of fill) at each sample locations TP14-4, D103 and D107, where asbestos (ACM or AF or FA) was detected but below the acceptable limits and dispose the fill materials at a landfill facility as asbestos waste, during remediation of Areas 1 to 7.

The final waste classification will be adopted to dispose contaminated soil into landfill facility from Areas 1 to 8. Anthropogenic inclusions of building debris including brick fragments, bitumen and concrete in the fill will be removed together with the contaminated soils and disposed of at a licensed landfill facility.

The waste must be disposed of at an appropriate licensed landfill facility which will meet their licence requirement to receive a particular type of waste. All landfill delivery dockets shall be provided to the appointed Asbestos Assessor and Environmental Consultant for inclusion in a final validation report, with cross referencing so that each landfill delivery dockets can be correlated with a particular remediation area. The records of the disposal (tonnage) will be correlated with the extent of remediation (volume of soil/material removed).

Removal and/or disposal of the waste must be carried out in accordance with the requirements of the regulators, such as NSW EPA and SafeWork NSW.

The proposed remediation works are considered to be Category 2 (subject to agreement by Northern Beaches Council). A minimum of 30 days notice of the intention to proceed with remedial works must be given to Northern Beaches Council.

The Site Management Plan, Occupational Health & Safety Plan and Contingency Plan, outlined in Sections 15.0, 16.0 and 18.0 of the report are required to be implemented during remediation works.

After completion of the remediation works, validation must be carried out in accordance with Section 17.0 of the report.

A validation report will be then prepared on the suitability of the site for future use as residential subdivision.

Based on this assessment, it is our opinion that the site is considered suitable for future use as residential subdivision subject to implementation of the following recommendations, prior to earthworks:

- Sampling and testing of soils in the footprints of site features such as the houses, building, sheds, carport, concrete, swimming pool, recycled asphalt, gravel, and bitumen covered areas, after complete demolition and removal or clearing and in the footprints of former glass house and two former galvanised iron (GI) sheds.
- Revise this RAP, if required, to remediate any other contamination that might be identified through the recommended additional sampling and testing, followed by appropriate validation. If no other contamination is detected beneath the site features after removal, carry out appropriate remediation and validation of only Areas 1 to 8 as detailed in this report.
- A validation report will be produced at completion of successful remediation by the appointed environmental consultant. The format of the report will follow that recommended in the NSW Environment Protection Authority (EPA), “Consultants Reporting on Contaminated Land" – 2020.

Reference should be made to Section 19.0 of the report for details of the recommendations regarding any materials to be excavated and removed from the site, and any fill to be imported to the site.

Reference should be made to Section 20.0 of the report and Appendix L, which set out details of the limitations of this DSI and RAP.

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1.0 INTRODUCTION

Further to the following reports and documents:

- Phase 1 preliminary contamination assessment (PCA) report (Ref No 13234/2-AA dated 25 August 2014), prepared by Geotechnique Pty Ltd (Geotechnique) for the property registered as Lots 2 and 3 in DP1115877 and Part Lot 3 in DP942319, located at 53A, 53B and 53 Warriewood Road, Warriewood
- Phase 2 contamination assessment (CA) report (Ref No 13757/2-AA dated 27 June 2016) prepared by Geotechnique for a parcel of land currently registered as Lots 2 and 3 in DP1115877, located at 53A and 53B Warriewood Road, Warriewood
- Contamination assessment report update (Ref: 20223/1-AA dated 28 July 2022, prepared by Geotechnique Pty Ltd (Geotechnique) for a parcel of land currently registered Lot 2 in DP1115877, located at 53A Warriewood Road, Warriewood

As requested, we have completed a Detailed Site Investigation (DSI) and Remedial Action Plan (RAP) for the parcel of land currently registered Lots 2 and 3 in DP1115877 and Part Lot 3 in DP942319, located at 53A, 53B and 53 Warriewood Road, Warriewood, in the local government area of Northern Beaches Council, (hereafter known as the site), as indicated on Figure 1 below:

FIGURE 1

Map Data ©2023 Google

It is understood that residential subdivision is the future use of the site.

The objective of the DSI was to delineate the extent of previously identified friable asbestos and PAH contamination. It also included contamination assessment of soil within Part Lot 3 in DP942319 (53 Warriewood Road), as no contamination assessment was carried out for this part of the site yet.

The objectives of the RAP were to provide methods of remediation that can be implemented and validated so that a statement can be made declaring the site environmentally suitable for the future use as residential subdivision, to ensure all remediation works are carried out with due regard to the protection of the environment; to ensure all remediation works comply with current regulations and guidelines; and to provide details of the validation processes to be adopted during and at completion of remediation.

This report was prepared in accordance with the NSW Environment Protection Authority (EPA), "Consultants Reporting on Contaminated Land" – 2020, and in consideration of State Environmental Planning Policy (Resilience and Hazards, 2021-Chapter 4 Remediation of Land) under the Environmental Planning and Assessment Act 1979.

2.0 SCOPE OF WORK

To achieve the objectives of the DSI and RAP, the following scope of work was conducted:

- Review and summary of the *Phase 1 preliminary contamination assessment (PCA)* and *Phase 2 contamination assessment (CA)* reports prepared by Geotechnique in August 2014 and June 2016, respectively.
- Inspection by an Environmental Scientist from Geotechnique Pty Ltd (Geotechnique) to identify current site activities, site features and any visible or olfactory indicators of potential contamination.
- Detailed soil sampling by the Environmental Scientist in the vicinity of previously identified asbestos contaminated and PAH contaminated test pit locations.
- Soil sampling by the Environmental Scientist within part of Lot 3 in DP942319 (53 Warriewood Road) in accordance with a pre-determined sampling plan developed with reference to the NSW EPA *Sampling Design Guidelines,* aimed at ascertaining the presence or otherwise of soil contaminants in the open area of 53 Warriewood Road.
- Implementation of industry standard quality assurance (QA) and quality control (QC) measures. QC samples were also forwarded to the testing laboratories.
- Carrying out on-site sieving tests to determine the concentration of any asbestos containing materials (ACM) in the fill materials with inclusions of fibro-cement pieces and/or at and in the vicinity of the previously identified asbestos contaminated locations and/or in the fill materials with inclusions of demolition waste.
- Asbestos and chemical analysis by laboratories accredited by the National Association of Testing Authorities (NATA), in accordance with Chains of Custody (COC) prepared by Geotechnique.
- Assessment of the laboratory analytical results of soil samples against current applicable guidelines.
- Assessment of laboratory and field QA/QC.
- Assessment of the contamination status of soil in the open area of 53 Warriewood Rd.
- Developing suitable remedial and validation strategies for the site.
- Preparation of this report.

3.0 SITE INFORMATION

The site is located on the south western side of Warriewood Road, Warriewood, in the local government area of Northern Beaches, as indicated on Figure 1 (page 1). The site comprises the entirety of Lots 2 and 3 in DP1115877 and part Lot 3 in DP942319. Reference may be made to Drawing No 13234/2-AA1 for the lot layout.

As shown on Drawing No 13234/2-AA1, the site is trapezoidal in shape and covers an area of approximately 1.63 hectares (ha).

At the time of inspection on 5 September 2022 by an Environmental Scientist from Geotechnique as a part of DSI, 53A Warriewood Road was one (1) individual property facing Warriewood Road, as observed during Phase 1 PCA in July 2014 and during the Phase 2 CA in May 2016. The site condition remains almost unchanged with the exception of removal of a glasshouse, a galvanised iron (GI) chook shed, and a GI shed from the site and presence of overgrown grass at the centre and rear portions of the site, as indicated on Drawing No 20223/1-AA1. The former glass house and GI chook shed were located near the remnant of former shed and the former GI shed was located adjacent to GI and fibro shed. A batter acting as a driveway along the north western boundary was partly covered with recycled asphalt. The centre portion was quite boggy. Almost the same site condition was also observed during the inspection on 13 July 2022 by the Environmental Scientist as a part of report update.

At the time of inspection on 28 February 2023, and 1 March 2023 by the Environmental Scientist from Geotechnique as a part of DSI for the remainder of the stie (53B & 53 Warriewood Road), 53B Warriewood Road appeared to comprise a recently vacated residential dwelling. The former house, shed and yard were noted and appeared unchanged since the Phase 2 CA in 2016. 53 Warriewood Road was a vacant land which appeared to be an easement, as observed during Phase 1 PCA in 2014.

There were no obvious ash materials on the ground surface, odour, or discolouration that would indicate the potential for contamination. There were no signs of soil staining, plant distress or visible indicators of potential contamination. There were no obvious features associated with underground storage tanks (bowser, breather pipe, inlet valve and piping). There were no air emissions emanating from the site and neighbouring properties.

The site is bound to the north west by residential land, to the north east by Warriewood Road and to the south east by a new residential subdivision development, with a new road directly adjoining the south eastern boundary bound by a retaining wall and to the south west by Narrabeen Creek.

4.0 TOPOGRAPHY, GEOLOGY & HYDROGEOLOGY

In general, ground surface of the site slopes moderately to gently toward the creek.

Based on the Geological Map of Sydney (Geological Series Sheet 9130, Scale 1:100,000, Edition 1, 1983), published by the Department of Minerals Resources, Geological Survey of New South Wales, the subsurface material across the site is anticipated to be stream alluvium and/or estuarine sand, comprising silty to peaty quartz sand, silt and clay, ferruginous and humic at places, with shell layers.

Reference to the Soil Landscape Map of Sydney (Soil Landscape Series Sheet 9130, Scale 1:100,000, Edition 2, 2002), prepared by the Department of Land and Water Conservation of NSW indicates that the landscape at the site belongs to Warriewood Group, which is characterised by level to gently undulating swales, depressions and in filled lagoons on Quaternary sand, with local relief of less than 10m, ground slopes of less than 3%, depth to water table of less than 2.0m. Soils in this group comprise sandy humus, sand and peaty, with thickness exceeding 1.5m. This landscape has high water table and is subjected to flooding.

Based on observation and site topography, surface run-off would generally follow the topography and may eventuate in the Narrabeen Creek, which borders the site to the south west.

A search was carried out during the phase 1 PCA through the website of the Department of Natural Resources for any registered groundwater bore data within a radius of one kilometre (km) of the site. The search revealed eight bores within this radius. However, features were available for six bores. The bores were drilled between 2004 and 2008, with standing water level at depths ranging from 0.9m to 7.0m. The bores were authorised / intended for monitoring purposes, test bore, recreation, and irrigation usage purposes.

Groundwater or perched water was not encountered during sampling to a maximum depth of about 2.7m below existing ground level. Based on the previous experience in the region, groundwater in the site is anticipated to be more than 2.0m below existing ground surface. Groundwater flow is anticipated to be towards the south west.

5.0 SITE HISTORY INFORMATION

Geotechnique carried out a review of site history information as part of the Phase 1 PCA. The review included historical aerial photographs, certificates of land titles (past and present), Planning Certificates issued by Council under Section 149 of the Environmental Planning and Assessment Act 1979, EPA records and WorkCover NSW information pertaining to storage of dangerous goods. For details, reference should be made to Report 13234/2-AA.

Historical aerial photographs revealed that the site was rural residential land with market garden activities since at least 1950s. Market garden activates were continued in the north western portion of the site until the 2000s, whilst in the south eastern portion it continued until the 1970s. From the 1980s, more sheds/buildings were built in the south eastern portion of the site.

NSW Department of Lands records indicate various current and past private owners of the site. A farmer owned the site between 1913 and 1943 and two market gardeners owned the site between 1949 and 1982. Lot 3 in DP942319 was owned by Council since 1919.

The Section 149 (2) Planning Certificates revealed no matters arising under the Contaminated Land Management (CLM) Act 1997.

A search of the EPA records revealed no EPA notices issued for the site.

A search of records held by WorkCover NSW did not locate any records of keeping dangerous goods at the site, including underground tanks.

6.0 SUMMARY OF PREVIOUS ASSESSMENTS

Contamination assessment was carried out for the subject site since 2014. The relevant reports are as follows:

- *Phase 1 Preliminary Contamination Assessment (PCA)* Report (Our Ref: 13234/2-AA dated 25 August 2014), prepared by Geotechnique
- *Phase 2 Contamination Assessment (CA)* Report (Our Ref: 13757/2-AA dated 27 June 2016), prepared by Geotechnique

Moreover, an update of the completed contamination assessment [C*ontamination Assessment Report Update* (Our Ref: 20223/1-AA dated 28 July 2022)], was also recently prepared by Geotechnique.

This section presents a summary of the scope of works involved in each assessment stage and the subsequent findings and recommendations for the site.

6.1 Phase 1 Preliminary Contamination Assessment (PCA) Report

A Phase 1 PCA was carried out for the site currently registered as Lots 2 and 3 in DP1115877 and Part Lot 3 in DP942319, located at 53A, 53B and 53 Warriewood Road, Warriewood, in the former local government area of Pittwater. The results were presented in the Geotechnique report *Phase 1 Preliminary Contamination Assessment* (Our Ref: 13234/2-AA dated 25 August 2014). It is understood that the site is proposed for residential development.

The objective of the assessment was to ascertain whether the site potentially presents a risk of harm to human health and/or the environment.

To achieve the objectives of the assessment, the scope of work included a study of site history, geological and hydrogeological information, and a site inspection.

At the time of inspections on 25 July 2014 by a Field Engineer from Geotechnique, the site comprised three individual properties. All properties were facing Warriewood Road. Two properties were rural residential, whilst the other one was vacant land. The following observations were made during the inspection, as shown on Drawing No 13234/2-AA1.

- Lot 2 in DP1115877 was a residential land. Former market gardening activities were reflected on the land terraces. A number of features were identified on site including: a fibro house with possible fibro roof, a colorbond garage, a galvanised iron (GI) and fibro shed, a GI shed, remnant of a former shed, a glass house, a GI chook house, and a concrete driveway. A batter acting as a driveway along the north western boundary was partly covered with recycled asphalt. The land slopes gently from Warriewood Road frontage toward the centre then become flat toward Narrabeen Creek. The centre portion was quite boggy.
- Lot 3 in DP 1115877 was a residential land. The lot consisted of a 2 storey brick house with tile roof, a fibro house with colorbond roof and awning, a colorbond garden shed, an in-ground swimming pool, a GI shed, a colorbond shed and bitumen driveway.
- Lot 3 in DP 942319 was vacant land which appeared to be an easement.

Lot 3 in DP1115877 and Lot 3 in DP 942319 appeared to have been formed by filling at the north-eastern portion for levelling under the houses, the pools and the driveways structures; and filling at the south western portion using coarse material such as gravel and building rubbles to create a stable surface on the original boggy ground.

There were no obvious features associated with any underground storage tanks (bowser, breather pipe, inlet valve and piping) or odour that would indicate the potential for contamination. There were no visible or olfactory indicators of potential contamination.

There were no air emissions emanating from the site and neighbouring properties.

The site is bound to the north west by residential land, to the north east by Warriewood Road and to the south east by a rural residential land and to the south west by Narrabeen Creek.

Based on the information obtained in preparation of the report, it is considered that the subject site has potential for contamination due to past market garden activities in the site, the presence of site features and potential fill within the site.

Based on the phase 1 PCA, the site would be suitable for the proposed residential development, subject to implementation of a suitable sampling and testing plan as a detailed contamination assessment to target the potential for contamination listed in Section 7.0 of the report. If any contaminants are identified the site could be made suitable for the proposed development following appropriate remediation and validation.

6.2 Phase 2 Contamination Assessment (CA) Report

Results of the phase 2 contamination assessment (CA) for a parcel of land currently registered as Lots 2 and 3 in DP1115877, located at 53A and 53B Warriewood Road, Warriewood, prepared by Geotechnique, were presented in Report No 13757/2-AA dated 27 June 2016.

At that time, the site was proposed for residential development which includes construction of residential dwellings and townhouses/apartment buildings with three storeys above the ground and one level of basement car park.

The objective of the Phase 2 CA was to supplement the Phase 1 PCA Report 13234/2-AA with appropriate soil sampling and testing, to ascertain whether the site is likely to present a risk of harm to human health and/or the environment.

To achieve the objective of the assessment, the scope of work included review of the phase 1 preliminary contamination assessment report, site reconnaissance, test pit excavation, soil sampling and testing, and preparation of the report.

As shown on Drawing No 13757/2-AA1, the site is trapezoidal in shape and covers an area of approximately 1.609 hectares (ha).

At the time of inspection and field sampling on 30 May 2016 by a Field Engineer from Geotechnique as a part of the Phase 2 CA, the site comprised two individual rural residential properties, facing Warriewood Road. During the inspection for the phase 2 CA, the site remained unchanged as observed during phase PCA in July 2014, as shown on Drawing No 13234/2-AA1.

Lot 2 in DP1115877 (53A Warriewood Road) was a residential land. Former market gardening activities were reflected on the land terraces. Several features were identified on site including: a fibro house with possible fibro roof, a colorbond garage, a GI and fibro shed, a GI shed, remnant of a former shed, a glass house, a GI chook house, and a concrete driveway. A batter acting as a driveway along the north western boundary was partly covered with recycled asphalt. The land slopes gently from Warriewood Road frontage toward the centre then become flat toward Narrabeen Creek. The centre portion was quite boggy.

Lot 3 in DP1115877 was a residential land. The lot consisted of a 2-storey brick house with tile roof, a fibro house with colorbond roof and awning, a colorbond garden shed, an in-ground swimming pool, a GI shed, a colorbond shed and bitumen driveway.

The remainder of Lots 2 and 3 was grass and/or tree covered. There were no obvious features associated with any underground storage tanks (bowser, breather pipe, inlet valve and piping) or odour that would indicate the potential for contamination. There were no visible or olfactory indicators of potential contamination.

There were no air emissions emanating from the site and neighbouring properties.

The site is bound to the north west by rural residential land, to the north east by Warriewood Road and to the south east by a narrow strip of vacant land and then a rural residential land and to the south west by Narrabeen Creek.

Based on the "*Sampling Design Guidelines for Contaminated Sites*" 1995, EPA, for site area of 1.609ha, twenty seven (27) systematic sampling positions were adopted and aimed at maximising coverage of the site area as a part of Phase 2 CA. Two judgemental sampling points (FCP1 and FCP2) were positioned where one fibro-cement piece was observed on the ground surface at each location.

The test pit, borehole and sample locations are shown on Drawing No 13757/2-AA1.

The general soil profile within Lots 2 and 3 comprised imported and site originated fill overlying natural clayey silt, sandy silt and clayey soil overlying natural sandy silt and/or clay or sandy clay at majority of the sample locations. Natural clayey silt or natural silty sandy clay or natural sandy silt with or without inclusions of root fibres was encountered in the remaining locations.

The test pits did not reveal any visual evidence of asbestos or other indicators of significant contamination, such as staining, odours or significant foreign matter, except presence of fibro-cement pieces at TP25. Moreover, one fibro-cement piece was observed at the ground surface of each of two judgmental sampling locations (FCP1 and FCP2).

As a result, and based on the potential for contamination identified in the Phase 1 Preliminary Contamination Assessment report, the following laboratory analysis plan was implemented for Lots 2 and 3:

- Discrete selected imported fill samples were analysed for Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc), Total Petroleum Hydrocarbons (TPH), BTEX (Benzene, Toluene, Ethyl Benzene and Xylenes) and Polycyclic Aromatic Hydrocarbons (PAH), Organochlorine Pesticides (OCP) and Polychlorinated Biphenyls (PCB).

- Discrete selected fill samples originating from the site, covering at least one sample for each type of fill materials, were analysed for Metals (arsenic, cadmium, copper, lead, mercury, and zinc) and OCP. For screening purposes, the samples were also analysed for chromium and nickel.
- Surface natural soil samples and natural soil samples, immediately below the fill materials, were analysed for Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) and/or OCP for screening purposes. Selected natural soil samples were also analysed for TPH, BTEX, PAH and PCB for screening purposes.
- Two judgmental soil samples where fibro-cement pieces were observed on the ground surface and fill samples with inclusions of fibro-cement pieces were analysed for asbestos. Fibro-cement pieces were also analysed for asbestos. Moreover, few selected fill and natural soil samples were also analysed for asbestos for screening purposes.

The findings of the Phase 2 CA for Lots 2 and 3 in DP1115877 are summarised as follows:

- The site comprised two individual rural residential properties facing Warriewood Road.
- The site is proposed for residential development involving construction of residential dwellings and townhouses/apartment buildings with three storeys above the ground and one level of basement car park.
- The entire site is underlain by imported and site originated fill overlying natural clayey silt, sandy silt, and clayey soil. The test pits did not reveal any visual evidence of asbestos or other indicators of significant contamination, such as staining, odours or significant foreign matter, except for the presence of fibro-cement pieces in the fill profile at test pit TP25. Moreover, one fibro-cement piece at the ground surface of each of two judgmental sampling locations (FCP1 and FCP2) was also observed. Both fibro-cement pieces were sent to laboratory for asbestos analysis. No other fibro-cement pieces were found on the ground surface at FCP1 and FCP2.
- All the laboratory test results satisfied the criteria for stating that the analytes selected are either not present i.e. concentrations less than laboratory limits of reporting, or present in the sampled soil at concentrations that do not pose a risk of hazard to human health or the environment under a “residential with access to soil” form of development, with the exception of elevated cadmium and PAH concentrations and detection of friable asbestos and boned asbestos containing material (ACM) fragments, as indicated on Drawing No 13757/2-AA2. Elevated Benzo(a)Pyrene TEQ concentrations and friable asbestos presents a risk of harm to human health, whilst elevated Benzo(a)Pyrene (BaP) and cadmium concentrations might impact on terrestrial ecosystems or on the growth of certain plants. ACM fragments present a potential risk of harm to human health.
- As presented in summary tables (Tables E1 to E2 and F to I) and discussed in Section 13.2, all the laboratory test results satisfied the criteria for stating that the analytes selected are either not present i.e. concentrations less than laboratory LOR, or present in the sampled soil at concentrations that do not pose a risk of hazard to human health or the environment under a “residential with access to soil” form of development, with the exception of elevated cadmium and PAH concentrations and detection of friable asbestos and boned asbestos containing material (ACM) fragments, as indicated on Drawing No 13757/2-AA2. Elevated Benzo(a)Pyrene TEQ concentrations and friable asbestos presents a risk of harm to human health, whilst elevated Benzo(a)Pyrene (BaP) and cadmium concentrations might impact on terrestrial ecosystems or on the growth of certain plants. ACM fragments present a potential risk of harm to human health.

Lots 2 and 3 in DP1115877 is considered suitable for the proposed residential development subject to implementation of the following recommendations prior to site preparation and earthworks:

- Detailed sampling and testing in the vicinity of locations of concern, as indicated on Drawing No 13757/2-AA2, to delineate the extent of contamination.
- Sampling and testing of soils in the footprints of site features such as the houses, building, sheds, carport, glasshouse, concrete, recycled asphalt, gravel, and bitumen covered areas, after complete demolition and removal or clearing.
- Development of a remedial action plan (RAP) to remediate PAH and asbestos contaminated fill materials with elevated Metals concentrations plus any other contamination identified through the recommended additional sampling and testing, followed by appropriate validation. We consider that the site can be made suitable for the proposed development following appropriate remediation and validation.

6.3 Contamination Assessment Report Update

An update of completed contamination assessment reports for a parcel of land currently registered as Lot 2 DP1115877, located at located at 53A Warriewood Road, Warriewood (hereafter referred as site), in the local government area of Northern Beaches was carried out by Geotechnique as presented in Letter Report No 20223/1-AA dated 28 July 2022.

The site is proposed for community title subdivision.

The objective of the contamination assessment reports was to determine the requirement to address any contamination issue of the site for the proposed development based on the available information.

In order to achieve the objective of the assessment, the scope of work included review of the phase 1 preliminary contamination assessment and phase 2 contamination assessment reports prepared by Geotechnique, review of available NearMap image to determine site usage since May 2016, site reconnaissance and preparation of the letter report.

At the time of inspection on 13 July 2022 by an Environmental Scientist from Geotechnique as a part of report updated, the site comprised one (1) individual property (53A Warriewood Road) facing Warriewood Road, as observed during Phase 1 PCA in July 2014 and during the Phase 2 CA in May 2016. The site condition remains almost unchanged with the exception of removal of a glasshouse, a galvanised iron (GI) chook shed and a GI shed from the site and presence of overgrown grass at the centre and rear portions of the site, as indicated on Drawing No 20223/1-AA1. The former glass house and GI chook shed were located near the remnant of former shed and the former GI shed was located adjacent to GI and fibro shed.

NearMap images in May 2017, June 2018, June 2020, January 2021, and May 2022 in Attachment B also show no significant change to the site over this time period.

As the site inspection and NearMap images raises no additional environmental concern, in our opinion we consider that the parcel of land currently registered Lot 2 in DP1115877, located at 53A Warriewood Road, Warriewood is suitable for the proposed community tile subdivision subject to implementation of the following recommendations prior to site preparation and earthworks:

- Detailed sampling and testing in the vicinity of location of concern FCP2, as indicated on Drawing No 20223/1-AA2 in Attachment A to delineate the extent of asbestos contamination. Other locations of concern (TP14, TP20 and TP25), as indicated on Drawing No 13757/2-AA2 in the Report 13757/2-AA are located outside the current site boundary.
- Sampling and testing of soils in the footprints of site features such as the house, sheds and recycled asphalt covered area, after complete demolition and removal or clearing and in the footprints of former glass house and two former GI sheds.
- Development of a remedial action plan (RAP) to remediate asbestos contaminated natural sandy silt plus any other contamination identified through the recommended additional sampling and testing, followed by appropriate validation. We consider that the site can be made suitable for the proposed residential development following appropriate remediation and validation.

7.0 CONCEPTUAL SITE MODELS

The sources, the exposure pathways and the receptors would be as follows:

Source	Exposure Pathway	Receptor
➢ Asbestos contaminated fill ➢ PAH	➢ Inhalation of asbestos fibres ➢ Ingestion of PAH ➢ Skin contact of PAH ➢ Inhalation of soil dust via wind ➢ Surface run-off	**On-site:** Workers and future residents **Off-site:** Nearby residents and environment

This conceptual site model illustrates source-pathway-receptors includes Asbestos and PAH contaminated soil, soil dust, inhalation of asbestos fibres and soil dust, ingestion and skin contact of PAH and contaminated soil, surface run-off, on-site workers, future residents, nearby residents, and environment.

The exposure pathways of concern are inhalation of asbestos fibres and soil dust, ingestion, and skin contact of PAH contaminated soil, as well as surface run-off. As such, consideration must be given to the potential for activities at the site to generate asbestos fibres and dust, in additional to stormwater and sediment control.

A precautionary approach is taken that an exposure pathway is complete where there are people at the site and nearby by, and a recipient could interact with the contaminated soil/material and soil dust.

8.0 DETAILED SAMPLING & ANALYSIS PLAN AND SAMPLING METHODOLOGY

As part of the DSI, detailed sampling FCP2a and FCP2-1 to FCP2-7, TP14-1 to TP14-4 and TP25-1 to TP25-4 was carried out in the vicinity of asbestos (AF, FA and/or bonded ACM fragments) contaminated location FCP2, TP14 and TP25 respectively identified during previous contamination assessment. Moreover, thirty two systematic test pits (D1 to D18 and D101 to D114) were positioned in the site. The sampling was carried out using an excavator on 5 September 2022, 28 February 2023 and 1 March 2023 by the Environmental Scientist from Geotechnique and fill materials samples were recovered.

As also part of the DSI, detailed sampling TP20-1 to TP20-4 was carried out in the vicinity PAH contaminated location TP20 identified during previous contamination assessment. The sampling was carried out using an excavator on 1 March 2023 by the Environmental Scientist from Geotechnique and fill materials samples were recovered.

During Phase 2 CA, laboratory test results revealed that two cadmium concentrations (3.5mg/kg & 4.7mg/kg) at samples TP25 (0.5-0.8m) & TP25 (1.0-1.3m) respectively exceeded the relevant PIL (3mg/kg). As in NEPM 2013, cadmium has no available EIL and PIL are no longer applicable, slightly elevated cadmium concentrations in test pit TP25, which were well below the relevant health investigation level, was not an issue for the site. Hence no delineation of cadmium was carried out in the vicinity of TP25.

Sampling and analyses were also carried out within part Lot 3 in DP942319 (53 Warriewood Road) to obtain a reasonable assessment of the following:

1. Nature and location of any soil contaminant(s) within the site.
2. The risks that the contaminants (if present) pose to human health and/or the environment under the conditions of the proposed land uses.

Based on the "Sampling Design Part 1- Application" 2022 EPA, eight (8) systematic sampling locations (BH101 and TP102 to TP108) were adopted in the site, aimed at maximising coverage of the site area.

The sampling was carried out using an excavator on 1 March 2023 by the Environmental Scientist from Geotechnique and fill materials and underlying natural soil samples where encountered, were recovered. As BH101 was located on the bitumen hardstand area, an excavator attached with auger was used for sampling.

Detailed test pit locations are shown on Drawing Nos 20223/2-AA1 and 20223/3-AA1.

The soil sampling and decontamination procedures adopted were as follows:

- The test pits were excavated using an excavator, over the depth interval nominated by the Environmental Scientist. The representative soil sample was recovered directly from the excavator bucket using a stainless-steel trowel. The borehole was drilled using an excavator fitted with auger. The representative soil sample was recovered directly from the auger using disposable gloves.
- The trowel and auger were decontaminated prior to use in order to prevent cross contamination (refer to Section 9.2 for details of the procedures for decontamination of the trowel and auger).
- To minimise the potential loss of volatiles, the soil sample was immediately transferred to a labelled, laboratory supplied, 250ml glass jar and sealed with an airtight, Teflon screw top lid. The fully filled jar was then placed in a chilled container.
- The recovered soil sample for asbestos analysis was transferred into a small plastic zip-lock bag, which was placed in a container.
- The recovered fibro-cement piece for asbestos testing was transferred into a small plastic bag and placed in a container.

To measure the reproducibility of test results, duplicate and split (interlaboratory duplicates) samples were prepared for analyses. Samples were kept in a labelled, laboratory supplied, glass jar (acid-washed and solvent-rinsed) and sealed with an airtight, Teflon screw top lid. The fully filled jar was placed in a chilled container.

A rinsate water sample was collected and placed in a glass bottle and vial supplied by the laboratory at completion of sampling. The fully filled bottle and vial were labelled and placed in a chilled container.

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

The primary samples and QA / QC samples including trip spike sample in the chilled container were forwarded under COC conditions to the primary testing laboratory of SGS Environmental Services (SGS). Inter-laboratory duplicate (split) samples were forwarded to the secondary testing laboratory of Envirolab Services Pty Ltd (Envirolab). For asbestos testing, selected soil samples and fibro-cement pieces in the container was sent to Australian Safer Environment & Technology Pty Ltd (ASET) under COC conditions SGS, Envirolab and ASET are NATA accredited.

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

Reference should be made to Table 1 in Appendix A for descriptions of the soils encountered during sampling using an excavator for the DSI. In general, the following profile was identified during field work for the Phase 2 CA and DSI:

Table 8.1

Fill	The following 5 types of fill were encountered; Type 1: 300mm to 2.0m thick, clay, medium plasticity, brown, inclusion of gravel, cobbles and silt was encountered at TP5, TP10, TP11, TP13, TP14 and its vicinity, TP16, TP17, TP19, TP20, TP24 and TP25, TP25-1, D6 and D11, D102 to D114, underlain by natural sandy silt or natural silty sandy clay, silty sand or type 2 fill. Type 2: 800mm thick silty sandy clay, low plasticity, dark grey, inclusion of branches, building material, bricks, fibro-cement pieces, was encountered at TP25, underlain by natural silty sandy clay. Type 3: 100mm to 500mm thick Sandy Silt, fine grained, brown, inclusion of gravel, inclusion of gravel, was encountered at TP13, TP14, TP10 and TP25 to TP27, D16, D18 and at and in the vicinity of FCP2, underlain by type 1 fill or natural silty sandy clay or natural silty sandy clay or natural sandy clay. Type 4: 100mm to 500mm thick clayey silt, fine grained, brown, was encountered at BH1, TP5, BH7, BH8, TP11, TP16 and TP17, underlain by type 1 fill or natural clayey silt. Type 5: 100mm to 500mm thick clayey silt, fine grained, brown, was encountered at D101, in the vicinity of TP20 and TP25, underlain by natural sandy silt. Based on the contents of the fill materials, the natural soil profiles and regional geological information, it appears that type 1 fill materials could have been imported to the site, whilst types 2 to 5 might have originated from the site.
Natural Soil	Sandy Silt, low plasticity, pale grey or silty sandy clay, clay, low plasticity, dark grey-brown and/or clay, medium to high plasticity, brown-grey or sandy clay, low plasticity, pale grey or silty sand, fine grained, was encountered below the fill material across the site. Natural clayey silt was also encountered on the surface layer of BH2 to BH4, BH6, TP9, TP12 and TP15. Natural silty sandy clay was also encountered on the surface layer of TP18 and TP21 to TP23. Natural sandy silt with or without inclusions of root fibres was also encountered on the surface layer of FCP2, D1 to D5, D7, D12 to D15 and D17.

There were no obvious ash materials, fibro-cement pieces and odour in the test pit locations, except for fibro-cement pieces within the fill profile in test pit TP25, FCP2-4, TP25-3, D101, D103, D112 and D113, and presence of one fibro-cement piece at the ground surface of each of two judgmental sampling locations (FCP1 and FCP2).

As a result, to delineate the extent of asbestos contamination, the detailed fill samples at and in the vicinity of FCP2, TP14 and TP25 were analysed for asbestos as a part of DSI. Fill materials with inclusions of demolition waste and/or fibro-cement pieces at test pits D6, D101, D103 and D106 to D114 were also analysed for asbestos for screening purposes. Fibro-cement pieces encountered in the fill profile at TP25-3, D101, D103, D112 and D113 were also analysed for asbestos.

To delineate the extent of PAH contamination, the detailed fill samples at and in the vicinity of TP20 were analysed for PAH.

For waste classification purposes, fill macerals at FC2-4, D101, D103, D112 and D113 was also analysed for Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc).

Based on the chemical of concern mentioned in Section 7.0 of Report 13234/1-AA, the following laboratory analysis plan was implemented for site originated fill materials, recovered from systematic sampling locations within part Lot 3 in DP942319 (53 Warriewood Road):

- All site originated fill samples were analysed for Metals and OCP. Two selected fill samples were also analysed for TRH, BTEX, PAH and PCB for screening purposes.

A summary of the laboratory test results is presented in Section 12.0 of this report.

9.0 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

9.1 Sampling Personnel

Geotechnique undertook all the sampling associated with this assessment. An Environmental Scientist from Geotechnique (Justin Hofmann) nominated sampling positions based on the project brief prepared by the Project Manager, supervised (full time) the excavation of test pits and drilling of borehole, recovery of soil samples and fibro-cement pieces, carrying out on-site sieve testing of soil samples with inclusions of demolition waste and detailed samples at and in the vicinity of FCP2, TP14 and TP25, preparation of samples for delivery to NATA accredited laboratories, and logging the sub-surface profile encountered at each sampling location

Mr Hofmann has a Bachelor of Environmental Science degree and has been employed by Geotechnique as an Environmental Scientist since 2015. At commencement of employment, Mr Hofmann underwent supervised training in Geotechnique procedures for sampling and logging.

9.2 Decontamination Procedures

As stated in Section 8.0 of this report, soil sampling was carried out using excavator with bucket and auger. Representative soil sample was transferred from the excavator bulk sample in the bucket to the laboratory supplied glass jar by using a trowel and from auger by using disposal gloves. The stainless steel trowel and auger were decontaminated prior to use. As stated in Sections 9.4 and 9.5, a trowel was used to divide the soil sample into two portions to prepare duplicate/split samples.

Decontamination of the trowel and auger involved the following:

- Removal of soils adhering to the trowel auger by scrubbing with a brush.
- Washing the trowel and auger thoroughly in a solution of phosphate free detergent (Decon 90) using brushes and disposable towels.
- Rinsing the trowel and auger thoroughly with distilled water.
- Repeating the washing / rinsing steps and rinsing with water.
- Drying the trowel and auger with a clean cloth.

A sample of the final rinsate water sample was recovered at completion of each day sampling.

9.3 Rinsate

A rinsate water sample was recovered on completion of each of the three days of field works for soil sampling in order to identify possible cross contamination between the sampling locations. Therefore, three (3) rinsate water samples (RS1 to RS3) were recovered.

The rinsate water samples were analysed for Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc), TRH, BTEX and/or PAH. The test results for the rinsate water samples are summarised in Table A. The laboratory test results certificates are included in Appendix B.

As indicated in Table A, all concentrations of analytes in the rinsate blank samples were less than the laboratory detection limits, which indicates that adequate decontamination had been carried out in the field.

9.4 Trip Spike

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

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

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

One trip spike sample (TS1) was forwarded to the primary analytical laboratory with the samples collected from the site and were tested for BTEX. The test results for the trip spike, reported as a percentage recovery of the applied and known spike concentrations, are shown in Table B. The laboratory test results certificates are included in Appendix B.

As indicated in Table B, the results show a good recovery of the spike concentrations, ranging between 87% and 89%, which are within the acceptable ranges (70% - 130%). Furthermore, there were no visible or olfactory indications of hydrocarbon contamination.

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

9.5 Duplicate Samples

A field duplicate sample was prepared in the field through the following processes:

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

Duplicate samples were prepared based on sample numbers recovered during the field work. The duplicate sample frequency was computed using the total number of samples analysed as part of this assessment. The duplicate sample frequencies computed for soil samples are as follows:

Metals:	9 samples analysed;	1 duplicate;	11% frequency
TRH:	2 samples analysed;	1 duplicate;	50% frequency
BTEX:	2 samples analysed;	1 duplicate;	50% frequency
PAH:	14 samples analysed;	2 duplicates;	14% frequency
OCP:	8 samples analysed;	1 duplicate;	13% frequency
PCB:	2 samples analysed;	1 duplicate;	50% frequency

The duplicate frequency adopted complies with the Schedule B3 Guideline on Laboratory Analysis of Potentially Contaminated Soils of the National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 1999 (April 2013), which recommends a duplicate frequency of at least 5%.

The duplicate sample test results are presented with the analytical reports in Appendix B and summarised in Tables C1 and C2.

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

As shown in Tables C1 and C2, the comparisons between the duplicate and corresponding original sample indicated acceptable RPD with exception of some metals. This is considered mainly due to the heterogeneity of the samples analysed.

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

Based on the above, the variations are not considered critical, and it is concluded that the laboratory test data provided by SGS are of adequate accuracy and reliability for this assessment.

9.6 Inter-laboratory Duplicate (Split) Samples

The inter-laboratory duplicate (split) sample provides a check on the analytical performance of the primary laboratory. The split sample was prepared in the same manner as the duplicate sample. Reference should be made to Section 9.5. The split sample was prepared based on sample numbers recovered during field work and the analyses undertaken by the primary laboratory. Split samples were submitted for analysis to a secondary laboratory (Envirolab).

The split sample frequency was computed using the total number of samples analysed as part of this assessment. The split sample frequencies computed for soil samples are as follows:

Metals:	9 samples analysed;	1 split;	11% frequency
TRH:	2 samples analysed;	1 split;	50% frequency
BTEX:	2 samples analysed;	1 split;	50% frequency
PAH:	14 samples analysed;	2 splits;	14% frequency
OCP:	8 samples analysed;	1 split;	13% frequency
PCB:	2 samples analysed;	1 split;	50% frequency

The split sample frequency adopted complies with the Schedule B3 of the NEPM 1999 (April 2013), which recommends a frequency of 5%.

The laboratory certificates of analysis from Envirolab are included in Appendix B of this report. The results are also summarised in Tables D1 and D2.

Based on Schedule B3 of the NEPM 1999 (April 2013), the difference in the results between the split samples should generally be within 30% of the mean concentration determined by both laboratories, i.e., RPD should be within 30%. However, this variation can be higher for organic analysis than for inorganics and for low concentrations of analytes or non-homogeneous samples.

As shown in Tables D1 and D2, the comparisons between the split and corresponding original sample indicated generally acceptable RPD, except for RPD for a number of metals. This is due to the non-homogeneous nature of the soil samples analysed.

All the concentrations with RPD more than 30% in the split pairs were less than the relevant assessment criteria.

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

10.0 LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

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

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

SGS and Envirolab are both accredited by NATA and operate a Quality System designed to comply with ISO/IEC 17025.

The recovered discrete soil samples were analysed within the allowable holding times detailed in Schedule B3 of the NEPM 1999 (April 2013). It should be noted that there is no specific holding time for asbestos analysis. The rinsate samples were analysed within the allowable holding times for water detailed in Standard Methods for the Examination of Water and Wastewater (APHA).

The test methods adopted by the laboratory are indicated with the laboratory test results certificates in Appendix B. As part of the analytical run for the project the laboratory included laboratory blanks, duplicate samples, laboratory control samples, matrix spikes and/or surrogate spikes.

We have checked the QA/QC procedures and results adopted by the laboratories against the appropriate guidelines. The quality control sample numbers adopted by SGS and Envirolab are considered adequate for the analyses undertaken.

The methods used by SGS and Envirolab have been validated as recommended in the NEPM and ANZECC guidelines and endorsed by NATA.

The samples analysed for TPH (C_6–C_9) and/or BTEX were extracted by the purge and trap method recommended by the NSW EPA.

All reported laboratory LOR / Practical Quantitation Limits (PQL) were less than the assessment criteria adopted for each analyte or analyte group.

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

11.0 ASSESSMENT CRITERIA

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

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

  It is understood that residential subdivision is the future use of the site. As such, with regard to human health, analytical results will be assessed against risk based HIL for *residential with garden/accessible soil* (HIL A).

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

  For this assessment, the analytical results were assessed against the available HSL for *residential with garden/accessible soil* (HSL A) for sand to depth of 0m to <1m and 1m to <2m.

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

  The analytical result was assessed against the available ESL for *residential with garden/accessible soil* for coarse-grained soil (sand).

- Ecological Investigation Levels (EIL), a specific type of Soil Quality Guidelines (SQG) for selected metals, are applicable for assessing the risk to terrestrial ecosystems. EIL listed in Table 1B(1-5) of Schedule B1 "*Guideline on Investigation Levels for Soil and Groundwater*" depend on specific soil physicochemical properties and land use scenarios and generally apply to the top 2m of soil. For arsenic and lead, generic EIL are adopted, for *urban residential* land use for aged contamination. For other metals, where available, EIL are calculated using the EIL calculator developed by CSIRO for NEPC.

  For this assessment, the analytical results were assessed against the available SQG / EIL for *urban residential* land use for aged contamination in soil for low traffic volume in old suburb.

  For DDT and Naphthalene, generic EIL are adopted, for *urban residential* land use for fresh contaminants.

For discrete soil samples, the individual concentrations of analytes were assessed against the HIL A / HSL A / ESL / EIL.

For asbestos, the assessed soil must not contain asbestos containing material (ACM) more than 0.01%w/w, surface soil within the site is free of visible ACM, and asbestos fines (AF) and fibrous asbestos (FA) in the soil is <0.001% w/w.

The site will be deemed contaminated or containing contamination "hot spots" if the above criteria are unfulfilled. Further investigation, remediation and/or management will be recommended if the area of concern is found to be contaminated or containing contamination "hot spots."

The adopted assessment criteria for the soil samples are detailed in Tables E to H, I1, I2, J1 and J2.

12.0 FIELD & LABORATORY TEST RESULTS, ASSESSMENT & DISCUSSION

12.1 Field Results

Details of the sub-surface conditions encountered during field work for this assessment are presented in Table 1 in Appendix A of this report. As discussed in Section 8.0, the general soil profile within the majority of the site comprised imported and site originated fill overlying natural clayey silt, sandy silt and clayey soil overlying natural sandy silt and/or clay or sandy clay at majority of the sample locations. Natural clayey silt or natural silty sandy clay or natural sandy silt with or without inclusions of root fibres was encountered in the remaining locations.

There were no obvious ash materials, fibro-cement pieces and odour in the test pits locations, with the exception of fibro-cement pieces within the fill profile in test pit TP25, FCP2-4, TP25-3, D101, D103, D112 and D113, and presence of one fibro-cement piece at the ground surface of each of two judgmental sampling locations (FCP1 and FCP2). Both fibro-cement pieces were sent to laboratory for asbestos analysis. No other fibro-cement pieces were found on the ground surface at FCP1 and FCP2. During Phase 2 CA and DSI, laboratory testing confirmed that the fibro-cement pieces observed on the ground surface at FCP1 and in the fill profile at TP25 (0.5-1.5m) and TP25-3 don't contain asbestos.

12.2 Analytical Results

The laboratory test results certificates are included in Appendix B. The test results are also presented in Tables E to H, I1, I2, J1 and J2 together with the assessment criteria adopted. A discussion of the test data is presented in the following sub-section.

12.2.1 Metals (As, Cd, Cr, Cu, Pb, Hg, Ni & Zn)

Test results of CEC and pH were adopted to calculate ecological investigation levels (EIL) in Table E.

The Metals test result for all discrete fill sample from 53 Warriewood Road are presented in Table E and as indicated, all concentrations of Metals were below the relevant available EIL and Health Investigation Levels (HIL) for residential development with garden/accessible soil (HIL A).

12.2.2 TRH and BTEX

The TRH and BTEX test results for selected discrete fill samples from 53 Warriewood Road are presented in Table F. As shown in Table F, the concentrations of F1 TRH, F2 TRH, F3 TRH, F4 TRH and BTEX were below the relevant Health Screening Levels A (HSL A) and / or Ecological Screening Levels (ESL) adopted. Moreover, all TRH and BTEX concentrations were below the laboratory limits of reporting (LOR).

12.2.3 Polycyclic Aromatic Hydrocarbons (PAH)

The PAH test results for selected discrete fill samples from 53 Warriewood Road and all detailed samples from the vicinity of TP20 are presented in Table G and as shown, concentrations of Benzo(a)Pyrene, Benzo(a)Pyrene TEQ, Naphthalene and Total PAH were well below the relevant HIL A or ESL or HSL A or EIL adopted. Moreover, most of the PA concentrations were below the laboratory LOR.

12.2.4 Organochlorine Pesticides (OCP)

The OCP test results for all discrete fill sample from 53 Warriewood Road are presented in Table H and as indicated, all concentrations of OCP were well below the relevant HIL A. Concentrations of DDT were also below the EIL. Moreover, all test results were below the laboratory LOR.

12.2.5 Polychlorinated Biphenyls (PCB)

The PCB test results for selected discrete fill samples from 53 Warriewood Road are presented in Table H and as indicated, the concentrations of PCB were below the relevant HIL A adopted as well as below the laboratory LOR.

12.2.6 Asbestos

The asbestos test results for the detailed fill samples at and in the vicinity of FCP2 and fill samples with inclusions of demolition waste at D6 are presented in Table I1. As indicated, AF and FA more than 0.001%w/w were not found in any fill samples.

As indicated in Table I1, bonded ACM (>7mm) was below the assessment criterion for all analysed fill samples.

The asbestos test results for the fibro-cement pieces observed in the fill profile at FCP2-4 contained ACM, as also indicated in Table I1, which presents a potential risk of harm to human health as these fragments may release asbestos dust or fibres if tooled, cut, etc.

The asbestos test results for the detailed fill samples at and in the vicinity of TP14 and TP25, and fill samples with inclusions of demolition waste/fibro-cement pieces at D101, D103 and D106 to D114 are presented in Table I2. As indicated, AF and FA more than 0.001%w/w were not found in any fill samples.

However, FA less than 0.001%w/w was detected in fill sample at D107 (1.0-2.0m) and AF less than 0.001%w/w was detected in fill samples at D108 (0-1.0m), D112 (0-1.0m) and TP14-4 (0-0.5m).

As indicated in Table I2, bonded ACM (>7mm) was found at or greater than the assessment criteria of 0.01% w/w in one fill sample (D108 (0-1.0m). All other analysed samples were below the assessment criterion.

The asbestos test results for the fibro-cement pieces observed in the fill profile at D101, D103, D112 and D113 contained ACM, as also indicated in Table I2, which presents a potential risk of harm to human health as these fragments may release asbestos dust or fibres if tooled, cut, etc. No asbestos was detected in the fibro-cement pieces observed in the fill profile at TP25-3.

12.2.7 Asbestos Sieve Test

In total, eleven samples (each about 10L volume) were recovered for on-site sieving test in accordance with gravimetric procedures as per NEPM 1999 (April 2013), at and in the vicinity of the previously identified asbestos contaminated location FCP2 where friable asbestos (AF & FA) were detected in the fill profile during the Phase 2 CA and also at D6, where demolition waste were observed in the fill profile during this DSI.

The on-site sieving test results for asbestos are presented in Table J1.
As indicated in Table J1, bonded ACM more than 0.01%w/w were detected in the fill materials at FCP2-4 (0.017%w/w), which presents a potential risk of harm to human health as these fragments may release asbestos dust or fibres if tooled, cut, etc.

As also indicated in Table J1, the concentrations of ACM in all remaining fill samples were equal to zero.

In total, twenty four samples (each about 10L volume) were recovered for on-site sieving test in accordance with gravimetric procedures as per NEPM 1999 (April 2013), at and in the vicinity of the previously identified asbestos contaminated locations TP14 and TP25 where friable asbestos (AF & FA) and/or bonded ACM were detected in the fill profile during the Phase 2 CA and also at D101, D103, D112 and D113, where demolition waste and/or fibro-cement pieces were observed in the fill profile during this DSI.

The on-site sieving test results for asbestos are presented in Table J2.

As indicated in Table J2, bonded ACM more than 0.01%w/w were detected in the fill materials at D101 (0-1.0m) (0.018%w/w), D112 (0-1.0m) (0.092%w/w) and D113 (0-1.0m) (0.027%w/w), which present a potential risk of harm to human health as these fragments may release asbestos dust or fibres if tooled, cut, etc.

As also indicated in Table J2, bonded ACM less than 0.01%w/w was detected in the fill materials at D103 (0-1.0m) (0.008%w/w)

As also indicated in Table J2, the concentrations of ACM in all remaining fill samples were equal to zero.

13.0 SITE CHARACTERISATION

Based on the Phase 2 CA and DSI, the identified revised location of contamination within the site which is indicated and tabulated on Drawing No 20223/3-AA2 and summarised below:

- Locations where asbestos (AF & FA) in the soil presents a risk of harm to human health due to the exceedance of relevant Health Screening Levels for Residential setting.
- Location where ACM fragments in the fill profile present a potential risk of harm to human health due to the exceedance of relevant Health Screening Level for Residential setting as these fragments may release asbestos dust or fibres if tooled, cut, etc.
- Location where Benzo(a)Pyrene TEQ in the fill presents a risk of harm to human health due to the exceedance of relevant Health Investigation Level.
- Location where elevated Benzo(a)Pyrene concentration might impact on terrestrial ecosystems due to the exceedance of relevant Ecological Screening Level.

Off-site impacts of contaminated soil are generally governed by the contaminant concentrations in the soils, the transport media available and likely receptors. The most common transport medium is water, whilst receptors include groundwater, surface waterbodies, humans, flora and fauna.

As the site is mostly unpaved it is considered that surface water drainage from the property would be primarily lost to ground via infiltration or directed off-site by gravity. Based on observation and site topography, surface run-off would generally follow the topography and may eventuate in the Narrabeen Creek, which borders the site to the south west.

14.0 SITE REMEDIATION

Based on the Phase 2 CA and DSI, seven locations contain asbestos (AF and FA or ACM fragments) contaminated fill materials, and one location contains Benzo(a)Pyrene TEQ contaminated fill with elevated Benzo(a)Pyrene (BaP) (isomers of PAH) within the site. Asbestos (AF and FA) present a risk of harm to human health present a risk of harm to human health due to the exceedance of relevant Health Screening Level for Residential setting, whilst Asbestos (ACM fragments) present a potential risk of harm to human health as these fragments, whose concentration exceeded of relevant Health Screening Level for Residential setting, may release asbestos dust or fibres if tooled, cut etc. Benzo(a)Pyrene TEQ presents a risk of harm to human health due to the exceedance of relevant Health Investigation Level (via vapour inhalation pathway). Elevated Benzo(a)Pyrene concentration might impact on terrestrial ecosystems due to the exceedance of relevant Ecological Screening Level. Therefore, remediation is required.

14.1 Site Remediation Policy

The preferred hierarchy of options for site clean-up and/or management set out in s.6(16) Assessment of Site Contamination Policy Framework of Schedules A and B of the NEPM is outlined as follows:

- On-site treatment of the contamination so that it is destroyed, or the associated risk is reduced to an acceptable level; and
- Off-site treatment of excavated soil, so that the contamination is destroyed, or the associated risk is reduced to an acceptable level, after which soil is returned to the site;

Or:

If the above are not practicable;

- Consolidation and isolation of the soil on-site by containment within a properly designed barrier; and
- Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material;

Or:

- Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

When deciding which option to choose, the sustainability (environmental, economic, and social) of each option should be considered, in terms of achieving an appropriate balance between the benefits and effects of undertaking the option.

The criteria for disposal of contaminated waste is generally governed by the "Waste Classification Guidelines Part 1: Classifying Waste" *EPA* 2014. This guideline outlines a clear step-by-step process for classifying waste. There are six waste classes to be used:

- Specific Waste including clinical and related waste, asbestos waste, as well as waste tyres.
- Liquid Waste.
- Hazardous Waste.
- Restricted Solid Waste.
- General Solid Waste (Putrescible).
- General Solid Waste (Non-putrescible).

Each category has separate requirements in terms of licensing for transportation and landfill sites. NSW EPA consent is required for disposal, treatment and/or storage of Hazardous waste.

The criteria for re-use of soils removed from a site are currently governed by the following:

- Guidelines on Resource Recovery Exemptions (Land Application of Waste Materials as Fill), DECC, NSW (February 2011).
- POEO (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A – The Excavated Natural Material Order and Exemption 2014.
- NSW EPA Certification: Virgin excavated natural material.

14.2 Remediation Area

Based on the contaminant concentrations and locations identified from the contamination assessments, eight indicative remediation areas (Area 1 to Area 8) have been developed and is shown on Drawing No 20223/3-AA3. Included on the plan is a table indicating the estimated areas and volumes of contaminated soil, types of soils and contaminants associated with each area.

The defined remediation area is estimates only and could extend beyond the boundaries shown. This will be confirmed by the necessary visual inspection, validation sampling and testing.

14.3 Remediation Goal

The goal of remediation is to enable a statement by the appointed Environmental Consultant declaring the site environmentally suitable for future use as residential subdivision. To achieve this goal, the remedial works outlined within “Site Remediation” section will be implemented and validated.

14.4 Remedial Options

As discussed in this report, the contaminant identified on-site is primarily asbestos (AF, FA & ACM fragments) PAH. Based on the contaminant identified (refer to Drawing No 20223/3-AA3) the following remediation options were considered:

ADVANTAGES AND DISADVANTAGES OF REMEDIATION OPTIONS

REMEDIATION METHOD	ADVANTAGE	DISADVANTAGE	REMAINING SITE RISK
Excavation and Landfill Disposal	- Simple & straightforward process; - Short time frame; - All contaminants removed from site; - Not overly expensive for smaller volumes of soil to be disposed off.	- Adds to already filling landfill; - Requires movement of contaminated soil on public roads; - Importing clean fill required to fill void.	None

REMEDIATION METHOD	ADVANTAGE	DISADVANTAGE	REMAINING SITE RISK
On-site Burial and Containment	- Retains soils within the site, thereby minimising land filling; - Cost saving (of Landfill Disposal) for large volumes; - Short time frame.	- May be subject to Council approval; - Retains contaminants within the site; - Additional investigations required prior to on-site burial; - Requires preparation, implementation, and monitoring of an ongoing environmental management plan (EMP); - Long term cost involved; - Owner of contaminated soils remains liable; - Notation on Section 10.7 Certificate may be required; - Potential devaluation of land.	- Breaching of capping layer; - Potential risk to human health.

Many factors such as advantages, disadvantages, risks, and the costs of separating relatively small amounts of waste, compared to apparently less complicated disposal off-site, etc., need to be considered in adoption of the final remediation strategy.

Based on the advantages, disadvantages, and risks of each of the remediation options, we consider that remediation by excavation of the contaminated soil in Areas 1 to 8, and disposal at a licensed landfill facility, as shown on Drawing No 20223/3-AA3, is considered appropriate for the site.

14.4.1 Off-site Landfill Disposal

Areas 1 to 7 contains asbestos (AF, FA and/or ACM fragments) contaminated fill materials.

Due to the presence of AF & FA, a contractor with a Class A Licence for friable asbestos must supervise excavation and stockpiling of contaminated soil from Areas 1, 3 and 7 on the ground surface. Following final waste classification, the contractor with a Class A Licence for friable asbestos must also supervise the excavation and loading of the stockpile in a covered, leak-proof vehicle for transport to an NSW EPA licensed landfill facility.

Due to the presence of bonded ACM, a contractor with a Class B Licence for bonded asbestos must supervise excavation and stockpiling of contaminated soil from Areas 2 and 4 to 6 on the ground surface. Following final waste classification, the contractor with Class B Licence for bonded asbestos must also supervise the excavation and loading of the stockpile in a covered, leak-proof vehicle for transport to an NSW EPA licensed landfill facility. A Class A Licence for friable asbestos can also supervise removal and loading of the asbestos contaminated.

Background asbestos air monitoring will be required for the duration of excavation and loading activities for Areas 1 to 7.

PAH contaminated fill materials in Area 8 must be transported to an NSW EPA licensed landfill facility in a covered vehicle.

Anthropogenic inclusions of building debris including brick fragments, bitumen and concrete in the fill will be removed together with the asbestos contaminated soils from Area 1 to Area 7 and disposed of at a licensed landfill facility.

Approval from the landfill must be provided prior to disposal and 24 hours' notice is required. Reference should be made to Section 14.5 below for waste classification details of material and soil in Areas 1 to 8.

14.5 Preliminary Waste Classification

The fill materials in Areas 1 to 7 are classified as "Asbestos Waste" according to the "Waste Classification Guidelines Part 1: Classifying Waste", the NSW EPA 2014, as a preliminary as detailed in Appendices C to I.

The fill materials in Area 8 are classified as "General Solid Waste" according to the "Waste Classification Guidelines Part 1: Classifying Waste", the NSW EPA 2014, as a preliminary as detailed in Appendix J.

For final waste classification of excavated soil from Areas 1 to 7 (about 124m^3) and excavated soil from Area 7 (14m^3), 5 samples and 3 samples respectively will be recovered and analysed, in accordance with section 5.4.5 and Table 3 of the Sampling Design Guidelines – application by NSW EPA 2022.

Final Waste Classification Report will be prepared in accordance with:

- Guidelines for Consultants Reporting on Contaminated Land (NSW EPA, 2020); and
- Waste Classification Guidelines Part 1: Classifying waste (NSW EPA, 2014

The final waste classification will be adopted to dispose contaminated soil into landfill facility from Areas 1 to 8.

Due to the presence of asbestos within the site, the fill materials in Area 8 must be inspected by the appointed environmental consultant during excavation of fill materials from that area. If any asbestos-cement piece(s) is observed during excavation in Area 8, the final waste classification will be utilised for remediation of that area followed by appropriate validation where asbestos testing will be added with the already identified other contaminant(s).

14.6 Remediation Schedule

This section provides the schedule of remediation works:

- Excavation and temporarily stockpile the contaminated soils from Areas 1 to 7 on the ground surface (preferably over a high-density polyethylene (HDPE) sheet) for final waste classification. Also excavate fill materials (about 1m x 1m x full depth of fill) at each sample locations TP14-4, D103 and D107 and add into the stockpile,
- Excavation and temporarily stockpile the contaminated soil from Area 8 on the separate ground surface (preferably over a high-density polyethylene (HDPE) sheet) for final waste classification.
- Disposal of the contaminated soils in accordance with the final waste classification.

The anticipated duration for remediation works is about 2 working days. Waste classification may take another few days. Following remediation of Area 1 to 8, the anticipated duration of the validation sampling and testing is about 1 week. If all validation results are within the acceptable limits, the entire remediation and validation will take about 2 weeks to complete. However, additional time for further remediation and validation will be required if any residue of contaminate is identified during validation in Areas 1 to 8.

14.7 Preparation for Remedial Works

Prior to conducting remedial works on-site, the following procedures will be carried out:

- The category of remedial works proposed is considered Category 2 (subject to agreement by Northern Beaches Council), as defined under the Chapter 4 Remediation of Land in the *State Environmental Planning Policy (Resilience and Hazards) 2021 under the Environmental Planning and Assessment Act 1979*, which has repealed "*Managing Land Contamination: Planning Guidelines*"-*SEPP 55 Remediation of Land*. Development consent to carry out the works is not likely to be required. Under Clause 4.13 of the *State Environmental Planning Policy (Resilience and Hazards)*, a minimum of 30 days notice of the intention to proceed with remedial works must be given to Northern Beaches Council.
- Notification must be provided by the remediation contractor to SafeWork NSW to excavate and dispose of asbestos contaminated soil at an EPA licensed landfill facility, specifically by the Class A Licenced contractor for friable asbestos.
- The nominated licensed landfill shall be contacted and informed of the soil classification details to obtain an approval for acceptance of the contaminated soil. All documentation required by the landfill facility shall be completed as required.
- Marking of the contaminated areas by an Environmental Representative. If Geotechnique is appointed, contact person is Anwar Barbhuyia (Ph: 02 4722 2700).
- As a part of site establishment, a meeting between the Remediation Contractor and Environmental Consultant as a minimum, need to be carried to be carried out to discuss the requirements of this RAP, the contractors programme and requirements from the Environmental Consultant or Remediation Contractor. All intended environmental management measures (refer to Section 15.0) will be installed by the appointed Remediation Contractor. An appointed Environmental Consultant will inspect all measures prior to remedial works commencing.
- All workers involved in the remediation works will be inducted into the Occupational Health & Safety (OH&S) requirements and in particular, the personal protective equipment required (refer to Section 16.0).
- No waste should be transported before acceptance of the application.
- Signage shall be placed at the site entrance, identifying the contact details of the appointed remediation contractor.
- The site shall remain secure during non-working hours.

14.8 Aesthetic Issue to be Considered Remediated and Addressed

Anthropogenic inclusions of building debris including bricks, timbers, PVC fragments, concrete, tiles, and/or wooden logs were identified within the subsurface fill material at seven test pit locations (D6, D106 to D111, D113 and D114) within the site.

In accordance with Section 3.6 of Schedule B1 of NEPM 2013, the presence on ground surface and anthropogenic inclusions in subsurface fill of building debris including fragments of brick, concrete, glass, plastic, tile, timber, PVC / terracotta pipe, metal and / or bitumen commonly occur and are widely distributed in urban areas during demolition and construction works. These mentioned building debris were considered inert, non-hazardous, and low concern under a residential land use scenario; however, are unsightly and some of which (for example, glass, PVC pipe, broken tile, metal) might be unsafe to children in unpaved / landscape areas.

Following the completion of remediation and validation, the aesthetic issue will be reassessed. If the residual surface soil / fill is found to contain materials deemed not suitable for residential land use from an aesthetic perspective in line with section 3.6 of NEMP 2013, the aesthetic issue will be addressed.

For safety precaution and unsightly concern, cover with a layer of clean soil of the anthropogenic inclusions of building debris in subsurface fill will be recommended especially in the unpaved and landscape areas.

If a cover layer of clean soil is to be adopted to address items of aesthetic concern, the surface of these materials should be at depth of approximately 0.3m to 0.5m below the final RL post cutting and filling activities. It is our opinion that a thickness of approximately 0.3m to 0.5m clean soil cover is considered appropriate.

Any geotechnically unsuitable material will need to be taken off site after waste classification.

15.0 SITE / ENVIRONMENTAL MANAGEMENT PLAN

The appointed remediation contractor will be provided with a copy of this RAP, so that they are aware of the contamination status of the soils and the remediation methodology to be adopted.

All remediation works will be carried out with due regard to the environment and to all statutory requirements. The works shall comply with the requirements of the following Acts:

- Protection of the Environment Operations Act 1997
- Construction Safety Act 1912
- Occupational Health and Safety Act 2000

All site works will comply with the provisions set out in the following:

- WorkCover NSW: Working with Asbestos Guide – 2008
- New South Wales Work Health and Safety Regulation 2017
- SafeWork NSW Code of Practice 2019: How to safely remove asbestos
- NSW EPA: Waste Classification Guidelines Part 1: Classifying Waste – November 2014
- NSW EPA Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3RD Edition) – 2017
- State Environmental Planning Policy (Resilience and Hazards, 2021-Chapter 4 Remediation of Land) under the Environmental Planning and Assessment Act 1979

In addition to any statutory requirements, the contractor will be responsible for carrying out the remediation works with all due care to ensure that the following conditions are specifically complied with:

- Minimal wind borne dust leaves the confines of the site.
- Water containing suspended matter or contaminants will not leave the confines of the site, as this might pollute watercourses, either directly or indirectly, through the stormwater drainage system.
- Material from exposed non-validated surfaces is not to be tracked onto other areas of the site by personnel or equipment.
- Vehicles will be cleaned and secured so that mud, soil, or water is not deposited on any public roadway or adjacent areas.
- Noise levels at the site boundaries will comply with the noise quality objectives of the region or legislative requirements.

The Project Manager will ensure that the contractor and the contractor's employees are familiar with the contents of the Environmental Management Plan.

The following sub-sections provide details of the environmental management practices to be employed at the site in order to comply with the statutory requirements and the previously mentioned items.

15.1 Working Hours

All remediation works will be carried out between the hours specified or required by Northern Beaches Council (Monday to Friday: 7am to 6pm and Saturday: 8am to 1pm).

15.2 Security / Safety Measures

Prior to any remediation works being carried out, adequate signage containing a "no unauthorised entry" statement, as well as the contractor's name and contact details during and after working hours will be erected at the site entrance.

A site superintendent appointed by the remediation and/or earthworks contractor will be in attendance for the duration of the works to ensure implementation of the day-to-day works and maintenance of the environmental safeguards. The superintendent will also be responsible for locking any gate at the completion of each day.

All earthworks machinery used on the site will be fitted with warning lights and reversing signals.

All remediation works will be completed and validated prior to any construction works proceeding within the site.

15.3 Traffic Management / Truck Monitoring

Access into the site will be via the gate on Warriewood Road. Prior to exiting, the site trucks will pass over a shaker grid or truck wash bay.

At completion of removal of soil from the site, the adjacent public road will be inspected for any soil deposits from exiting trucks, which will be cleaned up and returned to the site.

All loaded trucks will be fitted with secured covers over the entire load, thereby preventing any loss of the load on public roads. Each load of contaminated soil leaving the site shall be such that the origin, dispatch time, cleanliness of the vehicle, route, destination, and arrival time are recorded. Appropriate (trip ticket) docket information confirming disposal shall be maintained for inspection.

15.4 Dust Control

Generation of dust will be kept to a minimum at all times.

During working hours, water sprays will be used to keep the surface of the excavation and any stockpiled soils (which will be kept to a minimum) reasonably damp to suppress any dust. Water used for dust suppression will be only the minimum required and will not be allowed to escape the confines of the excavation areas. Polythene sheets will be used to cover any contaminated soil stockpile to minimise generation of dust. If excessive dust is being generated, works will cease until the dust is sufficiently suppressed.

A complaints register will be set up on-site for recording complaints from residents, with regard to dust. The complaints register will be completed by the Site Superintendent, as well as the corrective actions implemented.

15.5 Sediment and Stormwater Containment

Industry standard sediment control fencing will be installed along the downslope of the remediation area. The fencing will comprise geofabric filter stretched between posts at appropriate spacing. The base of the fabric will be buried in the ground and / or adequately weighted. The fabric will be an approved material.

The sediment control measures will be regularly inspected and maintained by the superintendent. Should any section be damaged or not perform to satisfaction it will be immediately repaired or replaced.

15.6 Stockpile Management

All materials stockpiled onsite will be managed by the Contractor. Unique numbers will be provided for each stockpile, the source of the stockpile, its estimated volume, material characterisation and its location onsite will also be recorded.

The following procedures will be implemented by the Contractor:

- No stockpiles of soil or other materials shall be placed on footpaths or road reserves unless prior Council approval has been obtained;
- All stockpiles of soil or other materials shall be placed away from drainage lines, gutters, or stormwater pits or inlets;
- A silt fence or straw bales must be placed around any soils temporarily stockpiled on site in order to prevent the loss of soils during rain periods;
- All stockpiles of soil or other materials likely to generate dust or odours shall be covered (where practical); and
- All stockpiles of chemically contaminated soil shall be stored in a secure area and be covered if remaining more than 24 hours (where practical).

15.7 Run-off

Run-off water, including that due to rain that has not been in contact with any contaminated soil is not of concern. Contaminated soil may be exposed at the surface and any surface water that comes into contact with soil must be collected. If the contaminated soil needs to be stockpiled on site temporarily, excavated material will be placed on the up-gradient side of the excavation and will be covered with tarpaulins. This method ensures that minimal rainwater will come into contact with contaminated soil and where it does, run-off water will be contained within the excavation.

Water suspected to be contaminated will be sampled and analysed by the laboratory to determine the most appropriate manner of disposal in accordance with the relevant guidelines.

It should be noted that excavation into contaminated soil is best commenced if fine, dry weather is forecast for the next 48 hour working period.

15.8 Minimising Cross Contamination

The following procedures should be implemented by the contractor to minimise any cross contamination during remediation works for its success:

- Cary out all works according to the RAP.
- During excavation and loading into trucks as a part of remediation, the contaminated soil needs to be separated based on the waste classification.
- Implementing stockpile management as detailed in Section 15.6 for any soils generated from Areas to be remediated temporarily stockpiled on site.

15.9 Noise Management

Noise impacts will generally result from the excavators and truck movements within the site and surrounding streets, all of which have noise levels within levels normally expected at a construction site.

To minimise noise impacts during the remediation works, the following measures will be implemented:

- Construction noise will be confined to the hours stipulated by Council. No machinery / trucks will be permitted to access the site outside these hours of operation.
- Signage at the site entrance providing contact details for the site superintendent so that noise complaints can be readily addressed.
- Establishment and monitoring of a complaints log.

15.10 Odour Control

To control odours at the site boundaries, the following processes will be adopted:

- All plant and equipment exhaust levels will be monitored by the site foreman / superintendent to ensure acceptable levels. If unacceptable levels are determined, the equipment will be replaced or repaired.
- If strong hydrocarbon odours are detected from any of the machinery, a hydrocarbon mitigating agent will be used.
- A complaints register will be set up on-site for recording complaints from residents, or tenants with regard to odours. The complaints register will be completed by the Site Superintendent, as well as the corrective actions implemented.

15.11 Waste and Asbestos Management

Disposal of contaminated soils (waste) from Areas 1 to 8, generated by the remediation works will be in accordance with Section 14.0 of this RAP.

All contaminated soil must be transported in a covered, leak-proof vehicle, and disposed of in accordance with NSW EPA and SafeWork NSW requirements.

During working hours, a water cart should be used to suppress any dust. Water used for dust suppression will be only the minimum required and will not be allowed to escape the confines of the site.

The remediation contractor will keep records of all off-site waste disposals.

Procedures for waste and asbestos management will include but not be limited to:

- Documenting the results of the visual and sample assessment, and the safe system of management throughout the remediation works.
- Notifying SafeWork NSW for removal of asbestos contaminated soil. This is generally done by the Class A Licensed contractor.
- Dampening, not saturating, the excavated fill materials and work area with water spray to minimise the potential for asbestos fibres from the asbestos contaminated soil becoming airborne.
- Wearing appropriate personal protection equipment (PPE) as detailed in the OH&S Plan in Section 16.0.
- NATA accredited asbestos air monitoring in the vicinity of the exclusion zone (a minimum of 10m from the perimeter of the asbestos contaminated areas) for airborne asbestos during excavation and loading of asbestos contaminated soil from Areas 1 to 7. If monitoring indicates the presence of airborne asbestos, all works must cease immediately, and the remediation methods re-assessed.
- Appropriate documentation of trucks that are used to transport contaminated soil before leaving the site and after disposing of the contaminated soil at an EPA licensed landfill facility.

Information relating to asbestos contamination in soils and safe disposal and transport is presented in WorkCover NSW (2008) Working with asbestos and NOHSC (2005) Code of Practice for the management and control of asbestos in the workplace.

The remediation contractor will keep records of all off-site waste disposals.

The works area will be kept in a tidy condition so that waste materials generated by the earthworks or workers on-site will be contained. Rubbish disposal bins with heavy lids will be provided within the site compound for personal litter. These bins will be monitored and emptied on a regular basis when near full. Any loose rubbish generated by the earthworks, capable of being blown off the site in high winds, will be hand collected and deposited into the bins provided. No burning of rubbish will be permitted.

All employees will be informed of the necessity to maintain a tidy environment. The site superintendent will carry out a daily inspection at the completion of works, prior to leaving the compound.

15.12 Re-use of Site Originated Soil

After completion of remediation and validation, site originated soil from outside the remediation area can be re-use as fill in the remediated areas. Periodic inspection should be carried out by the appointed Environmental Consultant during excavation of the soil.

If any suspect materials (identified by unusual staining, odour, discolouration, or inclusions such as building rubble, asbestos sheets/pieces/pipes, ash material, etc.) are encountered during the placement of site originated soil, Unexpected Finds Management Protocol (Appendix K) should be implemented. In the event of contamination, detailed assessment, remediation, and validation will be necessary.

15.13 Re-use of Imported Soil

After completion of remediation and validation, VENM, ENM or resource recovery order material exempted under the POEO act imported to the site and validated as per Section 17.3, can be re-use as fill in the remediated areas.

If any suspect materials (identified by unusual staining, odour, discolouration, or inclusions such as building rubble, asbestos sheets/pieces/pipes, ash material, etc.) are encountered during the placement of imported soil, Unexpected Finds Management Protocol (Appendix K) should be implemented. In the event of contamination, detailed assessment, remediation, and validation will be necessary.

16.0 OCCUPATIONAL HEALTH & SAFETY

A site-specific Occupational Health and Safety (OH&S) Plan has been developed to ensure that the remediation works are conducted in a safe manner. Personnel working on the site are required to read and understand the OH&S Plan prior to works commencing.

16.1 Potential Contaminants Associated with Human Health Issue

According to the International Agency for Research on Cancer (IARC), asbestos is a human carcinogen. The health effects of asbestos are well understood and result from inhalation of airborne respirable fibres. If deposited in the lungs, the fibres can initiate diseases that take many years to produce serious health effects. These effects include asbestosis (scar-like tissue in the lungs and in the pleural membrane that surrounds the lungs), lung cancer and mesothelioma.

People with asbestosis have difficulty breathing, often a cough and in severe cases heart enlargement. Asbestosis is a serious disease and can eventually lead to disability and death. The likelihood of asbestos-related disease is related to the concentration and duration of exposure to respirable asbestos fibres.

Bonded asbestos fragments generally do not present a significant health risk unless tooled, cut, sanded, abraded, or machined, which may release asbestos dust or fibres. Asbestos dust contains tiny almost indestructible fibres, which can cause damage to the lungs when breathed in.

According to the IARC, Benzo(a)Pyrene (an isomer of PA is a listed known human carcinogen (Group 1). The primary routes for human exposure are inhalation and ingestion. Benzo(a)Pyrene can cause skin irritation with rash and/or burning sensations. Exposure to sunlight and the chemical together can increase these effects. Repeated exposure can cause skin changes such as thickening and darkening. Exposure can irritate and/or burn the eyes on contact.

Note that the effects listed are usually the result of prolonged exposure to high concentrations. These extremes are not likely to be achieved during the works proposed.

16.2 Personal Protective Equipment (PPE)

To minimise exposure to the contaminants within the soils and to ensure the safety of workers by providing adequate protection, the minimum level of PPE for workers actively involved in handling the contaminated soil (particularly asbestos) includes:

- Disposable long sleeve worker coveralls/overalls to be disposed of at the completion of each day.
- Highly visible safety vests.
- Waterproof boots with steel toe and shank, complying with relevant Australian Standard.
- Safety glasses with side shields, complying with relevant Australian Standard.
- Hard hat, meeting relevant Australian Standard.
- Dust masks, complying relevant Australian Standard for filtering asbestos fibres.
- Nitrile work gloves, complying with relevant Australian Standard.

It should be noted that wearing PPE can reduce the dexterity of workers and senses of vision, hearing, and smell. Heat stress is another important consideration that must be taken into account during hot weather.

Eating or drinking on-site will only be carried out in a designated lunchroom. Hands are to be washed thoroughly upon completion of work and prior to eating, drinking or any other hand-to-mouth activity. Smoking can only be carried out in a dedicated area outdoor and away from hazard.

Visitors to the site, who will be observing activities being undertaken in or around excavations, should follow appropriate guidelines to prevent excessive dermal contact or inhalation of dust arising from the handling of contaminated materials. All visitors should wear the following PPE during remediation works:

- Highly visible safety vests.
- Waterproof boots with steel toe and shank.
- Safety glasses with side shields.
- Hard hat.
- Dust masks, complying relevant Australian Standard for filtering asbestos fibres.

The abovementioned PPE will also be required for site workers, or consultants not directly associated with the remedial works, but present on the site.

16.3 Safety Measures around Excavations

The safety measures to be adopted during any deep excavation works (i.e. deeper than 1.2m) are as follows:

- During non-working hours, the entire site will be secured.
- All personnel performing the works in and around the excavation will wear appropriate personal protective equipment, as listed above.
- Excavation works should not take place during periods of high wind, elevated temperature, or heavy rain.

16.4 Air Monitoring

During excavation and loading of asbestos contaminated fill materials from Areas 1 to 7, air quality/asbestos monitoring devices should be set up in the vicinity of the exclusion zone (a minimum of 10m from the perimeter of Areas 1 to 6 and monitored by a suitably experienced consultant. Monitoring should be carried out in accordance with the Worksafe Australia Code of Practice and Guidance Notes on Asbestos – Membrane Filter Method for Airborne Asbestos Dust – August 1988. The positions of monitoring devices should be determined through consultation with the appointed monitoring consultant and Class A licensed contractor for bonded asbestos.

16.5 Key Personnel and Contact Telephone Numbers

Remediation Contractor's Representative:	Not known at this stage
Superintendent:	Not known at this stage
Asbestos Assessor	Not known at this stage
Environmental Consultant	Not known at this stage
If Geotechnique is appointed, contact person	Mr A Barbhuyia Phone: (02) 4722 2700
Nearest Hospital:	Mona Vale Hospital Coronation St, Mona Vale NSW 2103 02 9998 6300
Emergency Response:	000

17.0 SITE VALIDATION

Validation sampling and testing forms a crucial part of the site remediation process, in that it monitors the success or otherwise of the adopted remediation strategy and confirms the suitability of the site for the proposed use.

The objective of the site validation plan is to obtain sufficient information and data to make the following conclusions:

1. All previously identified contaminated soil is appropriately remediated.
2. Any soil with aesthetic issues such as unacceptable odour or discolouration is removed from the site.
3. All waste disposal is carried out in accordance with current legislation.
4. The risks that the retained soils pose to human health, or the environment are minimal and acceptable.
5. The site is suitable for the proposed development.

The data qualitative objectives (DQO) for the validation process will be developed in accordance with NEPM 1999 (April 2013). The performance of the validation in achieving the DQO will be assessed through the application of Data Quality Indicators (DQI) defined as follows:

Precision	A quantitative measure of the variability (or reproducibility) of data;
Accuracy	A quantitative measure of the closeness of reported data to the "true" value;
Representativeness	The confidence (expressed qualitatively) that data is representative of each media present on the site;
Completeness	A measure of the amount of useable data from a data collection activity;
Comparability	The confidence (expressed qualitatively) that data can be considered equivalent for each sampling and analytical event.

The following table provides a list of the DQI for the proposed validation and the methods adopted to ensure that the DQI are met.

DATA QUALITY INDICATOR	METHODS OF ACHIEVEMENT
Documentation Completeness	Preparation of COC records. Laboratory sample receipt information. NATA registered laboratory results certificates.
Data Completeness	Validation sampling density is sufficient to establish 95% Upper Confidence Limits. On site visual assessment of soils. On site assessment of odour. Analysis for contaminants of concern.
Data Comparability	Using appropriate techniques for sample recovery. Using appropriate sample storage and transportation methods. Use of a NATA registered laboratories.
Data Representativeness	Reasonable validation sampling coverage. Representative validation sampling. Representative coverage of contaminants.
Data Precision and Accuracy	Use of trained and qualified field staff. Appropriate industry standard sampling equipment and decontamination procedures. 1 in 20 intra-laboratory/duplicate sample, 1 in 20 inter-laboratory/split sample and 1 rinsate blank water daily. Acceptable RPD for duplicate and split sample comparison. Acceptable concentrations in rinsate blank water samples. Check of laboratory QC methods and results.

The remediation works carried out will be validated through the following processes:

- Monitoring and documentation of the works by an appointed Asbestos Assessor and an Environmental Consultant.
- Collection and review of waste transportation and disposal documentation.
- Visual inspection, sampling and/or testing of soils upon removal of identified contaminated materials.

Following the completion of removal of asbestos contaminated fill materials from Areas 1 to 7, an independent SafeWork NSW licensed asbestos assessor must be engaged to issue clearance of Areas 1 to 7 for future use as residential subdivision. A qualified asbestos assessor will undertake all necessary visual inspection and/or sampling as a part asbestos clearance of the remediated areas.

Due to the presence of other contaminants apart from asbestos issue, an Environmental Consultant must be engaged to carry out supervision of remediation work of Area 8 and validation of Area 8 after completion of remediation work.

17.1 Sampling and Testing Plan

17.1.1 Sampling and Testing Plan-Soil Impacted by Asbestos (AF, FA and/or ACM fragments) (Areas 1 to 7)

After removal of asbestos (AF, FA and/or ACM fragments) contaminated fill materials from Areas 1 to 7, an independent SafeWork NSW licensed asbestos assessor must be engaged to issue clearance of Areas 1 to 7 for future use as residential subdivision. A qualified asbestos assessor will undertake all necessary visual inspection (asbestos assessor will systematically and thoroughly inspect the base of the excavation pits at an interval of 2m and entire perimeter of the wall). Any identified asbestos fragments will be picked for landfill disposal) and sampling as a part asbestos clearance of the remediated areas. No soil with unacceptable odour or discoloration or inclusions of ash, charcoal, fibro-cement pieces etc., can remains in the pit.

After completion of remediation works and completion of visual inspection by Asbestos Assessor for Areas 1 to 7, a thorough visual inspection of the excavation pits in Areas 1 to 7 must be carried out by the appointed environmental consultant to confirm that no soil with unacceptable odour or discoloration or inclusions of ash, charcoal, fibro-cement pieces etc. remains in the pits.

The following samples will be recovered using a stainless steel trowel:

- Excavation of side wall samples, 1 location per 10 linear metres or at least 1 per excavation wall, recovered from the top of the excavation to the full depth of the wall (at least one sample in every 500mm of soil or change of soil profile).
- Excavation base samples, 1 location per 25 square metres, recovered from the excavation base surface to a depth of 100mm.

In summary, the samples to be recovered and analysed are presented below.

Area	Estimated Excavation Area (m^2)	Estimated Excavated Depth	Number of Samples to be Collected	Analysis	Remarks
1	23	300mm (Full depth of fill)	5	Asbestos	➢ 1 sample (1 sample from 1 sampling location along the northern wall) at depth interval of 0-0.3m; 1 sample (1 sample from 1 sampling location along the eastern wall) at depth interval of 0-0.3m; 1 sample (1 samples from 1 sampling locations along the southern wall) at depth interval of 0-0.3m; 1 sample (1 sample from 1 sampling location along the western wall) at depth interval of 0-0.3m; ➢ 1 sample from the base at depth interval of 0.1m
2	25	1m (Full depth of fill)	9	Asbestos	➢ 2 samples (2 sample from 1 sampling location along the northern wall) at depth interval of 0-0.5m & 0.5-1.0m; 2 samples (2 sample from 1 sampling location along the eastern wall) at depth interval of 0-0.5m & 0.5-1.0m; ; 2 samples (2 sample from 1 sampling location along the southern wall) at depth interval of 0-0.5m & 0.5-1.0m; ; 2 samples (2 sample from 1 sampling location along the western wall) at depth interval of 0-0.5m & 0.5-1.0m; ; ➢ 1 sample from the base at depth interval of 0.1m
3	9	500m (Full depth of fill)	5	Asbestos	➢ 1 sample (1 sample from 1 sampling location along the northern wall) at depth interval of 0-0.5m; 1 sample (1 sample from 1 sampling location along the eastern wall) at depth interval of 0-0.5m ; 1 sample (1 sample from 1 sampling location along the southern wall) at depth interval of 0-0.5m ; 1 sample (1 sample from 1 sampling location along the western wall) at depth interval of 0-0.5m ; ➢ 1 sample from the base at depth interval of 0.1m
4	25	1m (Full depth of fill)	9	Asbestos	➢ 2 samples (2 sample from 1 sampling location along the northern wall) at depth interval of 0-0.5m & 0.5-1.0m; 2 samples (2 sample from 1 sampling location along the eastern wall) at depth interval of 0-0.5m & 0.5-1.0m; ; 2 samples (2 sample from 1 sampling location along the southern wall) at depth interval of 0-0.5m & 0.5-1.0m; ; 2 samples (2 sample from 1 sampling location along the western wall) at depth interval of 0-0.5m & 0.5-1.0m; ; ➢ 1 sample from the base at depth interval of 0.1m

Area	Estimated Excavation Area (m^2)	Estimated Excavated Depth	Number of Samples to be Collected	Analysis	Remarks
5	25	1m (Full depth of fill)	9	Asbestos	➢ 2 samples (2 sample from 1 sampling location along the northern wall) at depth interval of 0-0.5m & 0.5-1.0m; 2 samples (2 sample from 1 sampling location along the eastern wall) at depth interval of 0-0.5m & 0.5-1.0m; ; 2 samples (2 sample from 1 sampling location along the southern wall) at depth interval of 0-0.5m & 0.5-1.0m; ; 2 samples (2 sample from 1 sampling location along the western wall) at depth interval of 0-0.5m & 0.5-1.0m; ; ➢ 1 sample from the base at depth interval of 0.1m
6	25	1m (Full depth of fill)	9	Asbestos	➢ 2 samples (2 sample from 1 sampling location along the northern wall) at depth interval of 0-0.5m & 0.5-1.0m; 2 samples (2 sample from 1 sampling location along the eastern wall) at depth interval of 0-0.5m & 0.5-1.0m; ; 2 samples (2 sample from 1 sampling location along the southern wall) at depth interval of 0-0.5m & 0.5-1.0m; ; 2 samples (2 sample from 1 sampling location along the western wall) at depth interval of 0-0.5m & 0.5-1.0m; ; ➢ 1 sample from the base at depth interval of 0.1m
7	9	Average 1.3m (Full depth of fill)	12	Asbestos	➢ 3 samples (3 samples from 1 sampling location along the northern wall) at depth interval of 0-0.5m, 0.5-1.0m & 1.0-1.3m; 3 samples (3 samples from 1 sampling location along the eastern wall) at depth interval of 0-0.5m, 0.5-1.0m & 1.0-1.15m ; 2 samples (2 samples from 1 sampling location along the southern wall) at depth interval of 0-0.5m & 0.5-1.0m; 3 samples (3 samples from 1 sampling location along the western wall) at depth interval of 0-5m, 0.5-1.0m & 1.0-1.15m ; ➢ 1 sample from the base at depth interval of 0.1m

Disposable gloves will be used to transfer in total, fifty eight validation samples into large plastic bag (each about 10L volume) for on-site sieving test in accordance with gravimetric procedures as per NEPM 1999 (April 2013). Samples will also be collected in separate small plastic bag (1kg) for asbestos analysis by NATA accredited laboratory under COC condition.

Excavated soil from Areas 1 to 7 8 will be temporally stored on the ground of the site for final waste classification prior to disposal. Generally, the following samples will be recovered using a stainless-steel trowel from the footprint of the former stockpiles:

- 1 location per 25 square metres or at least 3 per footprint, recovered from the ground surface to a depth of 0.1m.

However, if a HDPE sheet is used over the ground surface to stockpile the contaminated soil, instead of sampling, a through visual inspection by the appointed Asbestos Assessor and Environmental Consultant must be carried out after removal of the stockpile to confirm that no soil with unacceptable odour or discoloration or inclusions of ash, charcoal, fibre-cement pieces etc., remains in the footprint of the former stockpile.

17.1.2 Soil Impacted by PAH (Area 8)

After completion of remediation works for Area 8, a thorough visual inspection of the excavation pit in Area 8 must be carried out by the appointed environmental consultant to confirm that no soil with unacceptable odour or discoloration or inclusions of ash, charcoal, fibro-cement pieces etc. remains in the pits.

The following samples will be recovered using a stainless steel trowel, which will also satisfy the minimum sampling point requirement for each area, based on the "Sampling Design Part 1- Application" 2022 EPA:

- Excavation of side wall samples, 1 location per 10 linear metres or at least 1 per excavation wall, recovered from the top of the excavation to the full depth of the wall (at least one sample in every 500mm of soil or change of soil profile, with allowable maximum sampling thickness of 300mm).
- Excavation base samples, 1 location per 25 square metres, recovered from the excavation base surface to a depth of 0.1m.

In summary, the samples to be recovered and analysed are presented below.

Area	Estimated Excavation Area (m^2)	Estimated Excavated Depth	Number of Samples to be Collected	Analysis	Remarks
8	9	1.5m (Full depth of fill)	13	PAH	➢ 3 samples (3 samples from 1 sampling location along the northern wall) at depth interval of 0-0.15m; 0.5-0.8m & 1.0-1.3m; 3 samples (3 sample from 1 sampling location along the eastern wall) at depth interval of 0-0.15m; 0.5-0.8m & 1.0-1.3m; ; 3 samples (3 samples from 1 sampling location along the southern wall) at depth interval of 0-0.15m; 0.5-0.8m & 1.0-1.3m; ; 3 samples (3 samples from 1 sampling location along the western wall) at depth interval of 0-0.15m; 0.5-0.8m & 1.0-1.3m; ; ➢ 1 sample from the base at depth interval of 0.1m

The stainless steel trowel will be regularly decontaminated using Decon 90 and distilled water. Disposable gloves will be used to transfer validation samples into glass jar for PAH analysis. The glass jars will be stored in a chilled container.

Industry standard QA and QC samples will also be prepared, including rinsate samples (one rinsate per day of field work), field duplicates (about 5% of samples analysed) and inter-laboratory duplicates (about 5% of samples analysed). The test results for these samples will be used to assess data precision and accuracy.

Excavated soil from Area 8 will be temporally stored on the separate ground of the site for final waste classification prior to disposal. Generally, the following samples will be recovered using a stainless-steel trowel from the footprint of the former stockpiles:

- 1 location per 25 square metres or at least 3 per footprint, recovered from the ground surface to a depth of 0.1m.

However, if a HDPE sheet is used over the ground surface to stockpile the contaminated soil, instead of sampling, a through visual inspection by the appointed Asbestos Assessor and Environmental Consultant must be carried out after removal of the stockpile to confirm that no soil with unacceptable odour or discoloration or inclusions of ash, charcoal, fibre-cement pieces etc., remains in the footprint of the former stockpile.

17.2 Validation Criteria

It is understood that residential subdivision is the future use of the site. As such, with regard to human health, analytical results will be assessed against risk health screening level for *residential with garden/accessible soil* (Residential A).

For asbestos assessment, the adopted validation assessment criteria are:

- 0.01% w/w for bonded ACM (residential with garden/accessible soil);
- 0.001% for friable asbestos in soil; and
- No visible asbestos on ground surface.

As it is understood that residential subdivision is the future use of the site, the analytical results will be assessed against risk based HIL for *residential with garden/accessible soil* (HIL A), and Ecological Screening Level (ESL) for *urban residential and public open space* for fine-grained soil (silt) and coarse-grained soil (sand).

The recovered valuation samples will be forwarded to a NATA accredited laboratory for Metals, PAH and TRH analysis. The acceptance criteria to be adopted for the validation process will be as follows:

Analyte	HIL A (mg/kg)	ESL (mg/kg)
Benzo(a)Pyrene (BaP)	-	0.7
BaP TEQ	3	-

Notes: HIL A Health Investigation Levels for residential with garden/accessible soil (e.g. ovals), secondary schools and footpath
ESL Ecological Screening Level

The NEPM provides guidance for assessment of a statistical distribution of contaminant concentrations taken from a data set of random samples. There are a number of criteria to be fulfilled in order to establish that a site (or study area) is not contaminated, which are:

- The arithmetic mean of the data set must be less than the relevant threshold level; that is, it is acceptable for individuals to exceed the guideline, but the cumulative mean of the data set of soil sample results should not exceed the threshold level.
- The standard deviation of the data set should be less than 50% of the relevant threshold level.
- No individual sample result should be greater than 250% of the relevant threshold level.

Where applicable, this statistical approach will be adopted for assessment of the laboratory data provided. However, as opposed to the arithmetic mean, the 95% Upper Confidence Limit (UCL) of the mean, as discussed in Section 5 of the NSW EPA "*Sampling Design Guidelines for Contaminated Sites*" – 1995, will be adopted as the governing value. Assessment of statistical distribution of test data sets where all concentrations were less than the laboratory LOR will not be carried out, as there is no data distribution to consider.

If the validation test results meet the adopted acceptance criteria the remediation area will be deemed as satisfactorily remediated.

If the validation test results do not meet the validation criteria, remediation will continue followed by additional validation sampling and testing. This process will continue until the test results meet the acceptance criteria.

17.3 Imported Material

If any material is to be imported to the site, the material will be validated as being suitable for use within the site prior to use. The imported fill must be free from asbestos, ash, and odour, not be discoloured and acid sulphate soil. Environmentally, virgin excavated natural material (VENM) or excavated natural material (ENM), or resource recovery order material exempted under the POEO act, will be suitable for use as fill for the site. Salinity assessment might be required.

The validation process will be as follows:

- Review of VENM or ENM classification or Resource Recovery Order material exemption reports prepared by suitably qualified consultant(s) made available by the supplier of the materials.
- Inspection of incoming material at the source site and during importation, if the documentation provided is found to be adequate, to ensure the material comply with those validated.
- If the documentation provided is found to be inadequate or if the incoming material is suspect, appropriate sampling and testing will be carried out by suitably qualified consultant(s) prior to acceptance within the site.

18.0 CONTINGENCY PLAN

18.1 Unexpected Finds

Contamination assessment had been undertaken to assess the identified contaminants of potential concern within the site. However, ground conditions between sampling points may vary, and further hazards may arise from unexpected sources and / or in unexpected locations during remediation. Residual hazards that may be present at the site are generally detectable through visual or olfactory means, for example:

- 10m^2 of ACM sheets / fragments encountered in any location;
- Friable ACM such as lagging encountered in any location;
- Bottles / containers / drums of chemicals;
- Odorous, unusual coloured or stained hydrocarbons impacted soils; and
- Ash and / or slag contaminated soils / fill materials.

As a precautionary measure to ensure the protection of the workforce and surrounding community, should any of the abovementioned substances, any other unexpected potentially hazardous substance, imported fill materials (which are different to those encountered during the previous assessments), etc. be identified, we recommend that this office is contacted for assessment and an unexpected finds management protocol in Appendix D of this report should be implemented.

The procedure to be followed in the event of an unexpected find is presented below:

- In the event of an unexpected find, all work in the immediate vicinity should cease and an environmental consultant should be contacted immediately;
- Temporary barricades should be erected to isolate the area from access to the public and works;
- The environmental consultant should attend the site and assess the extent of remediation that may be required;
- In the event additional remediation is required, the procedures outlined within this report should be adopted where appropriate, alternatively an addendum RAP should be prepared;
- An additional sampling and analytical rationale should be established by the consultant and should be implemented with reference to the relevant guideline documents; and
- Appropriate validation sampling should be undertaken by the appointed Environmental Consultant in accordance with the RAP and the results should be included in the validation report.

18.2 Contingency Scenarios & Corrective Actions

In some circumstances, remediation works can be unpredictable. The following table presents anticipated possible problems or events and the corresponding corrective actions to be implemented:

Incident / Event	Corrective Action
Spillage / leakage of oil, hydraulic fluid, or other fuels from the excavator and / or trucks	For major spill; place sandbags down slope, cover area in sand, excavate impacted sand and soils and dispose of at an appropriate EPA approved facility. If groundwater and/or water bodies are impacted, the appointed Environmental Consultant will assess the contamination and need to remediation based on the available information and relevant guidelines. If remediation is required, an addendum to the RAP will be prepared. Assessment and any remediation details will be added in the final validation report. For minor spill; cover area in sand, excavate impacted sand and soils and dispose at an EPA approved facility. Stop spillage / leakage where apparent.

Incident / Event	Corrective Action
Failure of sediment control measures	Replace or repair failed control measure. Determine reason for failure and ensure no repeat. Clean up any materials penetrating the safeguard and return to either the stockpile or excavation (origin).
Excessive dust generation	Cease activities until more appropriate dust control measures can be implemented. Cover all areas generating dust with plastic sheeting. Improve water control (i.e. sprays) where appropriate. Assess measures being implemented.
Discovery of asbestos cement pieces / fragments in locations other than identified locations / areas during remediation	An unexpected finds management protocol (Appendix K to be implemented.
Discovery of unexpected contamination and suspect materials that are not identified from the previous assessment	An unexpected finds management protocol (Appendix K) to be implemented.
Complaint from neighbouring property or sensitive receptor	Initiate pro-active consultation process with all neighbouring properties to ensure any concern and complaints will be resolved prior to commencement of any remediation work. The future appointed principal contractor (who is likely to be the future appointed civil contractor) will have responsibility to initiate a pro-active consultation process in the event of complaints from neighbouring properties.
Excessive noise	Identify source and add or amend noise attenuation equipment.
Failure of selected remediation strategy, as validation cannot be achieved.	The containment or capping of contaminated soil on-site can be considered. Technical issues associated with physically capping and containing contaminants on-site must be proven effective. An ongoing environmental management plan (EMP) would be required to be prepared by the appointed Environmental Consultant to the satisfaction of the Council. The EMP would need to be legally enforceable. Where containment and/or capping of contaminants is undertaken either the landowner will place a covenant on the land title or the requirements for the ongoing EMP to be legally enforceable would be as a condition of consent. For the latter option, the council must agree in writing to having a conditional sign-off and be satisfied of the legality of the EMP.

19.0 CONCLUSION AND RECOMMENDATIONS

The Phase 1 PCA, Phase 2 CA, contamination report update and DSI revealed that the site comprised two individual disused rural residential properties and one vacant land facing Warriewood Road. Narrabeen Creek traversed along the south western boundary of the site.

The general soil profile within the majority of the site comprised imported and site originated fill overlying natural clayey silt, sandy silt and clayey soil overlying natural sandy silt and/or clay or sandy clay at majority of the sample locations. Natural clayey silt or natural silty sandy clay or natural sandy silt with or without inclusions of root fibres was encountered in the remaining locations.

There were no obvious ash materials, fibro-cement pieces and odour in the test pits locations, with the exception of fibro-cement pieces within the fill profile in test pit TP25, FCP2-4, TP25-3, D101, D103, D112 and D113, and presence of one fibro-cement piece at the ground surface of each of two judgmental sampling locations (FCP1 and FCP2). Both fibro-cement pieces were sent to laboratory for asbestos analysis. No other fibro-cement pieces were found on the ground surface at FCP1 and FCP2. During Phase 2 CA and DSI, laboratory testing confirmed that the fibro-cement pieces observed on the ground surface at FCP1 and in the fill profile at TP25 (0.5-1.5m) and TP25-3 don't contain asbestos.

Based on the Phase 2 CA and DSI, eight locations contain asbestos (AF and FA or ACM fragments) contaminated fill materials, and one location contains Benzo(a)Pyrene TEQ contaminated fill with elevated Benzo(a)Pyrene (BaP) (isomers of PAH) within the site. Asbestos (AF and FA) present a risk of harm to human health present a risk of harm to human health due to the exceedance of relevant Health Screening Level for Residential setting, whilst Asbestos (ACM fragments) present a potential risk of harm to human health as these fragments, whose concentration exceeded of relevant Health Screening Level for Residential setting, may release asbestos dust or fibres if tooled, cut etc. Benzo(a)Pyrene TEQ presents a risk of harm to human health due to the exceedance of relevant Health Investigation Level (via vapour inhalation pathway). Elevated Benzo(a)Pyrene concentration might impact on terrestrial ecosystems due to the exceedance of relevant Ecological Screening Level. Therefore, remediation is deemed necessary.

Based on the contaminant concentrations and locations identified from the contamination assessments, eight indicative remediation areas (Area 1 to Area 8) have been developed and is shown on Drawing No 20223/3-AA3.

Based on the advantages, disadvantages, and risks of each of the remediation options, we consider that remediation by disposal of the asbestos (AF, FA and ACM fragments) contaminated fill materials in Areas 1 to 7 and PAH contaminated fill materials in Area 8 at an appropriately licensed landfill facility, as indicated on Drawing No 20223/2-AA3, is appropriate for the site.

This RAP has been prepared to provide guidance to contractor cleaning up / manage the contaminated soils within the site.

The contaminated soils are preliminary classified as:

- Asbestos waste for asbestos contaminated fill materials in Areas 1 to 7.
- General Solid Waste for PAH contaminated fill materials in Area 8.

Excavated soils from Areas 1 to 8 will be retested to confirm the final waste classification.

Due to the presence of asbestos within the site, the fill materials in Area 8 which is preliminary classified as “General Solid Waste” must be inspected by the appointed environmental consultant during excavation of fill materials from that area. If any asbestos-cement piece(s) is observed during excavation in Area 8, the final waste classification will be utilised for remediation of that area followed by appropriate validation where asbestos testing will be added with the already identified other contaminant(s).

As a precaution, it is recommended to excavate fill materials (about 1m x 1m x full depth of fill) at each sample locations TP14-4, D103 and D107, where asbestos (ACM or AF or FA) was detected but below the acceptable limits and dispose the fill materials at a landfill facility as asbestos waste, during remediation of Areas 1 to 7.

The final waste classification will be adopted to dispose contaminated soil into landfill facility from Areas 1 to 8. Anthropogenic inclusions of building debris including brick fragments, bitumen and concrete in the fill will be removed together with the contaminated soils and disposed of at a licensed landfill facility.

The waste must be disposed of at an appropriate licensed landfill facility which will meet their licence requirement to receive a particular type of waste. All landfill delivery dockets shall be provided to the appointed Asbestos Assessor and Environmental Consultant for inclusion in a final validation report, with cross referencing so that each landfill delivery dockets can be correlated with a particular remediation area. The records of the disposal (tonnage) will be correlated with the extent of remediation (volume of soil/material removed).

Removal and/or disposal of the waste must be carried out in accordance with the requirements of the regulators, such as NSW EPA and SafeWork NSW.

The proposed remediation works are considered to be Category 2 (subject to agreement by Northern Beaches Council). A minimum of 30 days notice of the intention to proceed with remedial works must be given to Northern Beaches Council.

The Site Management Plan, Occupational Health & Safety Plan and Contingency Plan, outlined in Sections 15.0, 16.0 and 18.0 of the report are required to be implemented during remediation works.

After completion of the remediation works, validation must be carried out in accordance with Section 17.0 of the report.

A validation report will be then prepared on the suitability of the site for the future use as residential subdivision.

Based on this assessment, it is our opinion that the site is considered suitable for the future use as residential subdivision subject to implementation of the following recommendations, prior to earthworks:

- Sampling and testing of soils in the footprints of site features such as the houses, building, sheds, carport, concrete, swimming pool, recycled asphalt, gravel, and bitumen covered areas, after complete demolition and removal or clearing and in the footprints of former glass house and two former galvanised iron (GI) sheds.

- Revise this RAP, if required, to remediate any other contamination that might be identified through the recommended additional sampling and testing, followed by appropriate validation. If no other contamination is detected beneath the site features after removal, carry out appropriate remediation and validation of only Areas 1 to 8 as detailed in this report.
- A validation report will be produced at completion of successful remediation by the appointed environmental consultant. The format of the report will follow that recommended in the NSW Environment Protection Authority (EPA), “Consultants Reporting on Contaminated Land" – 2020.

After completion of remediation and validation, if any materials to be excavated and removed from the site, it is recommended that waste classification of the materials, in accordance with the "Waste Classification Guidelines Part 1: Classifying Waste" NSW EPA 2014; NSW EPA resource recovery exemptions and orders under the Protection of the Environment Operations (Waste) Regulation 2014; or NSW EPA *Certification: Virgin excavated natural material* is undertaken prior to disposal at a facility that can lawfully accept the materials. Any soil disposed off-site needs to be tracked and documented and shall be provided to the appointed Environmental Consultant for inclusion in a final validation report.

Should VENM or ENM or resource recovery order material exempted under the POEO act be imported from other sites, the material classification shall be assessed by the appointed Environmental Consultant prior to such importation, as detailed in Section 17.3.

20.0 REPORT / ASSESSMENT LIMITATIONS

Within the scope of work outlined in the fee proposal (Our Ref: Q20223-3) dated 2 February 2023, the services performed by Geotechnique were conducted in a manner consistent with the level of quality and skill generally exercised by members of the profession and consulting practice.

To the best of our knowledge, all information obtained and contained in this report is true and accurate. No further investigation has been carried out to authenticate the information provided. Supporting documentation was obtained where possible, some of which is contained in this report.

This report has been prepared for Sekisui House through Willowtree Planning for the purposes stated within. Northern Beaches Council may rely upon the report for development and/or construction application determinations. Reliance on this report by other parties shall be at such parties' sole risk as the report might not contain sufficient information for other purposes.

This report shall only be presented in full and may not be used to support any objective other than those set out in the report, except where written approval is provided by Geotechnique Pty Ltd.

The information in this report is considered accurate at the completion of field work for the DSI (1 March 2023). Any variations to the site from or use beyond that date will nullify the conclusion stated.

Whilst the assessment conducted at the site was carried out in accordance with current NSW guidelines, the potential always exists for contaminated soils to be present between sampled locations.

Presented in Appendix L is a document entitled "Environmental Notes", which should be read in conjunction with this report.

LIST OF REFERENCES

Contaminated Land Management Act 1997

Contaminated Land Management Regulation 1998

Contaminated Sites: Consultants Reporting on Contaminated Land – NSW Environment Protection Authority 2020

Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd Edition) –NSW EPA 2017

Contaminated Sites: Sampling Design Part 1- Application - NSW Environment Protection Authority 2022

Geology of Sydney 1:100,000 Sheet (9130) – Geological Survey of New South Wales, Department of Mineral Resources 1983

Guidelines on Resource Recovery Exemptions (Land Application of Waster Materials as Fill), DECC, NSW (February 2011)

National Environmental Protection (Assessment of Site Contamination) Amendment Measures 1999, National Environmental Protection Council 2013

National Environment Protection (Assessment of Site Contamination) Measure – National Environmental Protection Council (NEPM) 1999 (April 2013)

Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A – The Excavated Natural Material Exemption and Order 2014

Soil Landscape of Sydney 1:100,000 Sheet (9130) – Department of Land & Water Conservation 2002

Standard Methods for the Examination of Water and Wastewater – American Public Health Association (APHA) 2017

State Environmental Planning Policy (Resilience and Hazards, 2021) under the Environmental Planning and Assessment Act 1979

Waste Classification Guidelines Part 1: Classifying Waste - NSW EPA (November 2014)

DRAWINGS

Drawing No 13234/2-AA1	*Lot Layout & Site Features*
Drawing No 13757/2-AA1	*Test Pit & Sample Locations*
Drawing No 13757/2-AA2	*Locations of Concern*
Drawing No 20223/1-AA1	*Site Features*
Drawing No 20223/1-AA2	*Locations of Concern*
Drawing No 20223/2-AA1	*Detailed Test Pit Locations*
Drawing No 20223/3-AA1	*Detailed Test Pit Locations*
Drawing No 20223/3-AA2	*Revised Locations of Contamination*
Drawing No 20223/3-AA3	*Indicative Areas to be Remediated*

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0 15 30 45 60 75m

Scale 1:1500

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NOTES

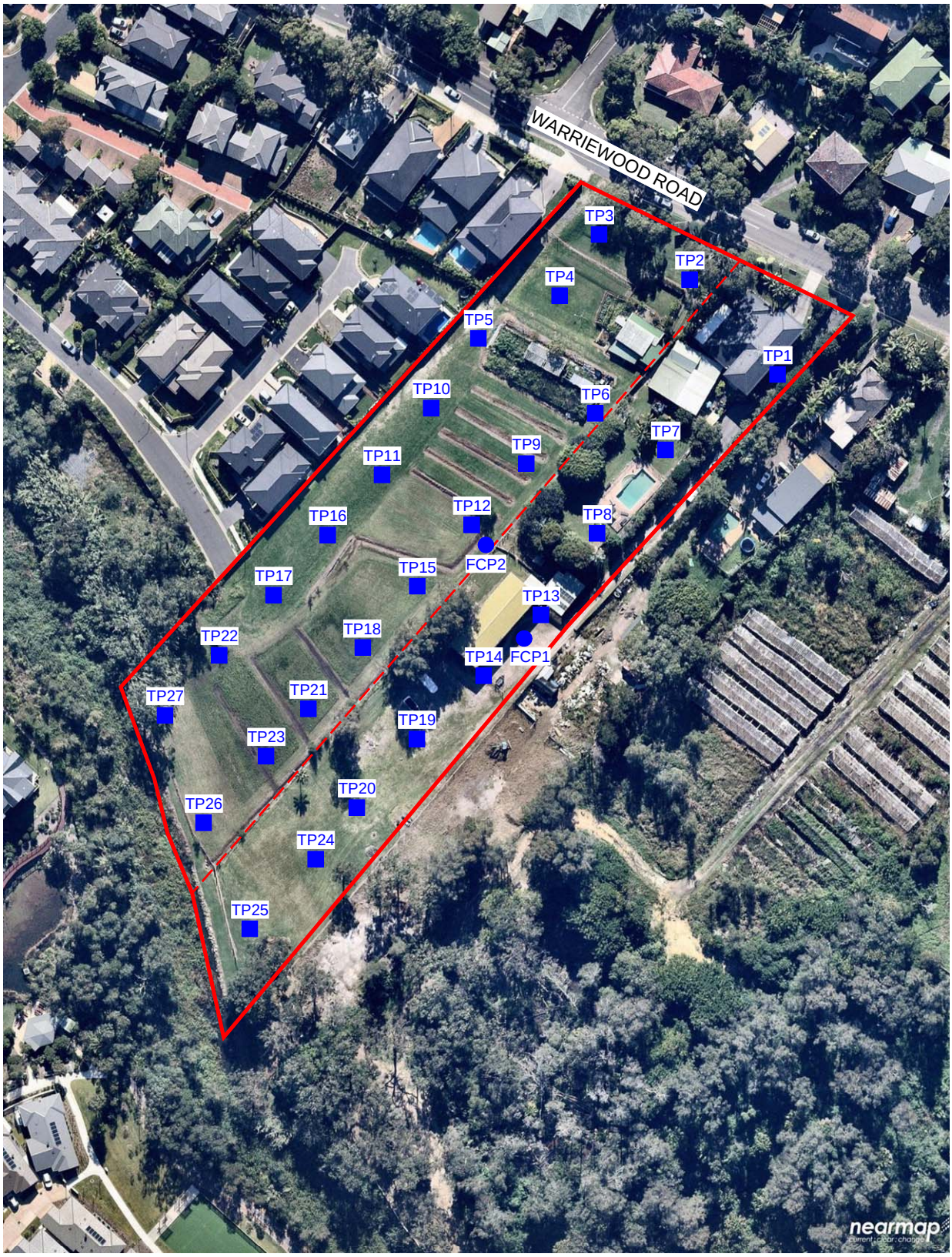
1. Site features are indicative and are not to scale.
2. This drawing has been produced using a base plan provided by others to which additional information e.g test pits, borehole locations or notes have been added. Some or all of the plan may not be relevant at the time of producing this drawing

Intercapital Consultants
Proposed Residential Development
Lots 2, 3 in DP1115877 and Lot 3 in DP942319
53A, 53B & 53 Warriewood Road, Warriewood

Lot Layout & Site Features

Drawing No: 13234/2-AA1
Job No: 13234/2
Drawn By: MH
Date: 25 August 2014
Checked By: AN/AB

File No: 13234-2
Layers: 0, AA1



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N

LEGEND

- Test Pit
- Sample

0 15 30 45 60 75m

Scale 1:1500

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Test Pit & Sample Locations

Drawing No: 13757/2-AA1
Job No: 13757/2
Drawn By: MH
Date: 23 June 2016
Checked By: JH/AB

File No: 13757-2
Layers: 0, AA1

LEGEND

- Test Pit
- Sample

Imagery ©2016 NearMap.com

0 15 30 45 60 75m

Scale 1:1500

Sample Location	Depth (m)	Contaminant	Concentration (mg/kg)	Level (mg/kg)			
				HIL A	EIL	PIL	ESL
TP14	0-0.5	Friable Chrysotile Asbestos	**NA**	-	-	-	-
TP20	0-0.5	Benzo(a)Pyrene (BaP), BaP TEQ	**4.9, 6.3**	- Bap TEQ = 3	- -	- -	BaP = 0.7 -
TP25	0.5-1.0	Cadmium (Cd)	**3.5**	Cd = 20	-	Cd= 3	-
TP25	1.0-1.5	Cd	**4.7**	Cd = 20	-	Cd= 3	-
TP25	1.5-1.8	Friable Chrysotile Asbestos & Bonded ACM fragments	**NA**	-	-	-	-
FCP2	0-0.1	Friable Chrysotile Asbestos	**NA**	-	-	-	-

Notes:

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

EIL : Ecological Investigation Level of aged Metals for urban residential land use

PIL : Provisional Phytotoxicity Based Investigation Level

ESL : Ecological Screening Level for urban residential land use

ACM : Asbestos Containing Material

NA : Not Applicable

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Locations of Concern

Drawing No: 13757/2-AA2
Job No: 13757/2
Drawn By: MH
Date: 23 June 2016
Checked By: AB

File No: 13757-2
Layers: 0, AA2

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0 12 24 36 48 60m

Scale 1:1200

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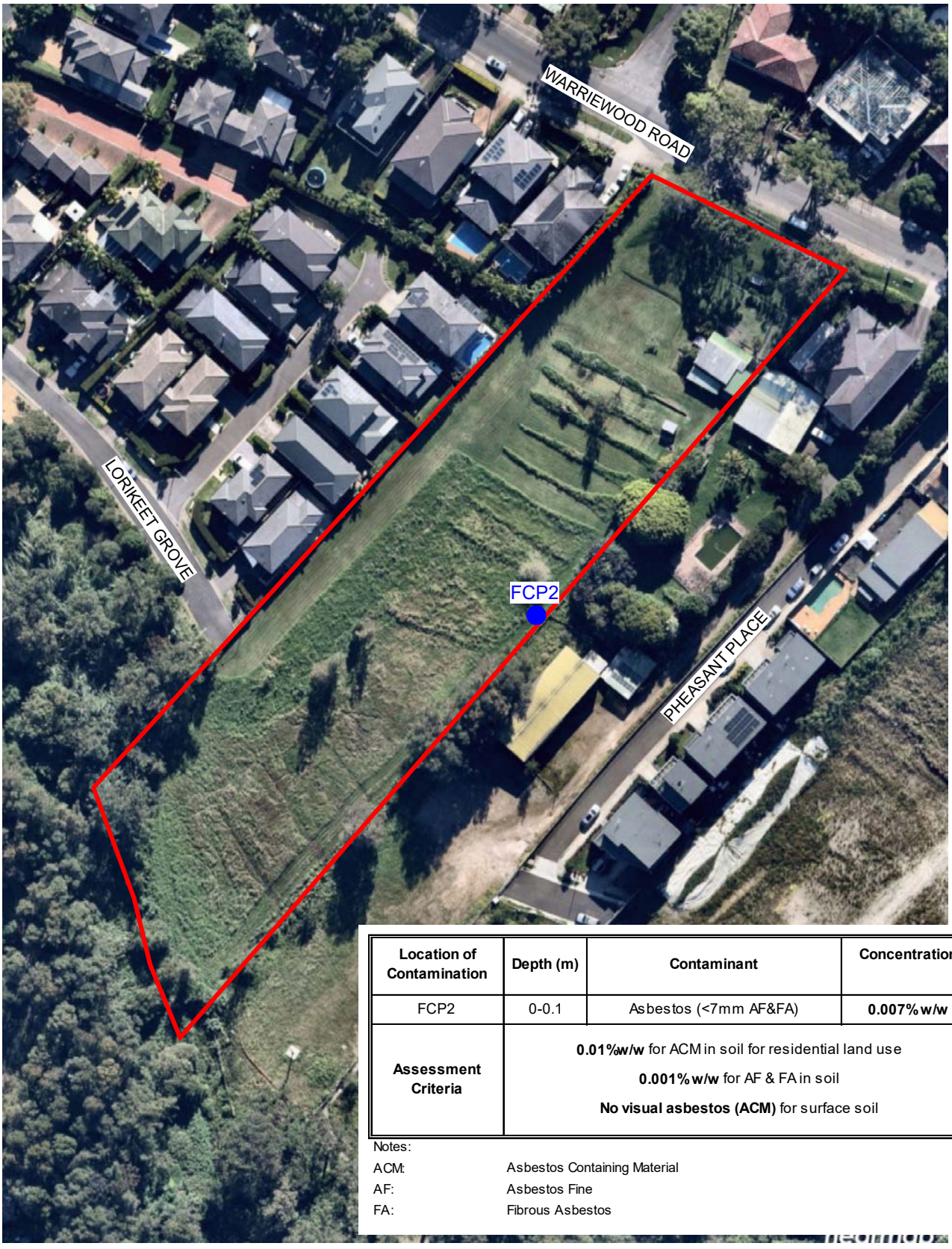
Willowtree Planning
Lot 2 DP1115877
53A Warriewood Road
Warriewood

Site Features

Drawing No: 20223/1-AA1
Job No: 20223/1
Drawn By: MH
Date: 25 July 2022
Checked By: JH/AB

File No: 20223-1
Layers: 0, AA1



Location of Contamination	Depth (m)	Contaminant	Concentration
FCP2	0-0.1	Asbestos (<7mm AF&FA)	**0.007%w/w**
Assessment Criteria	**0.01%w/w** for ACM in soil for residential land use **0.001%w/w** for AF & FA in soil **No visual asbestos (ACM)** for surface soil		

Notes:

ACM:	Asbestos Containing Material
AF:	Asbestos Fine
FA:	Fibrous Asbestos

LEGEND

● Sample

0 12 24 36 48 60m

Scale 1:1200

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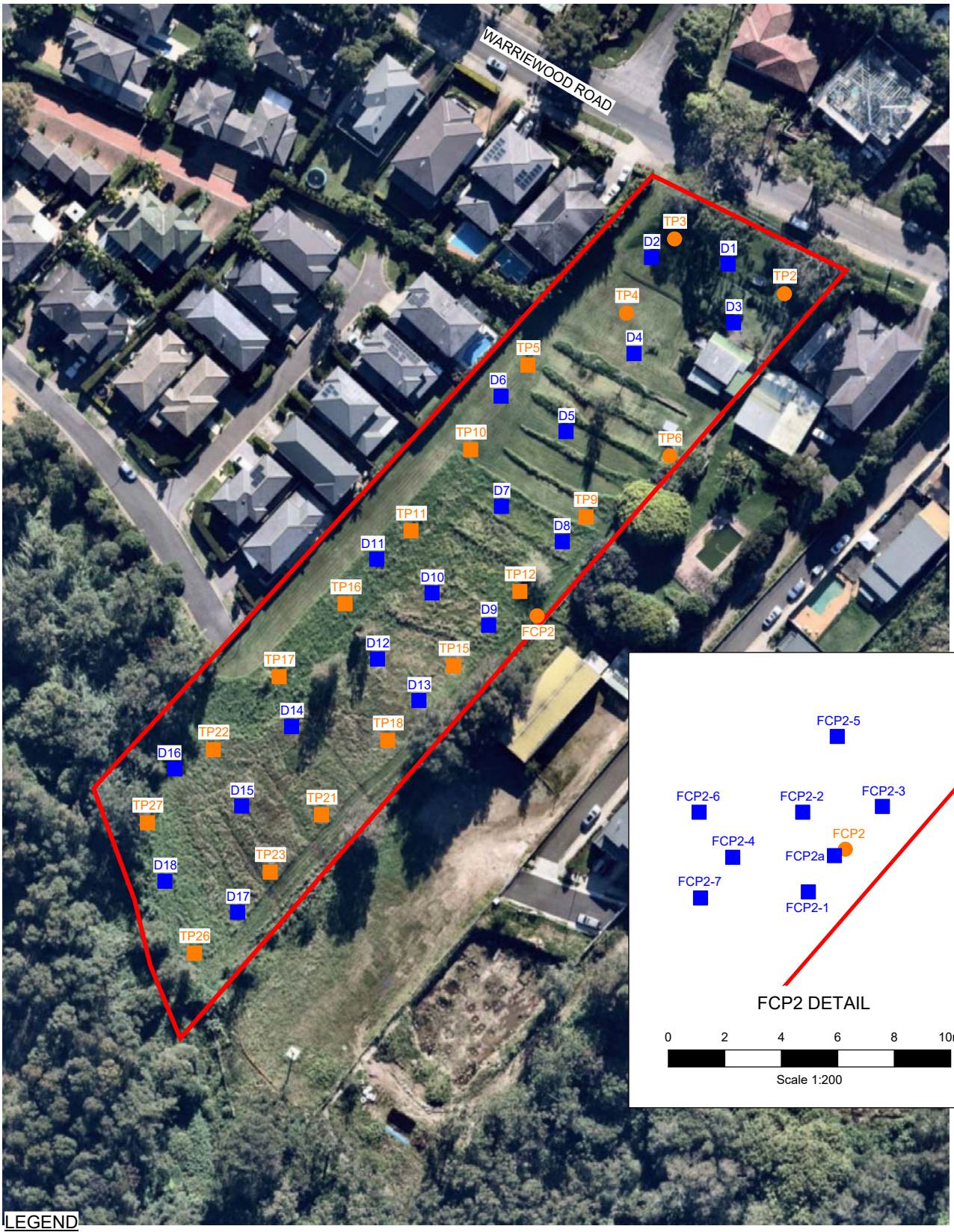
Warriewood

Location of Contamination

Drawing No: 20223/1-AA2
Job No: 20223/1
Drawn By: MH
Date: 25 July 2022
Checked By: AB

File No: 20223-1
Layers: 0, AA2



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Willowtree Planning
Lot 2 DP1115877
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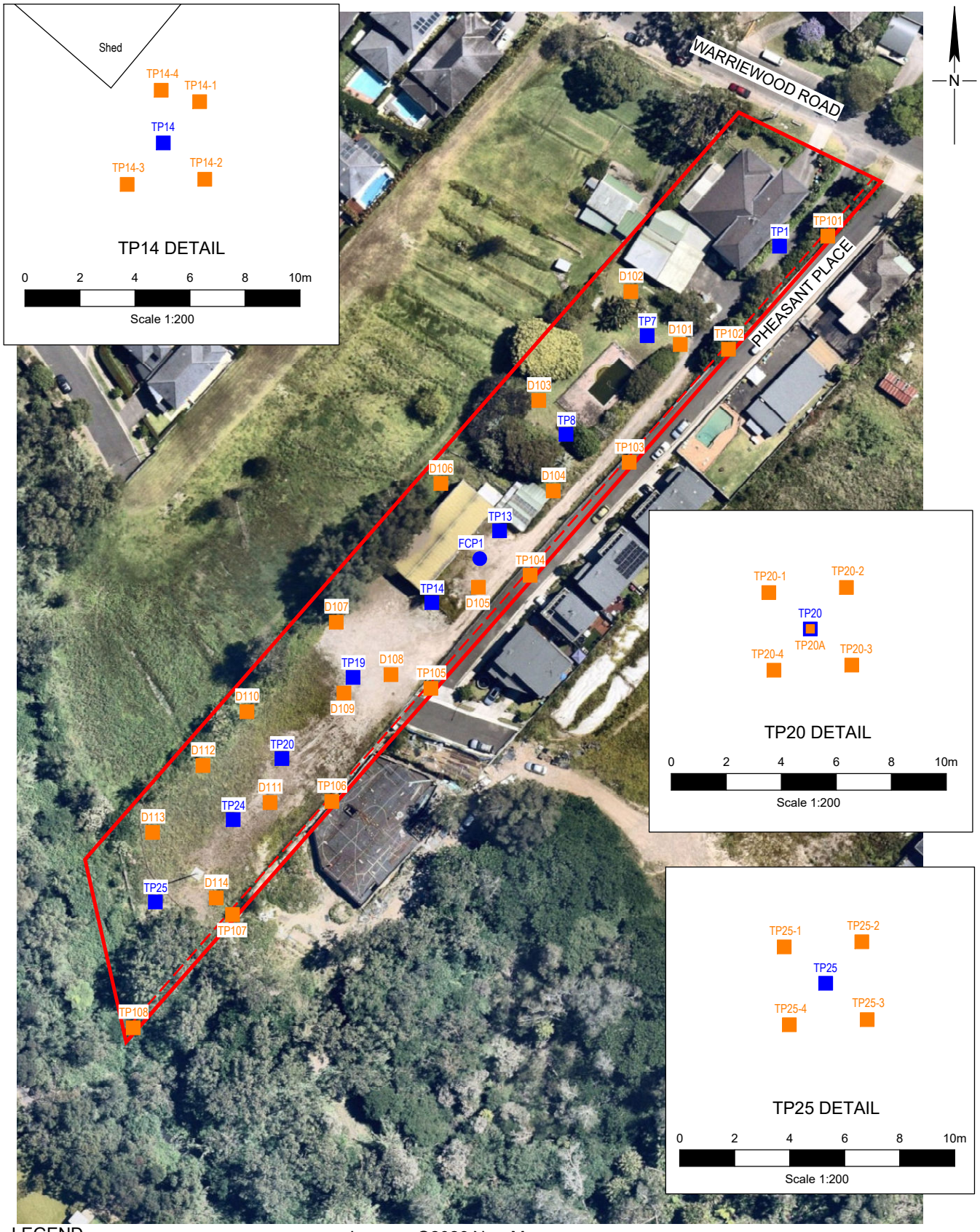
Detailed Test Pit Locations

Drawing No: 20223/2-AA1
Job No: 20223/2
Drawn By: MH
Date: 26 September 2022
Checked By: AB

File No: 20223-2
Layers: 0, AA1



LEGEND

- Test Pit (May 2016)
- Sample (May 2016)
- Test Pit (April 2023)

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0 12 24 36 48 60m

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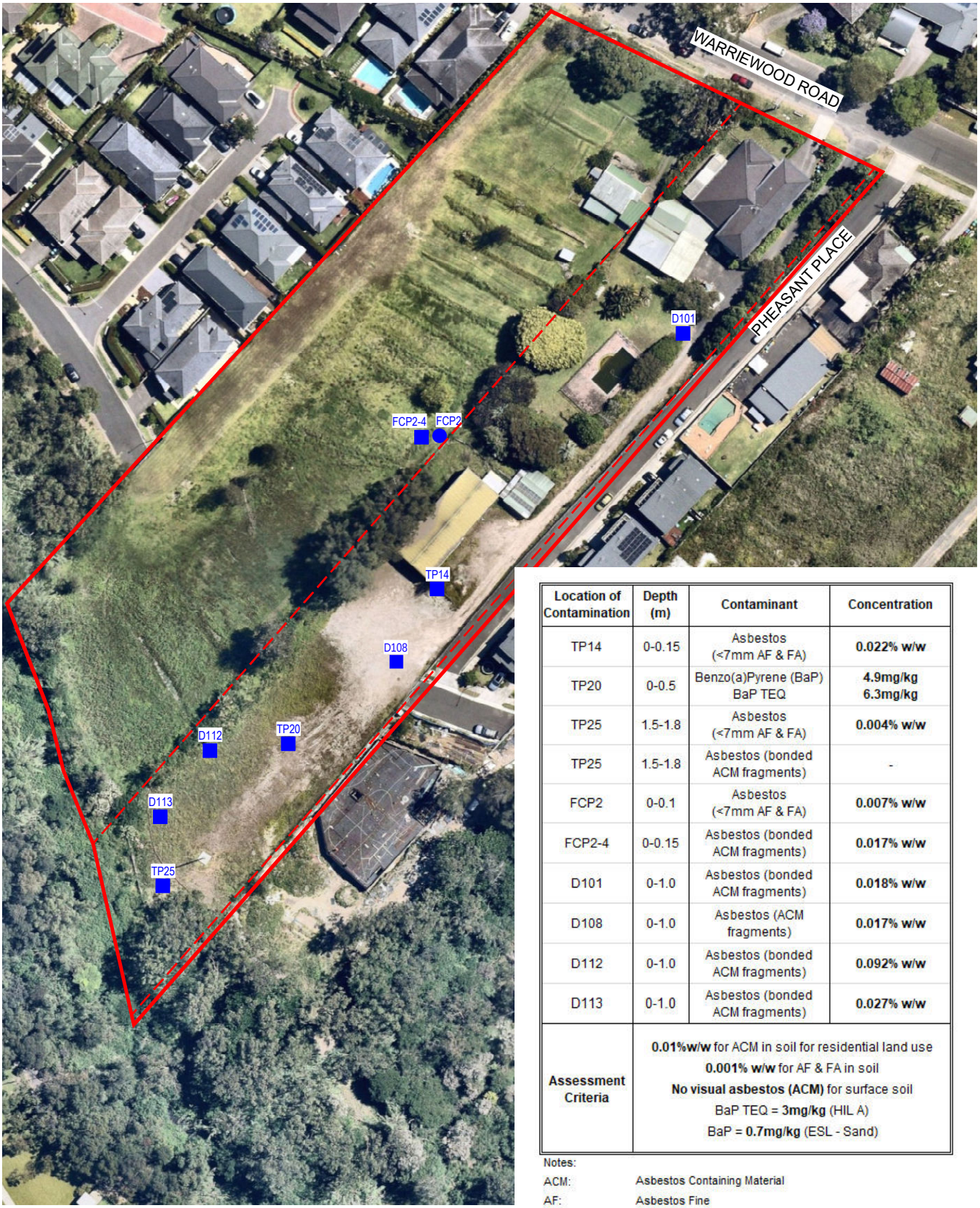
Warriewood

Detailed Test Pit Locations

Drawing No: 20223/3-AA1
Job No: 20223/3
Drawn By: MH
Date: 28 April 2023
Checked By: JH/AB

File No: 20223-3
Layers: 0, AA1



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Location of Contamination	Depth (m)	Contaminant	Concentration
TP14	0-0.15	Asbestos (<7mm AF & FA)	**0.022% w/w**
TP20	0-0.5	Benzo(a)Pyrene (BaP) BaP TEQ	**4.9mg/kg 6.3mg/kg**
TP25	1.5-1.8	Asbestos (<7mm AF & FA)	**0.004% w/w**
TP25	1.5-1.8	Asbestos (bonded ACM fragments)	-
FCP2	0-0.1	Asbestos (<7mm AF & FA)	**0.007% w/w**
FCP2-4	0-0.15	Asbestos (bonded ACM fragments)	**0.017% w/w**
D101	0-1.0	Asbestos (bonded ACM fragments)	**0.018% w/w**
D108	0-1.0	Asbestos (ACM fragments)	**0.017% w/w**
D112	0-1.0	Asbestos (bonded ACM fragments)	**0.092% w/w**
D113	0-1.0	Asbestos (bonded ACM fragments)	**0.027% w/w**
Assessment Criteria	**0.01%w/w** for ACM in soil for residential land use **0.001% w/w** for AF & FA in soil **No visual asbestos (ACM)** for surface soil BaP TEQ = **3mg/kg** (HIL A) BaP = **0.7mg/kg** (ESL - Sand)		

Notes:

ACM:	Asbestos Containing Material
AF:	Asbestos Fine
FA:	Fibrous Asbestos
HIL A:	Health-based Investigation Level for residential land with accessible gardens
ESL:	Ecological Screening Level for urban residential land use-Coarse-grained Soil (Sand)

LEGEND

- Test Pit
- Sample

0 12 24 36 48 60m

Scale 1:1200

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Revised Locations of Contamination

Drawing No: 20223/3-AA2
Job No: 20223/3
Drawn By: MH
Date: 22 May 2023
Checked By: AB

File No: 20223-3
Layers: 0, AA2

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LEGEND

Area to be Remediated

0 12 24 36 48 60m

Scale 1:1200

N

AREA	MATERIAL	ESTIMATED AREA (sq. m)	ESTIMATED DEPTH	ESTIMATED VOLUME (cu.m)	CONTAMINANT	REMEDIATION METHOD
1	Fill (Sandy Silt, low plasticity, brown, inclusion of gravel, root fibres and ACM fragments)	23	Full Depth of Fill (300mm)	7	Asbestos (<7mm AF & FA and ACM fragments)	Disposal as "Asbestos Waste" at an EPA licensed Landfill
2	Fill (Silty Sand, fine grained, brown, inclusion of cobble, brick, root fibres and ACM fragments)	25	Full Depth of Fill (1m)	25	Asbestos (ACM fragments)	Disposal as "Asbestos Waste" at an EPA licensed Landfill
3	Fill (Sandy Silt, low plasticity, brown, inclusion of cobbles/gravel and Clay, medium plasticity brown, inclusions of gravel, cobbles and silt)	9	Full Depth of Fill (500mm)	5	Asbestos (<7mm AF & FA)	Disposal as "Asbestos Waste" at an EPA licensed Landfill
4	Fill (Clay, medium plasticity, inclusion of gravel, cobble, silt and brick fragments)	25	Full Depth of Fill (1m)	25	Asbestos (>7mm ACM)	Disposal as "Asbestos Waste" at an EPA licensed Landfill
5	Fill (Clay, medium plasticity, inclusion of gravel, cobble, silt, bricks and ACM fragments)	25	Full Depth of Fill (1m)	25	Asbestos (ACM fragments)	Disposal as "Asbestos Waste" at an EPA licensed Landfill
6	Fill (Clay, medium plasticity, inclusion of gravel, cobble, silt, bricks, concrete and ACM fragments)	25	Full Depth of Fill (1m)	25	Asbestos (ACM fragments)	Disposal as "Asbestos Waste" at an EPA licensed Landfill
7	Fill (Sandy Silt, low plasticity, brown, inclusion of gravel and ACM fragments, Clay, medium plasticity brown, inclusions of gravel, cobbles and silt, building material, bricks, and Silty Sand, fine grained, brown, with cobble and bricks)	9	Full Depth of Fill (Average 1.3m)	12	Asbestos (<7mm AF & FA and ACM fragments)	Disposal as "Asbestos Waste" at an EPA licensed Landfill
8	Fill (Clay, medium plasticity, inclusion of gravel, cobble and silt and Silty Sand, fine grained, brown, with cobble)	9	Full Depth of Fill (1.5m)	14	PAH	Disposal as "General Solid Waste" at an EPA licensed Landfill

Notes:
ACM: Asbestos Containing Material
AF: Asbestos Fine
FA: Fibrous Asbestos
PAH: Polycyclic Aromatic Hydrocarbons

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2. Site features are shown at approximate locations and are not to scale.

Willowtree Planning
Lots 2 & 3 DP1115877 & Part Lot 3 DP942319
53B & 53 Warriewood Road
Warriewood

Indicative Areas to be Remediated

Drawing No: 20223/3-AA3
Job No: 20223/3
Drawn By: MH
Date: 22 May 2023
Checked By: AB

File No: 20223-3
Layers: 0, AA3

TABLES

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TABLE A
RINSATE
(Ref No: 20223/3-AA)

SAMPLE DATE	RS1 5/09/2022	RS2 28/02/2023	RS3 1/03/2023
METAL	**(mg/L)**	**(mg/L)**	**(mg/L)**
Arsenic	<0.02	<0.02	<0.02
Cadmium	<0.001	<0.001	<0.001
Chromium	<0.005	<0.005	<0.005
Copper	<0.005	<0.005	<0.005
Lead	<0.02	<0.02	<0.02
Mercury	<0.0001	<0.0001	<0.0001
Nickel	<0.005	<0.005	<0.005
Zinc	<0.01	<0.01	<0.01
TOTAL RECOVERABLE HYDROCARBON (TRH)	**-**	**-**	**(µg/L)**
F1 (C6-C10 less BTEX)	-	-	<50
F2 (>C10-C16)	-	-	<60
F3 (>C16-C34)	-	-	<500
F4 (>C34-C40)	-	-	<500
BTEX	**-**	**-**	**(µg/L)**
Benzene	-	-	<0.5
Toluene	-	-	<0.5
Ethyl Benzene	-	-	<0.5
Xylenes	-	-	<1.5
POLYCYCLIC AROMATIC HYDROCARBON (PAH)	**-**	**(µg/L)**	**(µg/L)**
Total PAH	-	<1	<1
Naphthalene	-	<0.1	<0.1
Benzo(a)Pyrene	-	<0.1	<0.1

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TABLE B
TRIP SPIKE
(Ref No: 20223/3-AA)

Sample	Sampling Date	BTEX			
		Benzene	Toluene	Ethylbenzene	Xylenes
TS1	1/03/2023	87%	88%	89%	89%

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

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TABLE C1
DUPLICATE SAMPLE
(Ref No: 20223/3-AA)

ANALYTE	TP20-1 0.0-0.15 (m) mg/kg	DDS1 mg/kg	RELATIVE PERCENTAGE DIFFERENCES (RPD) %
POLYCYCLIC AROMATIC HYDROCARBONS	#N/A		
Benzo(a)Pyrene TEQ	#N/A	<0.3	-
Total PAH	#N/A	<0.1	-
Naphthalene	#N/A	<0.1	-
Benzo(a)Pyrene	#N/A	<0.1	-

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TABLE C2
DUPLICATE SAMPLE
(Ref No: 20223/3-AA)

ANALYTE	TP102 0.0-0.15 (m) mg/kg	DDS2 mg/kg	RELATIVE PERCENTAGE DIFFERENCES (RPD) %
Arsenic	<1	2	-
Cadmium	<0.3	<0.3	-
Chromium	7.7	8.5	10
Copper	1	4.5	127
Lead	5	18	113
Mercury	<0.05	<0.05	-
Nickel	2.1	2.5	17
Zinc	2	16	156
TOTAL RECOVERABLE HYDROCARBONS (TRH)			
F1 (C6-C10 less BTEX)	<25	<25	-
F2 (>C10-C16)	<25	<25	-
F3 (>C16-C34)	<90	<90	-
F4 (>C34-C40)	<120	<120	-
BTEX			
Benzene	<0.1	<0.1	-
Toluene	<0.1	<0.1	-
Ethyl Benzene	<0.1	<0.1	-
Xylenes	<0.3	<0.3	-
POLYCYCLIC AROMATIC HYDROCARBONS			
Benzo(a)Pyrene TEQ	<0.3	<0.3	-
Total PAH	<0.1	<0.1	-
Naphthalene	<0.1	<0.1	-
Benzo(a)Pyrene	<0.1	<0.1	-
ORGANOCHLORINE PESTICIDES (OCP)			
Hexachlorobenzene (HCB)	<0.1	<0.1	-
Heptachlor	<0.1	<0.1	-
Aldrin+Dieldrin	<0.15	<0.15	-
Endrin	<0.1	<0.1	-
Methoxychlor	<0.1	<0.1	-
Mirex	<0.1	<0.1	-
Endosulfan (alpha, beta & sulphate)	<0.3	<0.3	-
DDD+DDE+DDT	<0.6	<0.6	-
Chlordane (alpha & gamma)	<0.2	<0.2	-
POLYCHLORINATED BIPHENYLS (PCB)			
Total PCB	<1	<1	-

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TABLE D1
SPLIT SAMPLE
(Ref No: 20223/3-AA)

ANALYTE	TP20-3 0.0-0.15 (m) mg/kg (SGS)	DSS1 mg/kg (ENVIROLAB)	RELATIVE PERCENTAGE DIFFERENCES (RPD) %
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)			
Benzo(a)Pyrene TEQ	<0.3	<0.5	-
Total PAH	0.3	0.8	91
Naphthalene	<0.1	<0.1	-
Benzo(a)Pyrene	<0.1	0.1	-

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TABLE D2
SPLIT SAMPLE
(Ref No: 20223/3-AA)

ANALYTE	TP105 0.0-0.15 (m) mg/kg (SGS)	DSS2 mg/kg (ENVIROLAB)	RELATIVE PERCENTAGE DIFFERENCES (RPD) %
Arsenic	3	<4	-
Cadmium	<0.3	<0.4	-
Chromium	9.4	9	4
Copper	10	12	18
Lead	33	16	69
Mercury	0.37	<0.1	-
Nickel	2.9	4	32
Zinc	42	30	33
TOTAL RECOVERABLE HYDROCARBONS (TRH)			
F1 (C6-C10 less BTEX)	<25	<25	-
F2 (>C10-C16)	<25	<50	-
F3 (>C16-C34)	<90	<100	-
F4 (>C34-C40)	<120	<100	-
BTEX			
Benzene	<0.1	<0.2	-
Toluene	<0.1	<0.5	-
Ethyl Benzene	<0.1	<1	-
Xylenes	<0.3	<1	-
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)			
Benzo(a)Pyrene TEQ	<0.3	<0.5	-
Total PAH	<0.1	0.07	-
Naphthalene	<0.1	<0.1	-
Benzo(a)Pyrene	<0.1	0.07	-
ORGANOCHLORINE PESTICIDES (OCP)			
Hexachlorobenzene (HCB)	<0.1	<0.1	-
Heptachlor	<0.1	<0.1	-
Aldrin+Dieldrin	<0.15	<0.2	-
Endrin	<0.1	<0.1	-
Methoxychlor	<0.1	<0.1	-
Endosulfan (alpha (I), beta (II) & sulphate)	<0.3	<0.3	-
DDD+DDE+DDT	<0.6	<0.1	-
Chlordane (alpha & gamma)	<0.2	<0.2	-
POLYCHLORINATED BIPHENYLS (PCB)			
Total PCB	<1	<0.1	-

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TABLE E
METAL, CATION EXCHANGE CAPACITY (CEC) & pH TEST RESULTS
DISCRETE SAMPLES
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	METAL (mg/kg) ARSENIC	CADMIUM	CHROMIUM (Total)	COPPER	LEAD	MERCURY	NICKEL	ZINC	CEC ($cmol_c/kg$)	pH
FCP2-4	0.0-0.15	8	0.4	14	18	31	<0.05	1.5	160	8.0	6.6
BH101	0.05-0.3	2	<0.3	4.8	6.4	10	<0.05	2.4	12	3.4	6.1
TP102	0.0-0.15	<1	<0.3	7.7	1	5	<0.05	2.1	2	2.9	7.3
TP103	0.0-0.15	2	<0.3	5.1	8.4	10	<0.05	3.8	20	27	8.4
TP104	0.0-0.15	3	<0.3	8.9	8.9	56	<0.05	4.6	42	35	8.6
TP105	0.0-0.15	3	<0.3	9.4	10	33	0.37	2.9	42	32	8.0
TP106	0.0-0.15	2	<0.3	7.7	4.6	20	0.05	1.7	19	16	7.9
TP107	0.0-0.15	3	<0.3	8.1	10	13	<0.05	4.8	32	33	8.7
TP108	0.0-0.15	2	<0.3	12	4.6	22	<0.05	2.4	37	9.3	7.3
Limit of Reporting (LOR)		1	0.3	0.5	0.5	1	0.05	0.5	2	0.02	0.1
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)											
Health-based Investigation Levels (HIL) [a] A - Resident		100	20	100 [c]	6000	300	10 [d]	400	7400		
Ecological Investigation Levels (EIL) [b]- Urban residenti		100 [e]	-	190[f]	70	1100 [g]	-	15	230		

Notes:
a: Residential with garden / accessible soil (home grown produce <10% fruit and vegetable intake (no poultry)), also includes childcare centres, preschools and primary schools.
b: EIL of aged chromium (III), copper, nickel & zinc were derived from calculation spreadsheet developed by CSIRO for NEPC; Old Suburb with Low Traffic; the lowest CEC=2.9 cmolc/kg & pH=6.1; the assumed clay content=1 % were selected for derivation of EIL; a conservative approach.
c: Chromium (VI)
d: Methyl Mercury
e: Generic EIL for aged arsenic
f: Chromium (III)
g: Generic added contaminant limit for aged lead

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TABLE F
TOTAL RECOVERABLE HYDROCARBONS (TRH) AND BTEX TEST RESULTS
DISCRETE SAMPLES
(Ref No: 20223/3-AA)

												NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)											
			TRH (mg/kg)					BTEX (mg/kg)				Health Screening Levels (HSL) A Low density residential						Ecological Screening Levels for coarse-grained soil Urban residential							
Sample Location	Depth (m)	Soil type	F1	F2*	F2**	F3	F4	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES	F1	F2*	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES	F1	F2**	F3	F4	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
TP102	0.0-0.15	Sand	<25	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	45	110	0.5	160	55	40	180	120	300	2800	50	85	70	105
TP105	0.0-0.15	Sand	<25	<25	<25	<90	<120	<0.1	<0.1	<0.1	<0.3	45	110	0.5	160	55	40	180	120	300	2800	50	85	70	105
Limit of Reporting (LOR)			25	25	25	90	120	0.1	0.1	0.1	0.3														

Notes:
F1: C6-C10 less BTEX
F2*: >C10-C16 less Naphthalene
F2**: >C10-C16
F3: >C16-C34
F4: >C34-C40
NL: Not Limiting

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TABLE G
POLYCYCLIC AROMATIC HYDROCARBONS (PAH) TEST RESULTS
DISCRETE SAMPLES
(Ref No: 20223/3-AA)

			PAH (mg/kg)				NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)				
							Health-based Investigation Levels (HIL) A - Residential A[a]		Health Screening Level (HSL) A - Low density residential	Generic Ecological Investigation Level (EIL) - Urban residential	Ecological Screening Level (ESL) - Urban residential
Sample Location	Depth (m)	Soil type	BaP TEQ	TOTAL PAHs	NAPHTHALENE	BENZO(a)PYRENE (BaP)	BaP TEQ	TOTAL PAHs	NAPHTHALENE	NAPHTHALENE	BENZO(a)PYRENE (BaP)
TP20_1	0.0-0.15	Sand	0.7	6.9	<0.1	0.4	3	300	3	170	0.7
TP20-1	0.5-0.8	Sand	<0.3	<0.1	<0.1	<0.1	3	300	3	170	0.7
TP20-1	1.0-1.3	Sand	<0.3	0.8	<0.1	<0.1	3	300	NL	170	0.7
TP20-2	0.0-0.15	Sand	<0.3	<0.1	<0.1	<0.1	3	300	3	170	0.7
TP20-2	0.5-0.8	Sand	<0.3	<0.1	<0.1	<0.1	3	300	3	170	0.7
TP20-2	1.0-1.3	Sand	<0.3	0.5	<0.1	0.1	3	300	NL	170	0.7
TP20-3	0.0-0.15	Sand	<0.3	0.3	<0.1	<0.1	3	300	3	170	0.7
TP20-3	0.5-0.8	Sand	<0.3	<0.1	<0.1	<0.1	3	300	3	170	0.7
TP20-3	1.0-1.3	Sand	<0.3	<0.1	<0.1	<0.1	3	300	NL	170	0.7
TP20-4	0.0-0.15	Sand	<0.3	<0.1	<0.1	<0.1	3	300	3	170	0.7
TP20-4	0.5-0.8	Sand	<0.3	<0.1	<0.1	<0.1	3	300	3	170	0.7
TP20-4	1.0-1.3	Sand	<0.3	<0.1	<0.1	<0.1	3	300	NL	170	0.7
TP102	0.0-0.15	Sand	<0.3	<0.1	<0.1	<0.1	3	300	3	170	0.7
TP105	0.0-0.15	Sand	<0.3	<0.1	<0.1	<0.1	3	300	3	170	0.7
Limit of Reporting (LOR)			0.3	0.1	0.1	0.1					

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

NL: Not Limiting

GEOTEC

TABLE H
ORGANOCHLORINE PESTICIDES (OCP) & POLYCHLORINATED BIPHENYLS (PCB)TEST RESULTS
DISCRETE SAMPLES
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	OCP (mg/kg) HEXACHLOROBENZENE (HCB)	HEPTACHLOR	ALDRIN+DIELDRIN	ENDRIN	METHOXYCHLOR	MIREX	ENDOSULFAN (alpha, beta & sulphate)	DDD+DDE+DDT	DDT	CHLORDANE (alpha & gamma)	PCB (mg/kg)
BH101	0.05-0.3	<0.1	<0.1	<0.15	<0.1	<0.1	<0.1	<0.3	<0.6	<0.2	<0.2	-
TP102	0.0-0.15	<0.1	<0.1	<0.15	<0.1	<0.1	<0.1	<0.3	<0.6	<0.2	<0.2	<1
TP103	0.0-0.15	<0.1	<0.1	<0.15	<0.1	<0.1	<0.1	<0.3	<0.6	<0.2	<0.2	-
TP104	0.0-0.15	<0.1	<0.1	<0.15	<0.1	<0.1	<0.1	<0.3	<0.6	<0.2	<0.2	-
TP105	0.0-0.15	<0.1	<0.1	<0.15	<0.1	<0.1	<0.1	<0.3	<0.6	<0.2	<0.2	<1
TP106	0.0-0.15	<0.1	<0.1	<0.15	<0.1	<0.1	<0.1	<0.3	<0.6	<0.2	<0.2	-
TP107	0.0-0.15	<0.1	<0.1	<0.15	<0.1	<0.1	<0.1	<0.3	<0.6	<0.2	<0.2	-
TP108	0.0-0.15	<0.1	<0.1	<0.15	<0.1	<0.1	<0.1	<0.3	<0.6	<0.2	<0.2	-
Limit of Reporting (LOR)		0.1	0.1	0.15	0.1	0.1	0.1	0.3	0.6	0.2	0.2	1
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)												
Health-based Investigation Levels (HIL) A [a] - Residential A		10	6	6	10	300	10	270	240		50	1
Ecological Investigation Levels (EIL) - Urban residential										180 [b]		

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

b: Generic EIL for DDT

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TABLE I1
ASBESTOS TEST RESULTS
DISCRETE SAMPLES
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	ASBESTOS (% w/w)		
Soil Sample		Bonded ACM (>7mm)	AF	FA
D6	0.0-0.15	<0.01	<0.001	<0.001
D6	0.5-0.8	<0.01	<0.001	<0.001
D6	1.0-1.3	<0.01	<0.001	<0.001
FCP2a	0.0-0.15	<0.01	<0.001	<0.001
FCP2-1	0.0-0.15	<0.01	<0.001	<0.001
FCP2-2	0.0-0.15	<0.01	<0.001	<0.001
FCP2-3	0.0-0.15	<0.01	<0.001	<0.001
FCP2-4	0.0-0.15	<0.01	<0.001	<0.001
FCP2-5	0.0-0.15	<0.01	<0.001	<0.001
FCP2-6	0.0-0.15	<0.01	<0.001	<0.001
FCP2-7	0.0-0.15	<0.01	<0.001	<0.001
Limits of Reporting (LOR)		0.01	0.001	0.001
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)				
Health Screening Levels [a] - Residential A		0.01	0.001	0.001
Fibro-cement Piece				
FCP2-4FCP	0.0-0.15	**ACM**		

Notes: ACM: Asbestos Containing Material

AF: Asbestos Fines

FA: Fibrous Asbestos

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

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TABLE I2
ASBESTOS TEST RESULTS
DISCRETE SAMPLES
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	ASBESTOS (% w/w)		
Soil Sample		Bonded ACM (>7mm)	AF	FA
D101	0.0-1.0	<0.01	<0.001	<0.001
D103	0.0-1.0	<0.01	<0.001	<0.001
D103	1.0-2.0	<0.01	<0.001	<0.001
D106	0.0-1.0	<0.01	<0.001	<0.001
D107	0.0-1.0	<0.01	<0.001	<0.001
D107	1.0-2.0	<0.01	<0.001	0.00015
D108	0.0-1.0	**0.017**	0.00008	<0.001
D109	0.0-1.0	<0.01	<0.001	<0.001
D110	0.0-1.0	<0.01	<0.001	<0.001
D111	0.0-1.0	<0.01	<0.001	<0.001
D112	0.0-1.0	<0.01	0.00045	<0.001
D113	0.0-1.0	<0.01	<0.001	<0.001
D114	0.0-1.0	<0.01	<0.001	<0.001
TP14_1	0.0-0.5	<0.01	<0.001	<0.001
TP14_2	0.0-0.5	<0.01	<0.001	<0.001
TP14_3	0.0-0.5	<0.01	<0.001	<0.001
TP14_4	0.0-0.5	<0.01	0.000034	<0.001
TP25_1	0.0-1.0	<0.01	<0.001	<0.001
TP25_1	1.0-1.3	<0.01	<0.001	<0.001
TP25_2	0.0-1.0	<0.01	<0.001	<0.001
TP25_2	1.0-1.3	<0.01	<0.001	<0.001
TP25_3	0.0-1.0	<0.01	<0.001	<0.001
TP25_4	0.0-1.0	<0.01	<0.001	<0.001
Limits of Reporting (LOR)		0.01	0.001	0.001
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)				
Health Screening Levels [a] - Residential A		-	0.001	0.001
Fibro-cement Piece				
FCP D101	0.0-0.1	**ACM**		
FCP D103	0.0-0.1	**ACM**		
FCP D112	0.0-0.1	**ACM**		
FCP D113	0.0-0.1	**ACM**		
FCP TP25 3	0.0-0.1	No ACM		

Notes: ACM: Asbestos Containing Material

AF: Asbestos Fines

FA: Fibrous Asbestos

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

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Table J1

ASBESTOS IN-SITU SIEVING TEST RESULTS

Ref. No. (20223/3-AA)

Location	Depth (m)	In-Situ 10L Sieve Test			
		Soil Mass (kg)	Weight of Bonded ACM [a] (g)	% ACM in Soil w/w [b]	Criterion [c] (% w/w)
FCP2a	0.0-0.15	13.01	0.0	0.000	0.01
FCP2-1	0.0-0.15	13.92	0.00	0.000	0.01
FCP2-2	0.0-0.15	13.68	0.00	0.000	0.01
FCP2-3	0.0-0.15	12.95	0.00	0.000	0.01
FCP2-4	0.0-0.15	13.52	**15.00**	**0.017**	0.01
FCP2-5	0.0-0.15	13.74	0.00	0.000	0.01
FCP2-6	0.0-0.15	13.99	0.00	0.000	0.01
FCP2-7	0.0-0.15	13.04	0.00	0.000	0.01
D6	0.0-0.15	12.59	0.00	0.000	0.01
D6	0.5-0.8	13.66	0.00	0.000	0.01
D6	1.0-1.3	13.75	0.00	0.000	0.01

Notes
a: Retained on 7mm sieve
b: NEPM 1999 (April 2013) (page 31): % Asbestos in Soil = % Asbestos Content x ACM (kg) / {Soil Volume (L) x Soil Density (kg/L)}, based on asbestos content of 15% and soil volume of 10L.
c: Health Screeing Level A (NEPM 1999 [April 2013]) for bonded ACM

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Table J2

ASBESTOS IN-SITU SIEVING TEST RESULTS

Ref. No. (20223/3-AA)

Location	Depth (m)	In-Situ 10L Sieve Test			
		Soil Mass (kg)	Weight of Bonded ACM [a] (g)	% ACM in Soil w/w [b]	Criterion [c] (% w/w)
TP14-1	0.0-0.5	13.01	0.00	0.000	0.01
TP14-2	0.0-0.5	13.92	0.00	0.000	0.01
TP14-3	0.0-0.5	13.68	0.00	0.000	0.01
TP14-4	0.0-0.5	12.95	0.00	0.000	0.01
TP25-1	0-1.0	13.52	0.00	0.000	0.01
TP25-1	1.0-1.3	14.00	0.00	0.000	0.01
TP25-2	0-1.0	14.06	0.00	0.000	0.01
TP25-2	1.0-1.3	15.60	0.00	0.000	0.01
TP25-3	0-1.0	14.87	0.00	0.000	0.01
TP25-4	0-1.0	14.87	0.00	0.000	0.01
D101	0-1.0	13.25	**16.00**	**0.018**	0.01
D103	0.0-1.0	16.01	9.00	0.008	0.01
D103	1.0-2.0	14.87	0.00	0.000	0.01
D106	0.0-1.0	15.29	0.00	0.000	0.01
D107	0.0-1.0	14.88	0.00	0.000	0.01
D107	1.0-2.0	14.36	0.00	0.000	0.01
D108	0.0-1.0	15.85	0.00	0.000	0.01
D109	0.0-1.0	15.10	0.00	0.000	0.01
D110	0.0-1.0	16.51	0.00	0.000	0.01
D111	0.0-1.0	14.67	0.00	0.000	0.01
D112	0.0-1.0	14.55	**89.00**	**0.092**	0.01
D113	0.0-1.0	14.96	**27.00**	**0.027**	0.01
D113	1.0-1.3	14.58	0.00	0.000	0.01
D114	0.0-1.0	13.87	0.00	0.000	0.01

Notes
a: Retained on 7mm sieve
b: NEPM 1999 (April 2013) (page 31): % Asbestos in Soil = % Asbestos Content x ACM (kg) / {Soil Volume (L) x Soil Density (kg/L)}, based on asbestos content of 15% and soil volume of 10L.
c: Health Screeing Level A (NEPM 1999 [April 2013]) for bonded ACM

APPENDIX A

TABLE 1
TEST PIT LOGS

Project:	Proposed Community Title Subdivision Development	**Job No:**	20223/2
Location:	Lot 2 in DP1115877 - 53A Warriewood Road, Warriewood	**Drawing No:**	20223/2-AA1
		Logged & Sampled by:	JH

Table 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Material Description	Remarks*
D1	0.0-0.3	NS	5/09/2022	(ML) Sandy SILT, low plasticity, dark brown, inclusion of root fibres	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D2	0.0-0.3	NS	5/09/2022	(ML) Sandy SILT, low plasticity, dark brown, inclusion of root fibres	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D3	0.0-0.3	NS	5/09/2022	(ML) Sandy SILT, low plasticity, dark brown, inclusion of root fibres	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D4	0.0-0.3	NS	5/09/2022	(ML) Sandy SILT, low plasticity, dark brown, inclusion of root fibres	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D5	0.0-0.3	NS	5/09/2022	(ML) Sandy SILT, low plasticity, dark brown, inclusion of root fibres	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D6	0.0-1.5	0.0-0.15	5/09/2022	FILL: Silty Clay, medium plasticity, brown, inclusion of gravel	trace of root fibres. Inclusion of Bricks, timbers, pvc fragments
		0.5-0.8			
		1.0-1.3			
	1.5-2.0	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D7	0.0-0.3	NS	5/09/2022	(ML) Sandy SILT, low plasticity, dark brown, inclusion of root fibres	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D8	0.0-0.3	NS	5/09/2022	(ML) Sandy SILT, low plasticity, dark brown, inclusion of root fibres	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D9	0.0-0.3	NS	5/09/2022	(ML) Sandy SILT, low plasticity, dark brown, inclusion of root fibres	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	

NS = No Sample
*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) PID reading etc.

Project:	Proposed Community Title Subdivision Development	**Job No:**	20223/2
Location:	Lot 2 in DP1115877 - 53A Warriewood Road, Warriewood	**Drawing No:**	20223/2-AA1
		Logged & Sampled by:	JH

Table 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Material Description	Remarks*
D10	0.0-0.3	NS	5/09/2022	(ML) Sandy SILT, low plasticity, dark brown, inclusion of root fibres	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D11	0.0-1.8	NS	5/09/2022	FILL: Silty Clay, medium plasticity, brown, inclusion of gravel	trace of root fibres. Inclusion of sandstone cobbles
	1.8-2.3	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D12	0.0-0.3	NS	5/09/2022	(ML) Sandy SILT, low plasticity, dark brown, inclusion of root fibres	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D13	0.0-0.3	NS	5/09/2022	(ML) Sandy SILT, low plasticity, dark brown, inclusion of root fibres	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D14	0.0-0.3	NS	5/09/2022	(ML) Sandy SILT, low plasticity, dark brown, inclusion of root fibres	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D15	0.0-0.3	NS	5/09/2022	(ML) Sandy SILT, low plasticity, dark brown, inclusion of root fibres	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D16	0.0-0.3	NS	5/09/2022	FILL: Sandy Silt, low plasticity, brown, trace of root fibres, inclusion of gravel	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D17	0.0-0.3	NS	5/09/2022	(ML) Sandy SILT, low plasticity, dark brown, inclusion of root fibres	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
D18	0.0-0.3	NS	5/09/2022	FILL: Sandy Silt, low plasticity, brown, trace of root fibres, inclusion of gravel	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
FCP2a	0.0-0.3	0.0-0.15	5/09/2022	FILL: Sandy Silt, low plasticity, brown, trace of root fibres, inclusion of gravel	

NS = No Sample
*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) PID reading etc.

Project:	Proposed Community Title Subdivision Development	**Job No:**	20223/2
Location:	Lot 2 in DP1115877 - 53A Warriewood Road, Warriewood	**Drawing No:**	20223/2-AA1
		Logged & Sampled by:	JH

Table 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Material Description	Remarks*
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
FCP2-1	0.0-0.3	0.0-0.15	5/09/2022	FILL: Sandy Silt, low plasticity, brown, trace of root fibres, inclusion of gravel	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
FCP2-2	0.0-0.3	0.0-0.15	5/09/2022	FILL: Sandy Silt, low plasticity, brown, trace of root fibres, inclusion of gravel	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
FCP2-3	0.0-0.3	0.0-0.15	5/09/2022	FILL: Sandy Silt, low plasticity, brown, trace of root fibres, inclusion of gravel	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
FCP2-4	0.0-0.3	0.0-0.15	5/09/2022	FILL: Sandy Silt, low plasticity, brown, trace of root fibres, inclusion of gravel	Inclusion of Fibro-cement pieces (FCP)
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
FCP2-5	0.0-0.3	0.0-0.15	5/09/2022	FILL: Sandy Silt, low plasticity, brown, trace of root fibres, inclusion of gravel	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
FCP2-6	0.0-0.3	0.0-0.15	5/09/2022	FILL: Sandy Silt, low plasticity, brown, trace of root fibres, inclusion of gravel	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	
FCP2-7	0.0-0.3	0.0-0.15	5/09/2022	FILL: Sandy Silt, low plasticity, brown, trace of root fibres, inclusion of gravel	
	0.3-0.5	NS		(CL) Sandy CLAY, low plasticity, pale grey	

NS = No Sample
*Odour (O), Discolouration (D), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) PID reading etc.

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Project:	Proposed Community Title Subdivision Developmen	**Job No:**	20223/3
	Lot 3 in DP1115877 & Part Lot 3 in DP942319- 53B		
Location:	& 53 Warriewood Road, Warriewood	**Drawing No:**	
			20223/3-AA1 Page 1 of 4
		Logged & Sampled by:	JH

Table 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Material Description	Remarks*
D101	0.0-1.0	0.0-1.0	28/02/2023	FILL: Silty Sand, fine grained, brown, with cobble	Inclusion of brick, roof tiles and fibro-cement pieces
	1.0-1.5	NS		(SM) Sandy SILT, fine grained, brown	
D102	0.0-1.5	NS	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	Inclusion of gavel, cobbles and silt
	1.5-2.0	NS		(SM) Sandy SILT, fine grained, brown	
D103	0.0-2.0	0.0-1.0	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	Inclusion of bitumen, brick fragments and fibro-cement pieces
		1.0-2.0			
	2.0-2.5	NS		(SM) Silty SAND, fine grained, dark grey	
D104	0.0-1.0	NS	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	
	1.0-1.5	NS		(SM) Silty SAND, fine grained, dark grey	
D105	0.0-0.5	NS	28/02/2023	FILL: Silty Sand, fine grained, brown, with cobble	
	0.5-1.0	NS		(SM) Silty SAND, fine grained, dark grey	
D106	0.0-1.0	0.0-1.0	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	Inclusion of brick fragments
D107	0.0-2.0	0.0-1.0	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	Inclusion of brick fragments
		1.0-2.0			
	2.0-2.5	NS		(SM) Silty SAND, fine grained, dark grey	
D108	0.0-1.0	0.0-1.0	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	Inclusion of brick fragments
	1.0-1.5	NS		(SM) Silty SAND, fine grained, dark grey	
D109	0.0-1.0	0.0-1.0	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	Inclusion of brick fragments and concrete
	1.0-1.5	NS		(SM) Silty SAND, fine grained, dark grey	

NS = No Sample

*Fibro-cement Piece (FCP), Odour (O), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) etc.

Project:	Proposed Community Title Subdivision Developmen	**Job No:**	20223/3
	Lot 3 in DP1115877 & Part Lot 3 in DP942319- 53B		
Location:	& 53 Warriewood Road, Warriewood	**Drawing No:**	
			20223/3-AA1 Page 2 of 4
		Logged & Sampled by:	JH

Table 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Material Description	Remarks*
D110	0.0-1.0	0.0-1.0	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	Inclusion of brick fragments and tiles
	1.0-1.5	NS		(SM) Silty SAND, fine grained, dark grey	
D111	0.0-1.0	0.0-1.0	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	Inclusion of brick fragments, concrete and wooden logs
	1.0-1.5	NS		(SM) Silty SAND, fine grained, dark grey	
D112	0.0-1.0	0.0-1.0	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	Inclusion of bricks and fibro-cement pieces
	1.0-1.5	NS		(SM) Silty SAND, fine grained, dark grey	
D113	0.0-1.0	0.0-1.0	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	Inclusion of bricks, concrete and fibro-cement pieces
	1.0-1.5	NS		(SM) Silty SAND, fine grained, dark grey	
D114	0.0-1.0	0.0-1.0	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	Inclusion of bricks, tiles and gravel
	1.0-1.5	NS		(SM) Silty SAND, fine grained, dark grey	
TP14-1	0.0-0.5	0.0-0.5	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	
	0.5-1.0	NS		(SM) Silty SAND, fine grained, dark grey	
TP14-2	0.0-0.5	0.0-0.5	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	
	0.5-1.0	NS		(SM) Silty SAND, fine grained, dark grey	
TP14-3	0.0-0.5	0.0-0.5	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	
	0.5-1.0	NS		(SM) Silty SAND, fine grained, dark grey	
TP14-4	0.0-0.5	0.0-0.5	28/02/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	
	0.5-1.0	NS		(SM) Silty SAND, fine grained, dark grey	
TP25-1	0.0-1.3	0.0-1.0	1/03/2023	FILL: Clay, medium plasticity, brown, inclusion of gravel, cobbles and silt	
		1.0-1.3			

NS = No Sample

*Fibro-cement Piece (FCP), Odour (O), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) etc.

Project:	Proposed Community Title Subdivision Developmen	**Job No:**	20223/3
	Lot 3 in DP1115877 & Part Lot 3 in DP942319- 53B		
Location:	& 53 Warriewood Road, Warriewood	**Drawing No:**	
			20223/3-AA1 Page 3 of 4
		Logged & Sampled by:	JH

Table 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Material Description	Remarks*
TP25-1	1.3-1.8	NS	1/03/2023	(SM) Sandy SILT, fine grained, brown	
TP25-2	0.0-1.3	0.0-1.0	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	Inclusion of bricks
		1.0-1.3			
	1.3-1.8	NS		(SM) Sandy SILT, fine grained, brown	
TP25-3	0.0-1.0	0.0-1.0	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	Inclusion of bricks and FCP
	1.0-1.5	NS		(SM) Sandy SILT, fine grained, brown	
TP25-4	0.0-1.0	0.0-1.0	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	Inclusion of bricks
	1.0-1.5	NS		(SM) Sandy SILT, fine grained, brown	
TP20-a	0.0-0.15	0.0-0.15	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	
TP20-1	0.0-1.5	0.0-0.15	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	
		0.5-0.8			
		1.0-1.3		FILL: Silty Sand, fine grained, brown, with cobble	
	1.5-2.0	NS		(SM) Sandy SILT, fine grained, brown	
TP20-2	0.0-1.5	0.0-0.15	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	
		0.5-0.8		FILL: Silty Sand, fine grained, brown, with cobble	
		1.0-1.3		FILL: Silty Sand, fine grained, brown, with cobble	
	1.5-2.0	NS		(SM) Sandy SILT, fine grained, brown	
TP20-3	0.0-1.5	0.0-0.15	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	
		0.5-0.8		FILL: Silty Sand, fine grained, brown, with cobble	

NS = No Sample
*Fibro-cement Piece (FCP), Odour (O), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) etc.

Project:	Proposed Community Title Subdivision Developmen	**Job No:**	20223/3
	Lot 3 in DP1115877 & Part Lot 3 in DP942319- 53B		
Location:	& 53 Warriewood Road, Warriewood	**Drawing No:**	20223/3-AA1
		Logged & Sampled by:	JH

Table 1

Test Pit	Depth (m)	Sample Depth (m)	Date	Material Description	Remarks*
TP20-3		1.0-1.3		FILL: Silty Sand, fine grained, brown, with cobble	
	1.5-2.0	NS		(SM) Sandy SILT, fine grained, brown	
TP20-4	0.0-1.5	0.0-0.15	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	
		0.5-0.8		FILL: Silty Sand, fine grained, brown, with cobble	
		1.0-1.3		FILL: Silty Sand, fine grained, brown, with cobble	
	1.5-2.0	NS		(SM) Sandy SILT, fine grained, brown	
BH101	0.0-0.05	NS	1/03/2023	Bitumen surface	
	0.05-0.3	0.05-0.3		FILL: Silty Sand, fine grained, brown, with cobble	
	0.3-0.5	0.35-0.45		(SM) Sandy SILT, fine grained, brown	
TP102	0.0-0.5	0.0-0.15	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	Terminated at 500mm due to services
TP103	0.0-0.5	0.0-0.15	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	Terminated at 500mm due to possible services
TP104	0.0-0.3	0.0-0.15	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	
	0.3-0.5	0.35-0.45		(SM) Sandy SILT, fine grained, brown	
TP105	0.0-0.5	0.0-0.15	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	Terminated at 500mm due to possible services
TP106	0.0-0.5	0.0-0.15	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	Terminated at 500mm due to possible services
TP107	0.0-0.5	0.0-0.15	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	Terminated at 500mm due to possible services
TP108	0.0-0.5	0.0-0.15	1/03/2023	FILL: Silty Sand, fine grained, brown, with cobble	Terminated at 500mm due to possible services

NS = No Sample
*Fibro-cement Piece (FCP), Odour (O), Petroleum Hydrocarbon Staining (PHS), Asbestos Containing Material (ACM), Ash Material (ASHM), Demolition Waste (DW), Groundwater (GW), Perched Water (PW) etc.

APPENDIX B

LABORATORY TEST RESULTS REPORTS/CERTIFICATES

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Anwar Barbhuyia
Client	Geotechnique
Address	P.O. Box 880 PENRITH NSW 2751
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Email	anwar@geotech.com.au
Project	**20223/3 Warriewood**
Order Number	**20223/3**
Samples	31

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
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SGS Reference	**SE243986 R0**
Date Received	2/3/2023
Date Reported	10/3/2023

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Akheeqar BENIAMEEN
Chemist

Bennet LO
Senior Chemist

Dong LIANG
Metals/Inorganics Team Leader

Huong CRAWFORD
Production Manager

Kamrul AHSAN
Senior Chemist

Ly Kim HA
Organic Section Head

Shane MCDERMOTT
Inorganic/Metals Chemist

VOC's in Soil [AN433] Tested: 3/3/2023

PARAMETER	UOM	LOR	TP102 SAND 0.0-0.15 1/3/2023 SE243986.020	TP105 SAND 0.0-0.15 1/3/2023 SE243986.023	DDS2 SAND - 1/3/2023 SE243986.028	TS1 SAND - 1/3/2023 SE243986.031
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	[87%]
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	[88%]
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	[89%]
m/p-xylene	mg/kg	0.2	<0.2	<0.2	<0.2	[90%]
o-xylene	mg/kg	0.1	<0.1	<0.1	<0.1	[89%]
Naphthalene (VOC)*	mg/kg	0.1	<0.1	<0.1	<0.1	-
Total Xylenes*	mg/kg	0.3	<0.3	<0.3	<0.3	-
Total BTEX*	mg/kg	0.3	<0.3	<0.3	<0.3	-

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 3/3/2023

PARAMETER	UOM	LOR	TP102 SAND 0.0-0.15 1/3/2023 SE243986.020	TP105 SAND 0.0-0.15 1/3/2023 SE243986.023	DDS2 SAND - 1/3/2023 SE243986.028
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1
TRH C6-C9	mg/kg	20	<20	<20	<20
TRH C6-C10	mg/kg	25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 3/3/2023

PARAMETER	UOM	LOR	TP102 SAND 0.0-0.15 1/3/2023 SE243986.020	TP105 SAND 0.0-0.15 1/3/2023 SE243986.023	DDS2 SAND - 1/3/2023 SE243986.028
TRH C10-C14	mg/kg	20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100
TRH >C10-C16	mg/kg	25	<25	<25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110
TRH >C10-C40 Total (F bands)	mg/kg	210	<210	<210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 3/3/2023

PARAMETER	UOM	LOR	TP20-1 SAND 0.0-0.15 1/3/2023 SE243986.007	TP20-1 SAND 0.5-0.8 1/3/2023 SE243986.008	TP20-1 SAND 1.0-1.3 1/3/2023 SE243986.009	TP20-2 SAND 0.0-0.15 1/3/2023 SE243986.010	TP20-2 SAND 0.5-0.8 1/3/2023 SE243986.011
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	**0.1**	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	**1.2**	<0.1	**0.1**	<0.1	<0.1
Anthracene	mg/kg	0.1	**0.3**	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	**1.5**	<0.1	**0.2**	<0.1	<0.1
Pyrene	mg/kg	0.1	**1.3**	<0.1	**0.2**	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	**0.3**	<0.1	**0.1**	<0.1	<0.1
Chrysene	mg/kg	0.1	**0.4**	<0.1	**0.1**	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	**0.4**	<0.1	**0.1**	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	**0.2**	<0.1	<0.1	<0.1	<0.1
Benzo(b&j&k)fluoranthene	mg/kg	0.2	**0.6**	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	**0.4**	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	**0.3**	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	**0.3**	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0*	mg/kg	0.2	**0.6**	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR*	mg/kg	0.3	**0.7**	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	mg/kg	0.2	**0.6**	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.1	**6.9**	<0.1	**0.8**	<0.1	<0.1
Total PAH (NEPM/WHO 16)	mg/kg	0.1	**6.9**	<0.1	**0.8**	<0.1	<0.1

PARAMETER	UOM	LOR	TP20-2 SAND 1.0-1.3 1/3/2023 SE243986.012	TP20-3 SAND 0.0-0.15 1/3/2023 SE243986.013	TP20-3 SAND 0.5-0.8 1/3/2023 SE243986.014	TP20-3 SAND 1.0-1.3 1/3/2023 SE243986.015	TP20-4 SAND 0.0-0.15 1/3/2023 SE243986.016
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	**0.1**	**0.1**	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	**0.2**	**0.1**	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	**0.1**	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	**0.1**	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j&k)fluoranthene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	**0.1**	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0*	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR*	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.1	**0.5**	**0.3**	<0.1	<0.1	<0.1
Total PAH (NEPM/WHO 16)	mg/kg	0.1	**0.5**	**0.3**	<0.1	<0.1	<0.1

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 3/3/2023 (continued)

PARAMETER	UOM	LOR	TP20-4- SAND 0.5-0.8 1/3/2023 SE243986.017	TP20-4 SAND 1.0-1.3 1/3/2023 SE243986.018	TP102 SAND 0.0-0.15 1/3/2023 SE243986.020	TP105 SAND 0.0-0.15 1/3/2023 SE243986.023	DDS1 SAND - 1/3/2023 SE243986.027
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b&j&k)fluoranthene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0*	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR*	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PAH (18)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total PAH (NEPM/WHO 16)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	DDS2 SAND - 1/3/2023 SE243986.028
Naphthalene	mg/kg	0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1
Fluorene	mg/kg	0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1
Anthracene	mg/kg	0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1
Pyrene	mg/kg	0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1
Chrysene	mg/kg	0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1
Benzo(b&j&k)fluoranthene	mg/kg	0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0*	mg/kg	0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR*	mg/kg	0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	mg/kg	0.2	<0.2
Total PAH (18)	mg/kg	0.1	<0.1
Total PAH (NEPM/WHO 16)	mg/kg	0.1	<0.1

OC Pesticides in Soil [AN420] Tested: 3/3/2023

PARAMETER	UOM	LOR	BH101 SAND 0.05-0.3 1/3/2023 SE243986.019	TP102 SAND 0.0-0.15 1/3/2023 SE243986.020	TP103 SAND 0.0-0.15 1/3/2023 SE243986.021	TP104 SAND 0.0-0.15 1/3/2023 SE243986.022	TP105 SAND 0.0-0.15 1/3/2023 SE243986.023
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lindane (gamma BHC)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE*	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDD*	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT*	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1	<1
Total Other OC VIC EPA	mg/kg	1	<1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1	<1

OC Pesticides in Soil [AN420] Tested: 3/3/2023 (continued)

PARAMETER	UOM	LOR	TP106 SAND 0.0-0.15 1/3/2023 SE243986.024	TP107 SAND 0.0-0.15 1/3/2023 SE243986.025	TP108 SAND 0.0-0.15 1/3/2023 SE243986.026	DDS2 SAND - 1/3/2023 SE243986.028
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Lindane (gamma BHC)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE*	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDD*	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT*	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05
Endrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Endrin ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1
Total Other OC VIC EPA	mg/kg	1	<1	<1	<1	<1
Total OC VIC EPA	mg/kg	1	<1	<1	<1	<1

PCBs in Soil [AN420] Tested: 3/3/2023

PARAMETER	UOM	LOR	TP102 SAND 0.0-0.15 1/3/2023 SE243986.020	TP105 SAND 0.0-0.15 1/3/2023 SE243986.023	DDS2 SAND - 1/3/2023 SE243986.028
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1.0	<1.0	<1.0

pH in soil (1:5) [AN101] Tested: 8/3/2023

PARAMETER	UOM	LOR	BH101 SAND 0.05-0.3 1/3/2023 SE243986.019	TP102 SAND 0.0-0.15 1/3/2023 SE243986.020	TP103 SAND 0.0-0.15 1/3/2023 SE243986.021	TP104 SAND 0.0-0.15 1/3/2023 SE243986.022	TP105 SAND 0.0-0.15 1/3/2023 SE243986.023
pH	pH Units	0.1	**6.1**	**7.3**	**8.4**	**8.6**	**8.0**

PARAMETER	UOM	LOR	TP106 SAND 0.0-0.15 1/3/2023 SE243986.024	TP107 SAND 0.0-0.15 1/3/2023 SE243986.025	TP108 SAND 0.0-0.15 1/3/2023 SE243986.026
pH	pH Units	0.1	**7.9**	**8.7**	**7.3**

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR) [AN122] Tested: 7/3/2023

PARAMETER	UOM	LOR	BH101 SAND 0.05-0.3 1/3/2023 SE243986.019	TP102 SAND 0.0-0.15 1/3/2023 SE243986.020	TP103 SAND 0.0-0.15 1/3/2023 SE243986.021	TP104 SAND 0.0-0.15 1/3/2023 SE243986.022	TP105 SAND 0.0-0.15 1/3/2023 SE243986.023
Exchangeable Calcium, Ca	cmol (+)/kg	0.01	2.4	2.5	26	34	31
Exchangeable Calcium Percentage*	%	0.1	71.4	85.9	97.4	95.2	97.5
Exchangeable Potassium, K	cmol (+)/kg	0.01	0.10	0.09	0.28	0.66	0.38
Exchangeable Potassium Percentage*	%	0.1	2.9	3.0	1.0	1.9	1.2
Exchangeable Magnesium, Mg	cmol (+)/kg	0.02	0.74	0.28	0.22	0.54	0.26
Exchangeable Magnesium Percentage*	%	0.1	21.7	9.8	0.8	1.5	0.8
Exchangeable Sodium, Na	cmol (+)/kg	0.01	0.13	0.04	0.20	0.50	0.17
Exchangeable Sodium Percentage*	%	0.1	4.0	1.2	0.7	1.4	0.5
Cation Exchange Capacity	cmol (+)/kg	0.02	3.4	2.9	27	35	32

PARAMETER	UOM	LOR	TP106 SAND 0.0-0.15 1/3/2023 SE243986.024	TP107 SAND 0.0-0.15 1/3/2023 SE243986.025	TP108 SAND 0.0-0.15 1/3/2023 SE243986.026
Exchangeable Calcium, Ca	cmol (+)/kg	0.01	16	31	7.4
Exchangeable Calcium Percentage*	%	0.1	96.7	95.7	79.7
Exchangeable Potassium, K	cmol (+)/kg	0.01	0.15	0.88	0.40
Exchangeable Potassium Percentage*	%	0.1	0.9	2.7	4.3
Exchangeable Magnesium, Mg	cmol (+)/kg	0.02	0.26	0.32	1.4
Exchangeable Magnesium Percentage*	%	0.1	1.6	1.0	14.7
Exchangeable Sodium, Na	cmol (+)/kg	0.01	0.13	0.19	0.12
Exchangeable Sodium Percentage*	%	0.1	0.8	0.6	1.3
Cation Exchange Capacity	cmol (+)/kg	0.02	16	33	9.3

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 7/3/2023

PARAMETER	UOM	LOR	D101 SAND 0.0-1.0 28/2/2023 SE243986.001	D103 CLAY 0.0-1.0 28/2/2023 SE243986.002	D103 CLAY 1.0-2.0 28/2/2023 SE243986.003	D112 CLAY 0.0-1.0 28/2/2023 SE243986.004	D113 CLAY 0.0-1.0 28/2/2023 SE243986.005
Arsenic, As	mg/kg	1	3	4	6	3	2
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.5	11	15	16	9.3	9.4
Copper, Cu	mg/kg	0.5	17	12	5.8	7.3	5.1
Lead, Pb	mg/kg	1	24	38	24	18	10
Nickel, Ni	mg/kg	0.5	5.3	12	6.7	3.1	4.1
Zinc, Zn	mg/kg	2	57	57	35	34	7

PARAMETER	UOM	LOR	TP25-3 SAND 0.0-1.0 1/3/2023 SE243986.006	BH101 SAND 0.05-0.3 1/3/2023 SE243986.019	TP102 SAND 0.0-0.15 1/3/2023 SE243986.020	TP103 SAND 0.0-0.15 1/3/2023 SE243986.021	TP104 SAND 0.0-0.15 1/3/2023 SE243986.022
Arsenic, As	mg/kg	1	14	2	<1	2	3
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.5	18	4.8	7.7	5.1	8.9
Copper, Cu	mg/kg	0.5	8.5	6.4	1.0	8.4	8.9
Lead, Pb	mg/kg	1	86	10	5	10	56
Nickel, Ni	mg/kg	0.5	1.3	2.4	2.1	3.8	4.6
Zinc, Zn	mg/kg	2	110	12	2	20	42

PARAMETER	UOM	LOR	TP105 SAND 0.0-0.15 1/3/2023 SE243986.023	TP106 SAND 0.0-0.15 1/3/2023 SE243986.024	TP107 SAND 0.0-0.15 1/3/2023 SE243986.025	TP108 SAND 0.0-0.15 1/3/2023 SE243986.026	DDS2 SAND - 1/3/2023 SE243986.028
Arsenic, As	mg/kg	1	3	2	3	2	2
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.5	9.4	7.7	8.1	12	8.5
Copper, Cu	mg/kg	0.5	10	4.6	10	4.6	4.5
Lead, Pb	mg/kg	1	33	20	13	22	18
Nickel, Ni	mg/kg	0.5	2.9	1.7	4.8	2.4	2.5
Zinc, Zn	mg/kg	2	42	19	32	37	16

Mercury in Soil [AN312] Tested: 7/3/2023

PARAMETER	UOM	LOR	D101 SAND 0.0-1.0 28/2/2023 SE243986.001	D103 CLAY 0.0-1.0 28/2/2023 SE243986.002	D103 CLAY 1.0-2.0 28/2/2023 SE243986.003	D112 CLAY 0.0-1.0 28/2/2023 SE243986.004	D113 CLAY 0.0-1.0 28/2/2023 SE243986.005
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	**0.10**	<0.05

PARAMETER	UOM	LOR	TP25-3 SAND 0.0-1.0 1/3/2023 SE243986.006	BH101 SAND 0.05-0.3 1/3/2023 SE243986.019	TP102 SAND 0.0-0.15 1/3/2023 SE243986.020	TP103 SAND 0.0-0.15 1/3/2023 SE243986.021	TP104 SAND 0.0-0.15 1/3/2023 SE243986.022
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	TP105 SAND 0.0-0.15 1/3/2023 SE243986.023	TP106 SAND 0.0-0.15 1/3/2023 SE243986.024	TP107 SAND 0.0-0.15 1/3/2023 SE243986.025	TP108 SAND 0.0-0.15 1/3/2023 SE243986.026	DDS2 SAND - 1/3/2023 SE243986.028
Mercury	mg/kg	0.05	**0.37**	**0.05**	<0.05	<0.05	<0.05

Moisture Content [AN002] Tested: 3/3/2023

PARAMETER	UOM	LOR	D101 SAND 0.0-1.0 28/2/2023 SE243986.001	D103 CLAY 0.0-1.0 28/2/2023 SE243986.002	D103 CLAY 1.0-2.0 28/2/2023 SE243986.003	D112 CLAY 0.0-1.0 28/2/2023 SE243986.004	D113 CLAY 0.0-1.0 28/2/2023 SE243986.005
% Moisture	%w/w	1	15.3	11.2	16.7	13.4	18.1

PARAMETER	UOM	LOR	TP25-3 SAND 0.0-1.0 1/3/2023 SE243986.006	TP20-1 SAND 0.0-0.15 1/3/2023 SE243986.007	TP20-1 SAND 0.5-0.8 1/3/2023 SE243986.008	TP20-1 SAND 1.0-1.3 1/3/2023 SE243986.009	TP20-2 SAND 0.0-0.15 1/3/2023 SE243986.010
% Moisture	%w/w	1	16.9	10.1	13.0	9.0	8.4

PARAMETER	UOM	LOR	TP20-2 SAND 0.5-0.8 1/3/2023 SE243986.011	TP20-2 SAND 1.0-1.3 1/3/2023 SE243986.012	TP20-3 SAND 0.0-0.15 1/3/2023 SE243986.013	TP20-3 SAND 0.5-0.8 1/3/2023 SE243986.014	TP20-3 SAND 1.0-1.3 1/3/2023 SE243986.015
% Moisture	%w/w	1	12.5	10.9	10.5	12.0	21.4

PARAMETER	UOM	LOR	TP20-4 SAND 0.0-0.15 1/3/2023 SE243986.016	TP20-4- SAND 0.5-0.8 1/3/2023 SE243986.017	TP20-4 SAND 1.0-1.3 1/3/2023 SE243986.018	BH101 SAND 0.05-0.3 1/3/2023 SE243986.019	TP102 SAND 0.0-0.15 1/3/2023 SE243986.020
% Moisture	%w/w	1	14.6	15.6	10.7	6.7	6.5

PARAMETER	UOM	LOR	TP103 SAND 0.0-0.15 1/3/2023 SE243986.021	TP104 SAND 0.0-0.15 1/3/2023 SE243986.022	TP105 SAND 0.0-0.15 1/3/2023 SE243986.023	TP106 SAND 0.0-0.15 1/3/2023 SE243986.024	TP107 SAND 0.0-0.15 1/3/2023 SE243986.025
% Moisture	%w/w	1	10.2	8.5	10.9	10.9	11.6

PARAMETER	UOM	LOR	TP108 SAND 0.0-0.15 1/3/2023 SE243986.026	DDS1 SAND - 1/3/2023 SE243986.027	DDS2 SAND - 1/3/2023 SE243986.028
% Moisture	%w/w	1	11.9	10.5	11.8

VOCs in Water [AN433] Tested: 8/3/2023

PARAMETER	UOM	LOR	RS3 WATER - 1/3/2023 SE243986.030
Benzene	µg/L	0.5	<0.5
Toluene	µg/L	0.5	<0.5
Ethylbenzene	µg/L	0.5	<0.5
m/p-xylene	µg/L	1	<1
o-xylene	µg/L	0.5	<0.5
Total Xylenes	µg/L	1.5	<1.5
Total BTEX	µg/L	3	<3
Naphthalene (VOC)*	µg/L	0.5	<0.5

Volatile Petroleum Hydrocarbons in Water [AN433] Tested: 8/3/2023

PARAMETER	UOM	LOR	RS3 WATER - 1/3/2023 SE243986.030
TRH C6-C9	µg/L	40	<40
Benzene (F0)	µg/L	0.5	<0.5
TRH C6-C10	µg/L	50	<50
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50

TRH (Total Recoverable Hydrocarbons) in Water [AN403] Tested: 7/3/2023

PARAMETER	UOM	LOR	RS3 WATER - 1/3/2023 SE243986.030
TRH C10-C14	µg/L	50	<50
TRH C15-C28	µg/L	200	<200
TRH C29-C36	µg/L	200	<200
TRH C37-C40	µg/L	200	<200
TRH >C10-C16	µg/L	60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60
TRH >C16-C34 (F3)	µg/L	500	<500
TRH >C34-C40 (F4)	µg/L	500	<500
TRH C10-C40	µg/L	320	<320

PAH (Polynuclear Aromatic Hydrocarbons) in Water [AN420] Tested: 7/3/2023

PARAMETER	UOM	LOR	RS2 WATER - 28/2/2023 SE243986.029	RS3 WATER - 1/3/2023 SE243986.030
Naphthalene	µg/L	0.1	<0.1	<0.1
2-methylnaphthalene	µg/L	0.1	<0.1	<0.1
1-methylnaphthalene	µg/L	0.1	<0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1	<0.1
Fluorene	µg/L	0.1	<0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1	<0.1
Anthracene	µg/L	0.1	<0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1	<0.1
Pyrene	µg/L	0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1	<0.1
Chrysene	µg/L	0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	µg/L	0.1	<0.1	<0.1
Benzo(k)fluoranthene	µg/L	0.1	<0.1	<0.1
Benzo(a)pyrene	µg/L	0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1	<0.1
Dibenzo(ah)anthracene	µg/L	0.1	<0.1	<0.1
Benzo(ghi)perylene	µg/L	0.1	<0.1	<0.1
Total PAH (18)	µg/L	1	<1	<1

Metals in Water (Dissolved) by ICPOES [AN320] Tested: 8/3/2023

PARAMETER	UOM	LOR	RS2 WATER - 28/2/2023 SE243986.029	RS3 WATER - 1/3/2023 SE243986.030
Arsenic, As	mg/L	0.02	<0.02	<0.02
Cadmium, Cd	mg/L	0.001	<0.001	<0.001
Chromium, Cr	mg/L	0.005	<0.005	<0.005
Copper, Cu	mg/L	0.005	<0.005	<0.005
Lead, Pb	mg/L	0.02	<0.02	<0.02
Nickel, Ni	mg/L	0.005	<0.005	<0.005
Zinc, Zn	mg/L	0.01	<0.01	<0.01

Mercury (dissolved) in Water [AN311(Perth)/AN312] Tested: 6/3/2023

PARAMETER	UOM	LOR	RS2 WATER - 28/2/2023 SE243986.029	RS3 WATER - 1/3/2023 SE243986.030
Mercury	mg/L	0.0001	<0.0001	<0.0001

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode and is calibrated against 3 buffers purchased commercially. For soils, sediments and sludges, an extract with water (or 0.01M CaCl2) is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN122	Exchangeable Cations, CEC and ESP: Soil sample is extracted in 1M Ammonium Acetate at pH=7 (or 1M Ammonium Chloride at pH=7) with cations (Na, K, Ca & Mg) then determined by ICP OES/ICP MS and reported as Exchangeable Cations. For saline soils, these results can be corrected for water soluble cations and reported as Exchangeable cations in meq/100g or soil can be pre-treated (aqueous ethanol/aqueous glycerol) prior to extraction. Cation Exchange Capacity (CEC) is the sum of the exchangeable cations in meq/100g.
AN122	The Exchangeable Sodium Percentage (ESP) is calculated as the exchangeable sodium divided by the CEC (all in meq/100g) times 100. ESP can be used to categorise the sodicity of the soil as below: ESP < 6% non-sodic ESP 6-15% sodic ESP >15% strongly sodic Method is referenced to Rayment and Lyons, 2011, sections 15D3 and 15N1.-
AN311(Perth)/AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN320	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoverable Hydrocarbons - Silica (TRH-Si) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.

AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken . This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup /fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D). Total PAH calculated from individual analyte detections at or above the limit of reporting .
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS /ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
***	Indicates that both * and ** apply.	LNR	Sample listed, but not received.		

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-qb/environment-health-and-safety .

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STATEMENT OF QA/QC PERFORMANCE

SE243986 R0

CLIENT DETAILS

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Project	**20223/3 Warriewood**
Order Number	**20223/3**
Samples	31

LABORATORY DETAILS

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SGS Reference	**SE243986 R0**
Date Received	02 Mar 2023
Date Reported	10 Mar 2023

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Duplicate	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	7 items
	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	1 item

SAMPLE SUMMARY

Sample counts by matrix	29 Clay/Sand,2 Wat	Type of documentation received	COC
Date documentation received	3/3/2023@2:42pm	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	16.3°C
Sample container provider	SGS	Turnaround time requested	3 Day/Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

HOLDING TIME SUMMARY

SE243986 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-[ENV]AN122

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH101	SE243986.019	LB273184	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	07 Mar 2023
TP102	SE243986.020	LB273184	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	07 Mar 2023
TP103	SE243986.021	LB273184	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	07 Mar 2023
TP104	SE243986.022	LB273184	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	07 Mar 2023
TP105	SE243986.023	LB273184	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	07 Mar 2023
TP106	SE243986.024	LB273184	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	07 Mar 2023
TP107	SE243986.025	LB273184	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	07 Mar 2023
TP108	SE243986.026	LB273184	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	07 Mar 2023

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Perth)/AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RS2	SE243986.029	LB273120	28 Feb 2023	02 Mar 2023	28 Mar 2023	06 Mar 2023	28 Mar 2023	08 Mar 2023
RS3	SE243986.030	LB273120	01 Mar 2023	02 Mar 2023	29 Mar 2023	06 Mar 2023	29 Mar 2023	08 Mar 2023

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
D101	SE243986.001	LB273271	28 Feb 2023	02 Mar 2023	28 Mar 2023	07 Mar 2023	28 Mar 2023	09 Mar 2023
D103	SE243986.002	LB273271	28 Feb 2023	02 Mar 2023	28 Mar 2023	07 Mar 2023	28 Mar 2023	09 Mar 2023
D103	SE243986.003	LB273271	28 Feb 2023	02 Mar 2023	28 Mar 2023	07 Mar 2023	28 Mar 2023	09 Mar 2023
D112	SE243986.004	LB273271	28 Feb 2023	02 Mar 2023	28 Mar 2023	07 Mar 2023	28 Mar 2023	09 Mar 2023
D113	SE243986.005	LB273271	28 Feb 2023	02 Mar 2023	28 Mar 2023	07 Mar 2023	28 Mar 2023	09 Mar 2023
TP25-3	SE243986.006	LB273271	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	09 Mar 2023
BH101	SE243986.019	LB273272	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	08 Mar 2023
TP102	SE243986.020	LB273272	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	08 Mar 2023
TP103	SE243986.021	LB273272	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	08 Mar 2023
TP104	SE243986.022	LB273272	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	08 Mar 2023
TP105	SE243986.023	LB273272	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	08 Mar 2023
TP106	SE243986.024	LB273272	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	08 Mar 2023
TP107	SE243986.025	LB273272	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	08 Mar 2023
TP108	SE243986.026	LB273272	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	08 Mar 2023
DDS2	SE243986.028	LB273272	01 Mar 2023	02 Mar 2023	29 Mar 2023	07 Mar 2023	29 Mar 2023	08 Mar 2023

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RS2	SE243986.029	LB273327	28 Feb 2023	02 Mar 2023	27 Aug 2023	08 Mar 2023	27 Aug 2023	09 Mar 2023
RS3	SE243986.030	LB273327	01 Mar 2023	02 Mar 2023	28 Aug 2023	08 Mar 2023	28 Aug 2023	09 Mar 2023

Moisture Content

Method: ME-(AU)-[ENV]AN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
D101	SE243986.001	LB273274	28 Feb 2023	02 Mar 2023	14 Mar 2023	07 Mar 2023	12 Mar 2023	09 Mar 2023
D103	SE243986.002	LB273274	28 Feb 2023	02 Mar 2023	14 Mar 2023	07 Mar 2023	12 Mar 2023	09 Mar 2023
D103	SE243986.003	LB273274	28 Feb 2023	02 Mar 2023	14 Mar 2023	07 Mar 2023	12 Mar 2023	09 Mar 2023
D112	SE243986.004	LB273274	28 Feb 2023	02 Mar 2023	14 Mar 2023	07 Mar 2023	12 Mar 2023	09 Mar 2023
D113	SE243986.005	LB273274	28 Feb 2023	02 Mar 2023	14 Mar 2023	07 Mar 2023	12 Mar 2023	09 Mar 2023
TP25-3	SE243986.006	LB273274	01 Mar 2023	02 Mar 2023	15 Mar 2023	07 Mar 2023	12 Mar 2023	09 Mar 2023
TP20-1	SE243986.007	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP20-1	SE243986.008	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP20-1	SE243986.009	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP20-2	SE243986.010	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP20-2	SE243986.011	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP20-2	SE243986.012	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP20-3	SE243986.013	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP20-3	SE243986.014	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP20-3	SE243986.015	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP20-4	SE243986.016	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP20-4-	SE243986.017	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP20-4	SE243986.018	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
BH101	SE243986.019	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP102	SE243986.020	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP103	SE243986.021	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP104	SE243986.022	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP105	SE243986.023	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023

HOLDING TIME SUMMARY

SE243986 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

Moisture Content (continued)

Method: ME-(AU)-[ENV]AN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP106	SE243986.024	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP107	SE243986.025	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
TP108	SE243986.026	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
DDS1	SE243986.027	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023
DDS2	SE243986.028	LB273074	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	08 Mar 2023	07 Mar 2023

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH101	SE243986.019	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP102	SE243986.020	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP103	SE243986.021	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP104	SE243986.022	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP105	SE243986.023	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP106	SE243986.024	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP107	SE243986.025	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP108	SE243986.026	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
DDS2	SE243986.028	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP20-1	SE243986.007	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-1	SE243986.008	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-1	SE243986.009	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-2	SE243986.010	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-2	SE243986.011	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-2	SE243986.012	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-3	SE243986.013	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-3	SE243986.014	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-3	SE243986.015	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-4	SE243986.016	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-4-	SE243986.017	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-4	SE243986.018	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP102	SE243986.020	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP105	SE243986.023	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
DDS1	SE243986.027	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
DDS2	SE243986.028	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RS2	SE243986.029	LB273183	28 Feb 2023	02 Mar 2023	07 Mar 2023	07 Mar 2023	16 Apr 2023	09 Mar 2023
RS3	SE243986.030	LB273183	01 Mar 2023	02 Mar 2023	08 Mar 2023	07 Mar 2023	16 Apr 2023	09 Mar 2023

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH101	SE243986.019	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP102	SE243986.020	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP103	SE243986.021	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP104	SE243986.022	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP105	SE243986.023	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP106	SE243986.024	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP107	SE243986.025	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP108	SE243986.026	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
DDS2	SE243986.028	LB273054	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023

pH in soil (1:5)

Method: ME-(AU)-[ENV]AN101

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH101	SE243986.019	LB273334	01 Mar 2023	02 Mar 2023	08 Mar 2023	08 Mar 2023	09 Mar 2023	08 Mar 2023
TP102	SE243986.020	LB273334	01 Mar 2023	02 Mar 2023	08 Mar 2023	08 Mar 2023	09 Mar 2023	08 Mar 2023
TP103	SE243986.021	LB273334	01 Mar 2023	02 Mar 2023	08 Mar 2023	08 Mar 2023	09 Mar 2023	08 Mar 2023
TP104	SE243986.022	LB273334	01 Mar 2023	02 Mar 2023	08 Mar 2023	08 Mar 2023	09 Mar 2023	08 Mar 2023
TP105	SE243986.023	LB273334	01 Mar 2023	02 Mar 2023	08 Mar 2023	08 Mar 2023	09 Mar 2023	08 Mar 2023
TP106	SE243986.024	LB273334	01 Mar 2023	02 Mar 2023	08 Mar 2023	08 Mar 2023	09 Mar 2023	08 Mar 2023

HOLDING TIME SUMMARY

SE243986 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

pH in soil (1:5) (continued)

Method: ME-(AU)-[ENV]AN101

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP107	SE243986.025	LB273334	01 Mar 2023	02 Mar 2023	08 Mar 2023	08 Mar 2023	09 Mar 2023	08 Mar 2023
TP108	SE243986.026	LB273334	01 Mar 2023	02 Mar 2023	08 Mar 2023	08 Mar 2023	09 Mar 2023	08 Mar 2023

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
D101	SE243986.001	LB273268	28 Feb 2023	02 Mar 2023	27 Aug 2023	07 Mar 2023	27 Aug 2023	09 Mar 2023
D103	SE243986.002	LB273268	28 Feb 2023	02 Mar 2023	27 Aug 2023	07 Mar 2023	27 Aug 2023	09 Mar 2023
D103	SE243986.003	LB273268	28 Feb 2023	02 Mar 2023	27 Aug 2023	07 Mar 2023	27 Aug 2023	09 Mar 2023
D112	SE243986.004	LB273268	28 Feb 2023	02 Mar 2023	27 Aug 2023	07 Mar 2023	27 Aug 2023	09 Mar 2023
D113	SE243986.005	LB273268	28 Feb 2023	02 Mar 2023	27 Aug 2023	07 Mar 2023	27 Aug 2023	09 Mar 2023
TP25-3	SE243986.006	LB273268	01 Mar 2023	02 Mar 2023	28 Aug 2023	07 Mar 2023	28 Aug 2023	09 Mar 2023
BH101	SE243986.019	LB273269	01 Mar 2023	02 Mar 2023	28 Aug 2023	07 Mar 2023	28 Aug 2023	08 Mar 2023
TP102	SE243986.020	LB273269	01 Mar 2023	02 Mar 2023	28 Aug 2023	07 Mar 2023	28 Aug 2023	08 Mar 2023
TP103	SE243986.021	LB273269	01 Mar 2023	02 Mar 2023	28 Aug 2023	07 Mar 2023	28 Aug 2023	08 Mar 2023
TP104	SE243986.022	LB273269	01 Mar 2023	02 Mar 2023	28 Aug 2023	07 Mar 2023	28 Aug 2023	08 Mar 2023
TP105	SE243986.023	LB273269	01 Mar 2023	02 Mar 2023	28 Aug 2023	07 Mar 2023	28 Aug 2023	08 Mar 2023
TP106	SE243986.024	LB273269	01 Mar 2023	02 Mar 2023	28 Aug 2023	07 Mar 2023	28 Aug 2023	08 Mar 2023
TP107	SE243986.025	LB273269	01 Mar 2023	02 Mar 2023	28 Aug 2023	07 Mar 2023	28 Aug 2023	08 Mar 2023
TP108	SE243986.026	LB273269	01 Mar 2023	02 Mar 2023	28 Aug 2023	07 Mar 2023	28 Aug 2023	08 Mar 2023
DDS2	SE243986.028	LB273269	01 Mar 2023	02 Mar 2023	28 Aug 2023	07 Mar 2023	28 Aug 2023	08 Mar 2023

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP20-1	SE243986.007	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-1	SE243986.008	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-1	SE243986.009	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-2	SE243986.010	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-2	SE243986.011	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-2	SE243986.012	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-3	SE243986.013	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-3	SE243986.014	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-3	SE243986.015	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-4	SE243986.016	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-4-	SE243986.017	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP20-4	SE243986.018	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP102	SE243986.020	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
TP105	SE243986.023	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
DDS1	SE243986.027	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023
DDS2	SE243986.028	LB273055	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	12 Apr 2023	07 Mar 2023

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RS2	SE243986.029	LB273183	28 Feb 2023	02 Mar 2023	07 Mar 2023	07 Mar 2023	16 Apr 2023	09 Mar 2023
RS3	SE243986.030	LB273183	01 Mar 2023	02 Mar 2023	08 Mar 2023	07 Mar 2023	16 Apr 2023	09 Mar 2023

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP102	SE243986.020	LB273067	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	15 Mar 2023	08 Mar 2023
TP105	SE243986.023	LB273067	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	15 Mar 2023	08 Mar 2023
DDS2	SE243986.028	LB273067	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	15 Mar 2023	08 Mar 2023
TS1	SE243986.031	LB273067	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	15 Mar 2023	08 Mar 2023

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RS3	SE243986.030	LB273338	01 Mar 2023	02 Mar 2023	15 Mar 2023	08 Mar 2023	15 Mar 2023	09 Mar 2023

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP102	SE243986.020	LB273067	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	15 Mar 2023	08 Mar 2023
TP105	SE243986.023	LB273067	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	15 Mar 2023	08 Mar 2023
DDS2	SE243986.028	LB273067	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	15 Mar 2023	08 Mar 2023
TS1	SE243986.031	LB273067	01 Mar 2023	02 Mar 2023	15 Mar 2023	03 Mar 2023	15 Mar 2023	08 Mar 2023

HOLDING TIME SUMMARY

SE243986 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

Volatile Petroleum Hydrocarbons in Water — **Method: ME-(AU)-[ENV]AN433**

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RS3	SE243986.030	LB273338	01 Mar 2023	02 Mar 2023	15 Mar 2023	08 Mar 2023	15 Mar 2023	09 Mar 2023

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	BH101	SE243986.019	%	60 - 130%	90
	TP102	SE243986.020	%	60 - 130%	90
	TP103	SE243986.021	%	60 - 130%	91
	TP104	SE243986.022	%	60 - 130%	89
	TP105	SE243986.023	%	60 - 130%	99
	TP106	SE243986.024	%	60 - 130%	86
	TP107	SE243986.025	%	60 - 130%	91
	TP108	SE243986.026	%	60 - 130%	91
	DDS2	SE243986.028	%	60 - 130%	87

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	TP20-1	SE243986.007	%	70 - 130%	98
	TP20-1	SE243986.008	%	70 - 130%	100
	TP20-1	SE243986.009	%	70 - 130%	100
	TP20-2	SE243986.010	%	70 - 130%	101
	TP20-2	SE243986.011	%	70 - 130%	98
	TP20-2	SE243986.012	%	70 - 130%	102
	TP20-3	SE243986.013	%	70 - 130%	101
	TP20-3	SE243986.014	%	70 - 130%	103
	TP20-3	SE243986.015	%	70 - 130%	101
	TP20-4	SE243986.016	%	70 - 130%	99
	TP20-4-	SE243986.017	%	70 - 130%	102
	TP20-4	SE243986.018	%	70 - 130%	109
	TP102	SE243986.020	%	70 - 130%	102
	TP105	SE243986.023	%	70 - 130%	99
	DDS1	SE243986.027	%	70 - 130%	105
	DDS2	SE243986.028	%	70 - 130%	101
d14-p-terphenyl (Surrogate)	TP20-1	SE243986.007	%	70 - 130%	105
	TP20-1	SE243986.008	%	70 - 130%	112
	TP20-1	SE243986.009	%	70 - 130%	113
	TP20-2	SE243986.010	%	70 - 130%	111
	TP20-2	SE243986.011	%	70 - 130%	109
	TP20-2	SE243986.012	%	70 - 130%	110
	TP20-3	SE243986.013	%	70 - 130%	112
	TP20-3	SE243986.014	%	70 - 130%	111
	TP20-3	SE243986.015	%	70 - 130%	114
	TP20-4	SE243986.016	%	70 - 130%	110
	TP20-4-	SE243986.017	%	70 - 130%	110
	TP20-4	SE243986.018	%	70 - 130%	111
	TP102	SE243986.020	%	70 - 130%	114
	TP105	SE243986.023	%	70 - 130%	108
	DDS1	SE243986.027	%	70 - 130%	114
	DDS2	SE243986.028	%	70 - 130%	109
d5-nitrobenzene (Surrogate)	TP20-1	SE243986.007	%	70 - 130%	112
	TP20-1	SE243986.008	%	70 - 130%	113
	TP20-1	SE243986.009	%	70 - 130%	116
	TP20-2	SE243986.010	%	70 - 130%	110
	TP20-2	SE243986.011	%	70 - 130%	110
	TP20-2	SE243986.012	%	70 - 130%	111
	TP20-3	SE243986.013	%	70 - 130%	113
	TP20-3	SE243986.014	%	70 - 130%	114
	TP20-3	SE243986.015	%	70 - 130%	112
	TP20-4	SE243986.016	%	70 - 130%	115
	TP20-4-	SE243986.017	%	70 - 130%	110
	TP20-4	SE243986.018	%	70 - 130%	107
	TP102	SE243986.020	%	70 - 130%	109
	TP105	SE243986.023	%	70 - 130%	107
	DDS1	SE243986.027	%	70 - 130%	112
	DDS2	SE243986.028	%	70 - 130%	108

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	RS2	SE243986.029	%	40 - 130%	75
	RS3	SE243986.030	%	40 - 130%	68
d14-p-terphenyl (Surrogate)	RS2	SE243986.029	%	40 - 130%	73
	RS3	SE243986.030	%	40 - 130%	77
d5-nitrobenzene (Surrogate)	RS2	SE243986.029	%	40 - 130%	77
	RS3	SE243986.030	%	40 - 130%	67

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
TCMX (Surrogate)	TP102	SE243986.020	%	60 - 130%	90
	TP105	SE243986.023	%	60 - 130%	99
	DDS2	SE243986.028	%	60 - 130%	87

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	TP102	SE243986.020	%	60 - 130%	86
	TP105	SE243986.023	%	60 - 130%	98
	DDS2	SE243986.028	%	60 - 130%	98
	TS1	SE243986.031	%	60 - 130%	83
d4-1,2-dichloroethane (Surrogate)	TP102	SE243986.020	%	60 - 130%	80
	TP105	SE243986.023	%	60 - 130%	90
	DDS2	SE243986.028	%	60 - 130%	88
	TS1	SE243986.031	%	60 - 130%	87
d8-toluene (Surrogate)	TP102	SE243986.020	%	60 - 130%	85
	TP105	SE243986.023	%	60 - 130%	97
	DDS2	SE243986.028	%	60 - 130%	97
	TS1	SE243986.031	%	60 - 130%	91

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	RS3	SE243986.030	%	40 - 130%	103
d4-1,2-dichloroethane (Surrogate)	RS3	SE243986.030	%	40 - 130%	96
d8-toluene (Surrogate)	RS3	SE243986.030	%	40 - 130%	103

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	TP102	SE243986.020	%	60 - 130%	86
	TP105	SE243986.023	%	60 - 130%	98
	DDS2	SE243986.028	%	60 - 130%	98
d4-1,2-dichloroethane (Surrogate)	TP102	SE243986.020	%	60 - 130%	80
	TP105	SE243986.023	%	60 - 130%	90
	DDS2	SE243986.028	%	60 - 130%	88
d8-toluene (Surrogate)	TP102	SE243986.020	%	60 - 130%	85
	TP105	SE243986.023	%	60 - 130%	97
	DDS2	SE243986.028	%	60 - 130%	97

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	RS3	SE243986.030	%	40 - 130%	103
d4-1,2-dichloroethane (Surrogate)	RS3	SE243986.030	%	60 - 130%	96
d8-toluene (Surrogate)	RS3	SE243986.030	%	40 - 130%	103

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Perth)/AN312

Sample Number	Parameter	Units	LOR	Result
LB273120.001	Mercury	mg/L	0.0001	<0.0001

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result
LB273271.001	Mercury	mg/kg	0.05	<0.05
LB273272.001	Mercury	mg/kg	0.05	<0.05

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Number	Parameter	Units	LOR	Result
LB273327.001	Arsenic, As	mg/L	0.02	<0.02
	Cadmium, Cd	mg/L	0.001	<0.001
	Chromium, Cr	mg/L	0.005	<0.005
	Copper, Cu	mg/L	0.005	<0.005
	Lead, Pb	mg/L	0.02	<0.02
	Nickel, Ni	mg/L	0.005	<0.005
	Zinc, Zn	mg/L	0.01	<0.01

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result
LB273054.001	Alpha BHC	mg/kg	0.1	<0.1
	Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1
	Beta BHC	mg/kg	0.1	<0.1
	Lindane (gamma BHC)	mg/kg	0.1	<0.1
	Delta BHC	mg/kg	0.1	<0.1
	Heptachlor	mg/kg	0.1	<0.1
	Aldrin	mg/kg	0.1	<0.1
	Isodrin	mg/kg	0.1	<0.1
	Heptachlor epoxide	mg/kg	0.1	<0.1
	Gamma Chlordane	mg/kg	0.1	<0.1
	Alpha Chlordane	mg/kg	0.1	<0.1
	Alpha Endosulfan	mg/kg	0.1	<0.1
	p,p'-DDE	mg/kg	0.1	<0.1
	Dieldrin	mg/kg	0.05	<0.05
	Endrin	mg/kg	0.1	<0.1
	Beta Endosulfan	mg/kg	0.1	<0.1
	p,p'-DDD	mg/kg	0.1	<0.1
	Endrin aldehyde	mg/kg	0.1	<0.1
	Endosulfan sulphate	mg/kg	0.1	<0.1
	p,p'-DDT	mg/kg	0.1	<0.1
	Endrin ketone	mg/kg	0.1	<0.1
	Methoxychlor	mg/kg	0.1	<0.1
	Mirex	mg/kg	0.1	<0.1
Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	85

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result
LB273055.001	Naphthalene	mg/kg	0.1	<0.1
	2-methylnaphthalene	mg/kg	0.1	<0.1
	1-methylnaphthalene	mg/kg	0.1	<0.1
	Acenaphthylene	mg/kg	0.1	<0.1
	Acenaphthene	mg/kg	0.1	<0.1
	Fluorene	mg/kg	0.1	<0.1
	Phenanthrene	mg/kg	0.1	<0.1
	Anthracene	mg/kg	0.1	<0.1
	Fluoranthene	mg/kg	0.1	<0.1
	Pyrene	mg/kg	0.1	<0.1
	Benzo(a)anthracene	mg/kg	0.1	<0.1
	Chrysene	mg/kg	0.1	<0.1
	Benzo(b&j&k)fluoranthene	mg/kg	0.2	<0.2
	Benzo(a)pyrene	mg/kg	0.1	<0.1

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB273055.001		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
		Benzo(ghi)perylene	mg/kg	0.1	<0.1
		Total PAH (18)	mg/kg	0.1	<0.1
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	113
		2-fluorobiphenyl (Surrogate)	%	-	104
		d14-p-terphenyl (Surrogate)	%	-	114

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB273183.001		Naphthalene	µg/L	0.1	<0.1
		2-methylnaphthalene	µg/L	0.1	<0.1
		1-methylnaphthalene	µg/L	0.1	<0.1
		Acenaphthylene	µg/L	0.1	<0.1
		Acenaphthene	µg/L	0.1	<0.1
		Fluorene	µg/L	0.1	<0.1
		Phenanthrene	µg/L	0.1	<0.1
		Anthracene	µg/L	0.1	<0.1
		Fluoranthene	µg/L	0.1	<0.1
		Pyrene	µg/L	0.1	<0.1
		Benzo(a)anthracene	µg/L	0.1	<0.1
		Chrysene	µg/L	0.1	<0.1
		Benzo(a)pyrene	µg/L	0.1	<0.1
		Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1
		Dibenzo(ah)anthracene	µg/L	0.1	<0.1
		Benzo(ghi)perylene	µg/L	0.1	<0.1
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	60
		2-fluorobiphenyl (Surrogate)	%	-	60
		d14-p-terphenyl (Surrogate)	%	-	90

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB273054.001		Arochlor 1016	mg/kg	0.2	<0.2
		Arochlor 1221	mg/kg	0.2	<0.2
		Arochlor 1232	mg/kg	0.2	<0.2
		Arochlor 1242	mg/kg	0.2	<0.2
		Arochlor 1248	mg/kg	0.2	<0.2
		Arochlor 1254	mg/kg	0.2	<0.2
		Arochlor 1260	mg/kg	0.2	<0.2
		Arochlor 1262	mg/kg	0.2	<0.2
		Arochlor 1268	mg/kg	0.2	<0.2
		Total PCBs (Arochlors)	mg/kg	1	<1.0
	Surrogates	TCMX (Surrogate)	%	-	85

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result
LB273268.001	Arsenic, As	mg/kg	1	<1
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.5	<0.5
	Copper, Cu	mg/kg	0.5	<0.5
	Nickel, Ni	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Zinc, Zn	mg/kg	2	<2
LB273269.001	Arsenic, As	mg/kg	1	<1
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.5	<0.5
	Copper, Cu	mg/kg	0.5	<0.5
	Nickel, Ni	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Zinc, Zn	mg/kg	2	<2

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

TRH (Total Recoverable Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB273055.001	TRH C10-C14	mg/kg	20	<20
	TRH C15-C28	mg/kg	45	<45
	TRH C29-C36	mg/kg	45	<45
	TRH C37-C40	mg/kg	100	<100
	TRH C10-C36 Total	mg/kg	110	<110

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB273183.001	TRH C10-C14	µg/L	50	<50
	TRH C15-C28	µg/L	200	<200
	TRH C29-C36	µg/L	200	<200
	TRH C37-C40	µg/L	200	<200

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB273067.001	Monocyclic Aromatic Hydrocarbons	Benzene	mg/kg	0.1	<0.1
		Toluene	mg/kg	0.1	<0.1
		Ethylbenzene	mg/kg	0.1	<0.1
		m/p-xylene	mg/kg	0.2	<0.2
		o-xylene	mg/kg	0.1	<0.1
	Polycyclic VOCs	Naphthalene (VOC)*	mg/kg	0.1	<0.1
	Surrogates	d4-1,2-dichloroethane (Surrogate)	%	-	93
		d8-toluene (Surrogate)	%	-	99
		Bromofluorobenzene (Surrogate)	%	-	98
	Totals	Total BTEX*	mg/kg	0.3	<0.3

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB273338.001	Monocyclic Aromatic Hydrocarbons	Benzene	µg/L	0.5	<0.5
		Toluene	µg/L	0.5	<0.5
		Ethylbenzene	µg/L	0.5	<0.5
		m/p-xylene	µg/L	1	<1
		o-xylene	µg/L	0.5	<0.5
	Polycyclic VOCs	Naphthalene (VOC)*	µg/L	0.5	<0.5
	Surrogates	d4-1,2-dichloroethane (Surrogate)	%	-	92
		d8-toluene (Surrogate)	%	-	96
		Bromofluorobenzene (Surrogate)	%	-	112

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB273067.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	d4-1,2-dichloroethane (Surrogate)	%	-	93

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB273338.001		TRH C6-C9	µg/L	40	<40
	Surrogates	d4-1,2-dichloroethane (Surrogate)	%	-	92
		d8-toluene (Surrogate)	%	-	96
		Bromofluorobenzene (Surrogate)	%	-	112

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Perth)/AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE243986.030	LB273120.023	Mercury	µg/L	0.0001	<0.0001	<0.0001	200	0

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE243927.003	LB273272.022	Mercury	mg/kg	0.05	0.07	0.06	108	13
SE243958.006	LB273271.014	Mercury	mg/kg	0.05	<0.05	<0.05	200	0
SE243986.006	LB273271.022	Mercury	mg/kg	0.05	<0.05	0.05	147	2
SE243986.024	LB273272.014	Mercury	mg/kg	0.05	0.05	0.08	106	32

Moisture Content

Method: ME-(AU)-[ENV]AN002

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE243923.001	LB273074.026	% Moisture	%w/w	1	8.6	8.1	42	6
SE243986.006	LB273274.007	% Moisture	%w/w	1	16.9	16.3	36	4
SE243986.016	LB273074.011	% Moisture	%w/w	1	14.6	12.7	37	14
SE243986.026	LB273074.022	% Moisture	%w/w	1	11.9	12.6	38	6

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE243923.001	LB273054.014		Alpha BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	200	0
			Beta BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Lindane (gamma BHC)	mg/kg	0.1	<0.1	<0.1	200	0
			Delta BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Heptachlor	mg/kg	0.1	<0.1	<0.1	200	0
			Aldrin	mg/kg	0.1	<0.1	<0.1	200	0
			Isodrin	mg/kg	0.1	<0.1	<0.1	200	0
			Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	200	0
			Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha Endosulfan	mg/kg	0.1	<0.2	<0.2	200	0
			o,p'-DDE*	mg/kg	0.1	<0.1	<0.1	200	0
			p,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
			Dieldrin	mg/kg	0.05	<0.2	<0.2	200	0
			Endrin	mg/kg	0.1	<0.2	<0.2	200	0
			Beta Endosulfan	mg/kg	0.1	<0.2	<0.2	200	0
			o,p'-DDD*	mg/kg	0.1	<0.1	<0.1	200	0
			p,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0
			Endrin aldehyde	mg/kg	0.1	<0.1	<0.1	200	0
			Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	200	0
			o,p'-DDT*	mg/kg	0.1	<0.1	<0.1	200	0
			p,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
			Endrin ketone	mg/kg	0.1	<0.1	<0.1	200	0
			Methoxychlor	mg/kg	0.1	<0.1	<0.1	200	0
			Mirex	mg/kg	0.1	<0.1	<0.1	200	0
			Total CLP OC Pesticides	mg/kg	1	<1	<1	200	0
			Total OC VIC EPA	mg/kg	1	<1	<1	200	0
			Total Other OC VIC EPA	mg/kg	1	<1	<1	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.14	0.14	30	1

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE243923.001	LB273055.022	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Acenaphthylene	mg/kg	0.1	<0.1	<0.1	200	0
		Acenaphthene	mg/kg	0.1	<0.1	<0.1	200	0
		Fluorene	mg/kg	0.1	<0.1	<0.1	200	0
		Phenanthrene	mg/kg	0.1	<0.1	<0.1	200	0
		Anthracene	mg/kg	0.1	<0.1	<0.1	200	0
		Fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE243923.001	LB273055.022		Pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Chrysene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(b&j&k)fluoranthene	mg/kg	0.2	<0.2	<0.2	200	0
			Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=0*	mg/kg	0.2	<0.2	<0.2	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	mg/kg	0.2	<0.2	<0.2	175	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR*	mg/kg	0.3	<0.3	<0.3	134	0
			Total PAH (18)	mg/kg	0.1	<0.8	<0.8	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.6	0.6	30	3
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	3
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.6	0.6	30	5
SE243986.016	LB273055.014		Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			Acenaphthylene	mg/kg	0.1	<0.1	<0.1	200	0
			Acenaphthene	mg/kg	0.1	<0.1	<0.1	200	0
			Fluorene	mg/kg	0.1	<0.1	<0.1	200	0
			Phenanthrene	mg/kg	0.1	<0.1	<0.1	170	0
			Anthracene	mg/kg	0.1	<0.1	<0.1	177	0
			Fluoranthene	mg/kg	0.1	<0.1	<0.1	138	0
			Pyrene	mg/kg	0.1	<0.1	<0.1	135	0
			Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Chrysene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	194	0
			Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	187	0
			Benzo(b&j&k)fluoranthene	mg/kg	0.2	<0.2	<0.2	190	0
			Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	200	0
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=0*	mg/kg	0.2	<0.2	<0.2	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	mg/kg	0.2	<0.2	<0.2	175	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR*	mg/kg	0.3	<0.3	<0.3	134	0
			Total PAH (18)	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.57	0.55	30	4
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.50	0.50	30	0
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.55	0.57	30	2

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE243923.001	LB273054.014		Arochlor 1016	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1221	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1232	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1242	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1248	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1254	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1260	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1262	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1268	mg/kg	0.2	<0.2	<0.2	200	0
			Total PCBs (Arochlors)	mg/kg	1	<1	<1	200	0
		Surrogates	TCMX (Surrogate)	mg/kg	-	0	0	30	1

pH in soil (1:5)

Method: ME-(AU)-[ENV]AN101

Original	Duplicate	Parameter	Units	LOR

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

pH in soil (1:5) (continued)

Method: ME-(AU)-[ENV]AN101

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE243986.024	LB273334.014	pH	pH Units	0.1	7.9	7.9	31	0
SE243986.026	LB273334.017	pH	pH Units	0.1	7.3	7.3	31	0

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE243927.003	LB273269.022	Arsenic, As	mg/kg	1	10	9	41	5
		Cadmium, Cd	mg/kg	0.3	0.3	0.4	116	1
		Chromium, Cr	mg/kg	0.5	21	20	32	6
		Copper, Cu	mg/kg	0.5	230	240	30	6
		Nickel, Ni	mg/kg	0.5	8.3	7.9	36	6
		Lead, Pb	mg/kg	1	35	35	33	2
		Zinc, Zn	mg/kg	2	260	260	31	2
SE243958.006	LB273268.014	Arsenic, As	mg/kg	1	7	4	47	54 ②
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.5	9.6	6.8	36	35
		Copper, Cu	mg/kg	0.5	24	15	33	49 ②
		Nickel, Ni	mg/kg	0.5	6.2	7.9	37	24
		Lead, Pb	mg/kg	1	14	9	39	44 ②
		Zinc, Zn	mg/kg	2	42	32	35	28
SE243986.006	LB273268.022	Arsenic, As	mg/kg	1	14	8	39	58 ②
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	168	0
		Chromium, Cr	mg/kg	0.5	18	13	33	36 ②
		Copper, Cu	mg/kg	0.5	8.5	7.5	36	12
		Nickel, Ni	mg/kg	0.5	1.3	2.5	56	64 ②
		Lead, Pb	mg/kg	1	86	55	31	44 ②
		Zinc, Zn	mg/kg	2	110	110	32	0
SE243986.024	LB273269.014	Arsenic, As	mg/kg	1	2	2	78	1
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.5	7.7	7.2	37	7
		Copper, Cu	mg/kg	0.5	4.6	6.8	39	40 ②
		Nickel, Ni	mg/kg	0.5	1.7	1.8	59	7
		Lead, Pb	mg/kg	1	20	24	35	17
		Zinc, Zn	mg/kg	2	19	23	40	16

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE243923.001	LB273055.022		TRH C10-C14	mg/kg	20	<20	<20	200	0
			TRH C15-C28	mg/kg	45	<45	<45	200	0
			TRH C29-C36	mg/kg	45	<45	<45	200	0
			TRH C37-C40	mg/kg	100	<100	<100	200	0
			TRH C10-C36 Total	mg/kg	110	<110	<110	200	0
			TRH >C10-C40 Total (F bands)	mg/kg	210	<210	<210	200	0
		TRH F Bands	TRH >C10-C16	mg/kg	25	<25	<25	200	0
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	200	0
			TRH >C16-C34 (F3)	mg/kg	90	<90	<90	200	0
			TRH >C34-C40 (F4)	mg/kg	120	<120	<120	200	0

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE243912.003	LB273183.028		TRH C10-C14	µg/L	50	<50	<50	200	0
			TRH C15-C28	µg/L	200	<200	<200	200	0
			TRH C29-C36	µg/L	200	<200	<200	200	0
			TRH C37-C40	µg/L	200	<200	<200	200	0
			TRH C10-C40	µg/L	320	<320	<320	200	0
		TRH F Bands	TRH >C10-C16	µg/L	60	<60	<60	200	0
			TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	200	0
			TRH >C16-C34 (F3)	µg/L	500	<500	<500	200	0
			TRH >C34-C40 (F4)	µg/L	500	<500	<500	200	0
SE243998.006	LB273183.027		TRH C10-C14	µg/L	50	<50	<50	200	0
			TRH C15-C28	µg/L	200	<200	<200	200	0
			TRH C29-C36	µg/L	200	<200	<200	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

TRH (Total Recoverable Hydrocarbons) in Water (continued)

Method: ME-(AU)-[ENV]AN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE243998.006	LB273183.027		TRH C37-C40	µg/L	200	<200	<200	200	0
			TRH C10-C40	µg/L	320	<320	<320	200	0
		TRH F Bands	TRH >C10-C16	µg/L	60	<60	<60	200	0
			TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	200	0
			TRH >C16-C34 (F3)	µg/L	500	<500	<500	200	0
			TRH >C34-C40 (F4)	µg/L	500	<500	<500	200	0

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE242419B.004	LB273067.020	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
		Aromatic	Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene (VOC)*	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	8.9	8.6	50	4
			d8-toluene (Surrogate)	mg/kg	-	9.4	9.2	50	2
			Bromofluorobenzene (Surrogate)	mg/kg	-	9.2	8.9	50	3
		Totals	Total BTEX*	mg/kg	0.3	<0.6	<0.6	200	0
			Total Xylenes*	mg/kg	0.3	<0.3	<0.3	200	0
SE243923.001	LB273067.022	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
		Aromatic	Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene (VOC)*	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	8.3	9.3	50	11
			d8-toluene (Surrogate)	mg/kg	-	9.0	10.0	50	10
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.9	9.7	50	9
		Totals	Total BTEX*	mg/kg	0.3	<0.6	<0.6	200	0
			Total Xylenes*	mg/kg	0.3	<0.3	<0.3	200	0

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE243926.001	LB273338.028	Monocyclic	Benzene	µg/L	0.5	<0.5	<0.5	200	0
		Aromatic	Toluene	µg/L	0.5	<0.5	<0.5	200	0
			Ethylbenzene	µg/L	0.5	<0.5	<0.5	200	0
			m/p-xylene	µg/L	1	<1	<1	200	0
			o-xylene	µg/L	0.5	<0.5	<0.5	200	0
		Polycyclic	Naphthalene (VOC)*	µg/L	0.5	<0.5	<0.5	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	9.0	9.6	30	6
			d8-toluene (Surrogate)	µg/L	-	10.1	10.3	30	2
			Bromofluorobenzene (Surrogate)	µg/L	-	11.8	10.4	30	12
		Totals	Total BTEX	µg/L	3	<3	<3	200	0

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE242419B.004	LB273067.020		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	8.9	8.6	30	4
			d8-toluene (Surrogate)	mg/kg	-	9.4	9.2	30	2
			Bromofluorobenzene (Surrogate)	mg/kg	-	9.2	8.9	30	3
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0
SE243923.001	LB273067.022		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	8.3	9.3	30	11
			d8-toluene (Surrogate)	mg/kg	-	9.0	10.0	30	10
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.9	9.7	30	9
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

Volatile Petroleum Hydrocarbons in Water — **Method: ME-(AU)-[ENV]AN433**

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE243912.001	LB273338.027		TRH C6-C10	µg/L	50	<50	<50	200	0
			TRH C6-C9	µg/L	40	<40	<40	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	9.6	9.7	30	0
			d8-toluene (Surrogate)	µg/L	-	10.4	9.9	30	5
			Bromofluorobenzene (Surrogate)	µg/L	-	9.9	10.4	30	5
		VPH F Bands	Benzene (F0)	µg/L	0.5	<0.5	<0.5	200	0
			TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	200	0
SE243926.001	LB273338.028		TRH C6-C10	µg/L	50	<50	<50	200	0
			TRH C6-C9	µg/L	40	<40	<40	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	9.0	9.6	30	6
			d8-toluene (Surrogate)	µg/L	-	10.1	10.3	30	2
			Bromofluorobenzene (Surrogate)	µg/L	-	11.8	10.4	30	12
		VPH F Bands	Benzene (F0)	µg/L	0.5	<0.5	<0.5	200	0
			TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB273271.002	Mercury	mg/kg	0.05	0.18	0.2	70 - 130	89
LB273272.002	Mercury	mg/kg	0.05	0.22	0.2	70 - 130	112

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB273327.002	Arsenic, As	mg/L	0.02	0.50	0.5	80 - 120	100
	Cadmium, Cd	mg/L	0.001	0.47	0.5	80 - 120	94
	Chromium, Cr	mg/L	0.005	0.48	0.5	80 - 120	96
	Copper, Cu	mg/L	0.005	0.49	0.5	80 - 120	97
	Lead, Pb	mg/L	0.02	0.48	0.5	80 - 120	95
	Nickel, Ni	mg/L	0.005	0.47	0.5	80 - 120	95
	Zinc, Zn	mg/L	0.01	0.49	0.5	80 - 120	98

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB273054.002		Delta BHC	mg/kg	0.1	0.2	0.2	60 - 140	81
		Heptachlor	mg/kg	0.1	0.2	0.2	60 - 140	84
		Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	82
		Dieldrin	mg/kg	0.05	0.16	0.2	60 - 140	80
		Endrin	mg/kg	0.1	0.2	0.2	60 - 140	81
		p,p'-DDT	mg/kg	0.1	0.1	0.2	60 - 140	71
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.13	0.15	40 - 130	85

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB273055.002		Naphthalene	mg/kg	0.1	4.3	4	60 - 140	107
		Acenaphthylene	mg/kg	0.1	4.5	4	60 - 140	112
		Acenaphthene	mg/kg	0.1	4.2	4	60 - 140	105
		Phenanthrene	mg/kg	0.1	3.9	4	60 - 140	98
		Anthracene	mg/kg	0.1	4.3	4	60 - 140	107
		Fluoranthene	mg/kg	0.1	4.2	4	60 - 140	106
		Pyrene	mg/kg	0.1	4.3	4	60 - 140	108
		Benzo(a)pyrene	mg/kg	0.1	4.1	4	60 - 140	103
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.57	0.5	40 - 130	114
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.54	0.5	40 - 130	108
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.54	0.5	40 - 130	108

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB273183.002		Naphthalene	µg/L	0.1	28	40	60 - 140	70
		Acenaphthylene	µg/L	0.1	32	40	60 - 140	81
		Acenaphthene	µg/L	0.1	34	40	60 - 140	84
		Phenanthrene	µg/L	0.1	36	40	60 - 140	90
		Anthracene	µg/L	0.1	38	40	60 - 140	94
		Fluoranthene	µg/L	0.1	41	40	60 - 140	103
		Pyrene	µg/L	0.1	41	40	60 - 140	103
		Benzo(a)pyrene	µg/L	0.1	44	40	60 - 140	111
	Surrogates	d5-nitrobenzene (Surrogate)	µg/L	-	0.3	0.5	40 - 130	62
		2-fluorobiphenyl (Surrogate)	µg/L	-	0.3	0.5	40 - 130	68
		d14-p-terphenyl (Surrogate)	µg/L	-	0.4	0.5	40 - 130	82

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB273054.002	Arochlor 1260	mg/kg	0.2	0.4	0.4	60 - 140	90

pH in soil (1:5)

Method: ME-(AU)-[ENV]AN101

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB273334.003	pH	pH Units	0.1	7.4	7.415	98 - 102	99

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB273268.002		Arsenic, As	mg/kg	1	360	318.22	80 - 120	114
		Cadmium, Cd	mg/kg	0.3	4.4	4.81	70 - 130	91
		Chromium, Cr	mg/kg	0.5	39	38.31	80 - 120	102
		Copper, Cu	mg/kg	0.5	340	290	80 - 120	116
		Nickel, Ni	mg/kg	0.5	200	187	80 - 120	105
		Lead, Pb	mg/kg	1	94	89.9	80 - 120	104
		Zinc, Zn	mg/kg	2	290	273	80 - 120	106
LB273269.002		Arsenic, As	mg/kg	1	350	318.22	80 - 120	109
		Cadmium, Cd	mg/kg	0.3	3.9	4.81	70 - 130	80
		Chromium, Cr	mg/kg	0.5	39	38.31	80 - 120	102
		Copper, Cu	mg/kg	0.5	330	290	80 - 120	113
		Nickel, Ni	mg/kg	0.5	190	187	80 - 120	102
		Lead, Pb	mg/kg	1	92	89.9	80 - 120	102
		Zinc, Zn	mg/kg	2	280	273	80 - 120	102

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB273055.002		TRH C10-C14	mg/kg	20	46	40	60 - 140	115
		TRH C15-C28	mg/kg	45	<45	40	60 - 140	112
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	80
	TRH F Bands	TRH >C10-C16	mg/kg	25	46	40	60 - 140	115
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	105
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	67

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB273183.002		TRH C10-C14	µg/L	50	1100	1200	60 - 140	90
		TRH C15-C28	µg/L	200	1300	1200	60 - 140	110
		TRH C29-C36	µg/L	200	1400	1200	60 - 140	115
	TRH F Bands	TRH >C10-C16	µg/L	60	1200	1200	60 - 140	98
		TRH >C16-C34 (F3)	µg/L	500	1300	1200	60 - 140	108
		TRH >C34-C40 (F4)	µg/L	500	780	600	60 - 140	130

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB273067.002	Monocyclic Aromatic	Benzene	mg/kg	0.1	4.3	5	60 - 140	87
		Toluene	mg/kg	0.1	4.9	5	60 - 140	98
		Ethylbenzene	mg/kg	0.1	5.0	5	60 - 140	100
		m/p-xylene	mg/kg	0.2	9.7	10	60 - 140	97
		o-xylene	mg/kg	0.1	5.2	5	60 - 140	104
	Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	11	10	70 - 130	105
		d8-toluene (Surrogate)	mg/kg	-	11	10	70 - 130	108
		Bromofluorobenzene (Surrogate)	mg/kg	-	9.9	10	70 - 130	99

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB273338.002	Monocyclic Aromatic	Benzene	µg/L	0.5	52	45.45	60 - 140	114
		Toluene	µg/L	0.5	54	45.45	60 - 140	118
		Ethylbenzene	µg/L	0.5	49	45.45	60 - 140	107
		m/p-xylene	µg/L	1	96	90.9	60 - 140	106
		o-xylene	µg/L	0.5	48	45.45	60 - 140	106
	Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	10.7	10	60 - 140	107
		d8-toluene (Surrogate)	µg/L	-	11.2	10	70 - 130	112
		Bromofluorobenzene (Surrogate)	µg/L	-	10.0	10	70 - 130	100

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB273067.002		TRH C6-C10	mg/kg	25	88	92.5	60 - 140	95
		TRH C6-C9	mg/kg	20	76	80	60 - 140	95
	Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	11	10	70 - 130	105
		Bromofluorobenzene (Surrogate)	mg/kg	-	9.9	10	70 - 130	99
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	59	62.5	60 - 140	94

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Volatile Petroleum Hydrocarbons in Water — **Method: ME-(AU)-[ENV]AN433**

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB273338.002		TRH C6-C10	µg/L	50	880	946.63	60 - 140	93
		TRH C6-C9	µg/L	40	760	818.71	60 - 140	93
	Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	10.7	10	60 - 140	107
		d8-toluene (Surrogate)	µg/L	-	11.2	10	70 - 130	112
		Bromofluorobenzene (Surrogate)	µg/L	-	10.0	10	70 - 130	100
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	µg/L	50	580	639.67	60 - 140	90

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE244117.001	LB273272.004	Mercury	mg/kg	0.05	0.23	<0.05	0.2	117

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE243986.019	LB273054.004	Alpha BHC	mg/kg	0.1	<0.1	<0.1	-	-
		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	-	-
		Beta BHC	mg/kg	0.1	<0.1	<0.1	-	-
		Lindane (gamma BHC)	mg/kg	0.1	<0.1	<0.1	-	-
		Delta BHC	mg/kg	0.1	0.2	<0.1	0.2	89
		Heptachlor	mg/kg	0.1	0.2	<0.1	0.2	88
		Aldrin	mg/kg	0.1	0.2	<0.1	0.2	88
		Isodrin	mg/kg	0.1	<0.1	<0.1	-	-
		Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	-	-
		Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	-	-
		Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	-	-
		Alpha Endosulfan	mg/kg	0.1	<0.1	<0.1	-	-
		o,p'-DDE*	mg/kg	0.1	<0.1	<0.1	-	-
		p,p'-DDE	mg/kg	0.1	<0.1	<0.1	-	-
		Dieldrin	mg/kg	0.05	0.17	<0.05	0.2	85
		Endrin	mg/kg	0.1	0.2	<0.1	0.2	84
		Beta Endosulfan	mg/kg	0.1	<0.1	<0.1	-	-
		o,p'-DDD*	mg/kg	0.1	<0.1	<0.1	-	-
		p,p'-DDD	mg/kg	0.1	<0.1	<0.1	-	-
		Endrin aldehyde	mg/kg	0.1	<0.1	<0.1	-	-
		Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	-	-
		o,p'-DDT*	mg/kg	0.1	<0.1	<0.1	-	-
		p,p'-DDT	mg/kg	0.1	0.1	<0.1	0.2	72
		Endrin ketone	mg/kg	0.1	<0.1	<0.1	-	-
		Methoxychlor	mg/kg	0.1	<0.1	<0.1	-	-
		Mirex	mg/kg	0.1	<0.1	<0.1	-	-
		Total CLP OC Pesticides	mg/kg	1	1	<1	-	-
		Total OC VIC EPA	mg/kg	1	1	<1	-	-
		Total Other OC VIC EPA	mg/kg	1	<1	<1	-	-
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.14	0.14	-	91

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE243986.007	LB273055.004	Naphthalene	mg/kg	0.1	4.5	<0.1	4	111
		2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		Acenaphthylene	mg/kg	0.1	4.7	<0.1	4	115
		Acenaphthene	mg/kg	0.1	4.4	<0.1	4	110
		Fluorene	mg/kg	0.1	<0.1	0.1	-	-
		Phenanthrene	mg/kg	0.1	4.3	1.2	4	77
		Anthracene	mg/kg	0.1	4.4	0.3	4	103
		Fluoranthene	mg/kg	0.1	4.8	1.5	4	82
		Pyrene	mg/kg	0.1	4.8	1.3	4	87
		Benzo(a)anthracene	mg/kg	0.1	0.1	0.3	-	-
		Chrysene	mg/kg	0.1	0.1	0.4	-	-
		Benzo(b&j)fluoranthene	mg/kg	0.1	0.1	0.4	-	-
		Benzo(k)fluoranthene	mg/kg	0.1	<0.1	0.2	-	-
		Benzo(b&j&k)fluoranthene	mg/kg	0.2	0.2	0.6	-	-
		Benzo(a)pyrene	mg/kg	0.1	4.3	0.4	4	97
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	0.3	-	-
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	-	-
		Benzo(ghi)perylene	mg/kg	0.1	0.1	0.3	-	-
		Carcinogenic PAHs, BaP TEQ <LOR=0*	mg/kg	0.2	4.4	0.6	-	-
		Carcinogenic PAHs, BaP TEQ <LOR=LOR/2*	mg/kg	0.2	4.4	0.6	-	-
		Carcinogenic PAHs, BaP TEQ <LOR=LOR*	mg/kg	0.3	4.5	0.7	-	-

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE243986.007	LB273055.004		Total PAH (18)	mg/kg	0.1	37	6.9	-	-
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.56	0.56	-	112
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.52	0.49	-	103
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.52	0.52	-	104

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE243913.001	LB273268.004		Arsenic, As	mg/kg	1	55	6	50	99
			Cadmium, Cd	mg/kg	0.3	47	<0.3	50	94
			Chromium, Cr	mg/kg	0.5	61	10	50	103
			Copper, Cu	mg/kg	0.5	67	13	50	107
			Nickel, Ni	mg/kg	0.5	69	14	50	109
			Lead, Pb	mg/kg	1	66	12	50	109
			Zinc, Zn	mg/kg	2	97	33	50	129
SE244117.001	LB273269.004		Arsenic, As	mg/kg	1	52	3	50	97
			Cadmium, Cd	mg/kg	0.3	49	<0.3	50	98
			Chromium, Cr	mg/kg	0.5	53	6.1	50	95
			Copper, Cu	mg/kg	0.5	50	2.0	50	95
			Nickel, Ni	mg/kg	0.5	52	3.0	50	99
			Lead, Pb	mg/kg	1	59	8	50	101
			Zinc, Zn	mg/kg	2	64	20	50	87

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE243580A.028	LB273067.004	Monocyclic	Benzene	mg/kg	0.1	4.5	<0.1	5	89
		Aromatic	Toluene	mg/kg	0.1	5.2	<0.1	5	103
			Ethylbenzene	mg/kg	0.1	5.4	<0.1	5	108
			m/p-xylene	mg/kg	0.2	11	<0.2	10	105
			o-xylene	mg/kg	0.1	5.7	<0.1	5	114
		Polycyclic	Naphthalene (VOC)*	mg/kg	0.1	<0.1	<0.1	-	-
		Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	8.9	8.6	10	89
			d8-toluene (Surrogate)	mg/kg	-	9.0	9.2	10	90
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.6	9.5	10	86
		Totals	Total BTEX*	mg/kg	0.3	31	<0.6	-	-
			Total Xylenes*	mg/kg	0.3	16	<0.3	-	-

VOCs in Water

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Original	Spike	Recovery%
SE243869.001	LB273338.026	Monocyclic	Benzene	µg/L	0.5	0.02278395047	45.45	112
		Aromatic	Toluene	µg/L	0.5	0.02173326946	45.45	113
			Ethylbenzene	µg/L	0.5	0.00340962988	45.45	109
			m/p-xylene	µg/L	1	0.00781471397	90.9	110
			o-xylene	µg/L	0.5	0.00363723469	45.45	110
		Polycyclic	Naphthalene (VOC)*	µg/L	0.5	0.03643525824	-	-
		Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	10.2504533042	-	89
			d8-toluene (Surrogate)	µg/L	-	10.2696252033	-	122
			Bromofluorobenzene (Surrogate)	µg/L	-	10.5799286923	-	112
		Totals	Total BTEX	µg/L	3	0	-	-

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE243580A.028	LB273067.004		TRH C6-C10	mg/kg	25	92	<25	92.5	98
			TRH C6-C9	mg/kg	20	79	<20	80	98
		Surrogates	d4-1,2-dichloroethane (Surrogate)	mg/kg	-	8.9	8.6	10	89
			d8-toluene (Surrogate)	mg/kg	-	9.0	9.2	10	90
			Bromofluorobenzene (Surrogate)	mg/kg	-	8.6	9.5	-	86
		VPH F	Benzene (F0)	mg/kg	0.1	4.5	<0.1	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	61	<25	62.5	95

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number	Parameter	Units	LOR

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Volatile Petroleum Hydrocarbons in Water (continued) — **Method: ME-(AU)-[ENV]AN433**

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE243869.001	LB273338.026	Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	8.9	10.2504533042E	-	89
			d8-toluene (Surrogate)	µg/L	-	12.2	10.2696252033I	-	122
			Bromofluorobenzene (Surrogate)	µg/L	-	11.2	10.5799286923C	-	112
		VPH F	Benzene (F0)	µg/L	0.5		0.02278395047	-	-

MATRIX SPIKE DUPLICATES

SE243986 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: https://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
***	Indicates that both * and ** apply.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.
①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to relevant report comments for further information.

GEOTECHNIQUE PTY LTD

1 LEMKO PLACE PENRITH NSW 2750

E-MAILED 3/3 @ 2.42pm

CHAIN OF CUSTODY

Results Required By: Normal Turnaround 4 days **Date:** Thursday, 9 March 2023

Except pH Results Required By 3 days **Date:** Wednesday, 8 March 2023

Your Reference No.: [redacted]

TO: SGS
UNIT 16, 33 MADDOX STREET
ALEXANDRIA NSW 2015

Sampled By: JH Ref No: 20223/3 Project Manager: ANWAR BARBHUYIA

Location: Warriewood

	Location	Depth (m)	Date	Soil	Water	Material	Metals As Cd Cr Cu Pb Hg Ni Zn	pH	CEC	CL8 TRH BTEX PAH	CL10 Metals* TRH BTEX PAH	CL16 Metals* TRH BTEX PAH OC PCB	Be B Co Mn Se	Mn	BTEX	TRH & BTEX	PAH	OCP	PCB	OCP & PCB	OPP&PCB	OCP,OP P& PCB	Cyanide	VOC	Phenol	PFAS	TCLP PAH	TCLP	Metals (Retest)
1	D101	0.0-1.0	28/02/2023	G		Sand	✔																						
2	D103	0.0-1.0	28/02/2023	G		Clay	✔																						
3	D103	1.0-2.0	28/02/2023	G		Clay	✔																						
4	D112	0.0-1.0	28/02/2023	G		Clay	✔																						
5	D113	0.0-1.0	28/02/2023	G		Clay	✔																						
6	TP25-3	0.0-1.0	1/03/2023	G		Sand	✔																						
7	TP20-1	0.0-0.15	1/03/2023	G		Sand											✔												
8	TP20-1	0.5-0.8	1/03/2023	G		Sand											✔												
9	TP20-1	1.0-1.3	1/03/2023	G		Sand											✔												
10	TP20-2	0.0-0.15	1/03/2023	G		Sand											✔												
11	TP20-2	0.5-0.8	1/03/2023	G		Sand											✔												
12	TP20-2	1.0-1.3	1/03/2023	G		Sand											✔												
13	TP20-3	0.0-0.15	1/03/2023	G		Sand											✔												
14	TP20-3	0.5-0.8	1/03/2023	G		Sand											✔												
15	TP20-3	1.0-1.3	1/03/2023	G		Sand											✔												
16	TP20-4	0.0-0.15	1/03/2023	G		Sand											✔												
17	TP20-4	0.5-0.8	1/03/2023	G		Sand											✔												
18	TP20-4	1.0-1.3	1/03/2023	G		Sand											✔												
19	BH101	0.05-0.3	1/03/2023	G		Sand	✔	✔	✔									✔											
	BH101	0.35-0.45	1/03/2023	G		Silt																							
20	TP102	0.0-0.15	1/03/2023	G		Sand		✔	✔			✔																	
21	TP103	0.0-0.15	1/03/2023	G		Sand	✔	✔	✔									✔											
22	~~TP104~~	~~0.0-0.15~~	~~1/03/2023~~	~~G~~		~~Sand~~	~~✔~~	~~✔~~	~~✔~~									✔											
	TP104	0.35-0.45	1/03/2023	G		Silt																							
23	TP105	0.0-0.15	1/03/2023	G		Sand		✔	✔			✔																	
24	TP106	0.0-0.15	1/03/2023	G		Sand	✔	✔	✔									✔											
25	TP107	0.0-0.15	1/03/2023	G		Sand	✔	✔	✔									✔											
26	TP108	0.0-0.15	1/03/2023	G		Sand	✔	✔	✔									✔											

SGS EHS Sydney COC

SE243986

GEOTECHNIQUE PTY LTD

1 LEMKO PLACE PENRITH NSW 2750

CHAIN OF CUSTODY

Results Required By: Normal Turnaround 4 days **Date:** Thursday, 9 March 2023

Except pH Results Required By 3 days **Date:** Wednesday, 8 March 2023

Your Reference No.: [redacted]

TO: SGS
UNIT 16, 33 MADDOX STREET
ALEXANDRIA NSW 2015

Sampled By: JH | Ref No: 20223/3 | Project Manager: ANWAR BARBHUYIA

Location: Warriewood

	Location	Depth (m)	Date	Soil	Water	Material	Metals As Cd Cr Cu Pb Hg Ni Zn	pH	CEC	CL8 TRH BTEX PAH	CL10 Metals* TRH BTEX PAH	CL16 Metals* TRH BTEX PAH OC PCB	Be B Co Mn Se	Mn	BTEX	TRH & BTEX	PAH	OCP	PCB	OCP & PCB	OPP&PCB	OCP,OP P& PCB	Cyanide	VOC	Phenol	PFAS	TCLP PAH	TCLP	Metals (Retest)
27	DDS1		1/03/2023	G		Sand											✔												
28	DDS2		1/03/2023	G		Sand						✔																	
29	RS2		28/02/2023		Vial+WG		✔										✔												
30	RS3		1/03/2023		Vial+WG						✔																		
31	TS1		1/03/2023	Vial											✔														

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
ANWAR BARBHUYIA	AB	2/03/2023		[signature]	02/03/23 @ 3.15

WG: Water sample (glass bottle) G Soil sample (glass jar) FCP Fibro Cement Piece (plastic bag)
WP: Water sample (plastic bottle) P Soil sample (plastic bag) ✔ Test required

SAMPLE RECEIPT ADVICE

SE243986

CLIENT DETAILS

Contact	Anwar Barbhuyia
Client	Geotechnique
Address	P.O. Box 880 PENRITH NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	anwar@geotech.com.au
Project	**20223/3 Warriewood**
Order Number	**20223/3**
Samples	31

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Thu 2/3/2023
Report Due	Thu 9/3/2023
SGS Reference	**SE243986**

SUBMISSION DETAILS

This is to confirm that 31 samples were received on Thursday 2/3/2023. Results are expected to be ready by COB Thursday 9/3/2023. Please quote SGS reference SE243986 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	29 Clay/Sand,2 Water	Type of documentation received	COC
Date documentation received	3/3/2023@2:42pm	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	16.3°C
Sample container provider	SGS	Turnaround time requested	3 Day/Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

COMMENTS

SAMPLE RECEIPT ADVICE

SE243986

CLIENT DETAILS

Client Geotechnique

Project 20223/3 Warriewood

SUMMARY OF ANALYSIS

No.	Sample ID	Exchangeable Cations and Cation Exchange Capacity	OC Pesticides in Soil	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	PCBs in Soil	pH in soil (1:5)	TRH (Total Recoverable Hydrocarbons) in Soil	VOC's in Soil	Volatile Petroleum Hydrocarbons in Soil
007	TP20-1 0.0-0.15	-	-	27	-	-	-	-	-
008	TP20-1 0.5-0.8	-	-	27	-	-	-	-	-
009	TP20-1 1.0-1.3	-	-	27	-	-	-	-	-
010	TP20-2 0.0-0.15	-	-	27	-	-	-	-	-
011	TP20-2 0.5-0.8	-	-	27	-	-	-	-	-
012	TP20-2 1.0-1.3	-	-	27	-	-	-	-	-
013	TP20-3 0.0-0.15	-	-	27	-	-	-	-	-
014	TP20-3 0.5-0.8	-	-	27	-	-	-	-	-
015	TP20-3 1.0-1.3	-	-	27	-	-	-	-	-
016	TP20-4 0.0-0.15	-	-	27	-	-	-	-	-
017	TP20-4- 0.5-0.8	-	-	27	-	-	-	-	-
018	TP20-4 1.0-1.3	-	-	27	-	-	-	-	-
019	BH101 0.05-0.3	9	30	-	-	1	-	-	-
020	TP102 0.0-0.15	9	30	27	11	1	10	11	7
021	TP103 0.0-0.15	9	30	-	-	1	-	-	-
022	TP104 0.0-0.15	9	30	-	-	1	-	-	-
023	TP105 0.0-0.15	9	30	27	11	1	10	11	7
024	TP106 0.0-0.15	9	30	-	-	1	-	-	-

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE RECEIPT ADVICE

SE243986

CLIENT DETAILS

Client Geotechnique

Project 20223/3 Warriewood

SUMMARY OF ANALYSIS

No.	Sample ID	Exchangeable Cations and Cation Exchange Capacity	OC Pesticides in Soil	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	PCBs in Soil	pH in soil (1:5)	TRH (Total Recoverable Hydrocarbons) in Soil	VOC's in Soil	Volatile Petroleum Hydrocarbons in Soil
025	TP107 0.0-0.15	9	30	-	-	1	-	-	-
026	TP108 0.0-0.15	9	30	-	-	1	-	-	-
027	DDS1	-	-	27	-	-	-	-	-
028	DDS2	-	30	27	11	-	10	11	7
031	TS1	-	-	-	-	-	-	11	-

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE RECEIPT ADVICE

SE243986

CLIENT DETAILS

Client Geotechnique

Project 20223/3 Warriewood

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury in Soil	Moisture Content	Total Recoverable Elements in Soil/Waste
001	D101 0.0-1.0	1	1	7
002	D103 0.0-1.0	1	1	7
003	D103 1.0-2.0	1	1	7
004	D112 0.0-1.0	1	1	7
005	D113 0.0-1.0	1	1	7
006	TP25-3 0.0-1.0	1	1	7
007	TP20-1 0.0-0.15	-	1	-
008	TP20-1 0.5-0.8	-	1	-
009	TP20-1 1.0-1.3	-	1	-
010	TP20-2 0.0-0.15	-	1	-
011	TP20-2 0.5-0.8	-	1	-
012	TP20-2 1.0-1.3	-	1	-
013	TP20-3 0.0-0.15	-	1	-
014	TP20-3 0.5-0.8	-	1	-
015	TP20-3 1.0-1.3	-	1	-
016	TP20-4 0.0-0.15	-	1	-
017	TP20-4- 0.5-0.8	-	1	-
018	TP20-4 1.0-1.3	-	1	-
019	BH101 0.05-0.3	1	1	7
020	TP102 0.0-0.15	1	1	7
021	TP103 0.0-0.15	1	1	7
022	TP104 0.0-0.15	1	1	7
023	TP105 0.0-0.15	1	1	7
024	TP106 0.0-0.15	1	1	7

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE RECEIPT ADVICE

SE243986

CLIENT DETAILS

Client Geotechnique

Project 20223/3 Warriewood

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury in Soil	Moisture Content	Total Recoverable Elements in Soil/Waste	VOCs in Water	Volatile Petroleum Hydrocarbons in Water
025	TP107 0.0-0.15	1	1	7	-	-
026	TP108 0.0-0.15	1	1	7	-	-
027	DDS1	-	1	-	-	-
028	DDS2	1	1	7	-	-
030	RS3	-	-	-	11	7

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
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Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE RECEIPT ADVICE

SE243986

CLIENT DETAILS

Client Geotechnique

Project 20223/3 Warriewood

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury (dissolved) in Water	Metals in Water (Dissolved) by ICPOES	PAH (Polynuclear Aromatic Hydrocarbons) in Water	TRH (Total Recoverable Hydrocarbons) in Water
029	RS2	1	7	22	-
030	RS3	1	7	22	9

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Anwar Barbhuyia
Client	Geotechnique
Address	P.O. Box 880 PENRITH NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	anwar@geotech.com.au
Project	**20223/3 Warriewood - Additional**
Order Number	**20223/3**
Samples	31

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE243986A R0**
Date Received	10/5/2023
Date Reported	12/5/2023

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Akheeqar BENIAMEEN
Chemist

Dong LIANG
Metals/Inorganics Team Leader

Ly Kim HA
Organic Section Head

TCLP (Toxicity Characteristic Leaching Procedure) for Organics/SVOC [AN006] Tested: 10/5/2023

PARAMETER	UOM	LOR	TP20A SAND 0.0-0.15 1/3/2023 SE243986A.007
pH 1:20	pH Units	-	**8.7**
pH 1:20 plus HCL	pH Units	-	**1.9**
Extraction Solution Used	No unit	-	**1**
Mass of Sample Used*	g	-	**25**
Volume of ExtractionSolution Used*	mL	-	**500**
pH TCLP after 18 hours	pH Units	-	**5.5**

PAH (Polynuclear Aromatic Hydrocarbons) in TCLP Extract [AN420] Tested: 11/5/2023

PARAMETER	UOM	LOR	TP20A SAND 0.0-0.15 1/3/2023 SE243986A.007
Perylene*	µg/L	0.1	-
Naphthalene	µg/L	0.1	<0.1
2-methylnaphthalene	µg/L	0.1	<0.1
1-methylnaphthalene	µg/L	0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1
Fluorene	µg/L	0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1
Anthracene	µg/L	0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1
Pyrene	µg/L	0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1
Chrysene	µg/L	0.1	<0.1
Benzo(b&j)fluoranthene	µg/L	0.1	<0.1
Benzo(k)fluoranthene	µg/L	0.1	<0.1
Benzo(a)pyrene	µg/L	0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1
Dibenzo(ah)anthracene	µg/L	0.1	<0.1
Benzo(ghi)perylene	µg/L	0.1	<0.1
Total PAH (18)*	µg/L	1	<1

METHOD	METHODOLOGY SUMMARY
AN006	Contaminants of interest in a waste material are leached out of the waste with a selected leaching solution under controlled conditions. The ratio of sample to extraction fluid is 100g to 2L (1 to 20 by mass). The concentration of each contaminant of interest is determined in the leachate by appropriate methods after separation from the sample by filtering. Base on USEPA 1311.
AN006	Extraction Fluid #1: This fluid is made by combining 128.6mL of dilute sodium hydroxide solution and 11.5mL glacial acetic acid with water and diluting to a volume of 2 litres. The pH of this fluid should be 4.93 ± 0.05.
AN006	Extraction Fluid #2: This fluid is made by diluting 5.7mL glacial acetic acid with water to a volume of 1 litre. The pH of this fluid should be 2.88 ± 0.05.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D). Total PAH calculated from individual analyte detections at or above the limit of reporting .

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		
***	Indicates that both * and ** apply.				

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety .

STATEMENT OF QA/QC PERFORMANCE

SE243986A R0

CLIENT DETAILS

Contact	Anwar Barbhuyia
Client	Geotechnique
Address	P.O. Box 880 PENRITH NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	anwar@geotech.com.au
Project	**20223/3 Warriewood - Additional**
Order Number	**20223/3**
Samples	31

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE243986A R0**
Date Received	10 May 2023
Date Reported	12 May 2023

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Extraction Date	PAH (Polynuclear Aromatic Hydrocarbons) in TCLP Extract	1 item
	TCLP (Toxicity Characteristic Leaching Procedure) for Organics/SVOC	1 item

SAMPLE SUMMARY

Sample counts by matrix	1 Sand	Type of documentation received	COC
Date documentation received	10/5/2023@9:08am	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	16.3°C
Sample container provider	SGS	Turnaround time requested	Two Days
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

HOLDING TIME SUMMARY

SE243986A R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

PAH (Polynuclear Aromatic Hydrocarbons) in TCLP Extract

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP20A	SE243986A.007	LB279170	01 Mar 2023	10 May 2023	22 Mar 2023	11 May 2023†	20 Jun 2023	12 May 2023

TCLP (Toxicity Characteristic Leaching Procedure) for Organics/SVOC

Method: ME-(AU)-[ENV]AN006

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP20A	SE243986A.007	LB279080	01 Mar 2023	10 May 2023	15 Mar 2023	10 May 2023†	14 May 2023	12 May 2023

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in TCLP Extract — **Method: ME-(AU)-[ENV]AN420**

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	TP20A	SE243986A.007	%	40 - 130%	44
d14-p-terphenyl (Surrogate)	TP20A	SE243986A.007	%	40 - 130%	78
d5-nitrobenzene (Surrogate)	TP20A	SE243986A.007	%	40 - 130%	42

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

PAH (Polynuclear Aromatic Hydrocarbons) in TCLP Extract — **Method: ME-(AU)-[ENV]AN420**

Sample Number		Parameter	Units	LOR	Result
LB279170.001		1-methylnaphthalene	µg/L	0.1	<0.1
		2-methylnaphthalene	µg/L	0.1	<0.1
		Acenaphthene	µg/L	0.1	<0.1
		Acenaphthylene	µg/L	0.1	<0.1
		Anthracene	µg/L	0.1	<0.1
		Benzo(a)anthracene	µg/L	0.1	<0.1
		Benzo(a)pyrene	µg/L	0.1	<0.1
		Benzo(ghi)perylene	µg/L	0.1	<0.1
		Chrysene	µg/L	0.1	<0.1
		Dibenzo(ah)anthracene	µg/L	0.1	<0.1
		Fluoranthene	µg/L	0.1	<0.1
		Fluorene	µg/L	0.1	<0.1
		Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1
		Naphthalene	µg/L	0.1	<0.1
		Phenanthrene	µg/L	0.1	<0.1
		Pyrene	µg/L	0.1	<0.1
	Surrogates	2-fluorobiphenyl (Surrogate)	%	-	56
		d14-p-terphenyl (Surrogate)	%	-	75
		d5-nitrobenzene (Surrogate)	%	-	55

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean
The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR
Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may give a different calculated RPD.

Original	Duplicate	Parameter	Units	LOR

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

PAH (Polynuclear Aromatic Hydrocarbons) in TCLP Extract — **Method: ME-(AU)-[ENV]AN420**

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB279170.002		Acenaphthene	µg/L	0.1	31	40	60 - 140	76
		Acenaphthylene	µg/L	0.1	33	40	60 - 140	82
		Anthracene	µg/L	0.1	30	40	60 - 140	75
		Benzo(a)pyrene	µg/L	0.1	34	40	60 - 140	85
		Fluoranthene	µg/L	0.1	32	40	60 - 140	81
		Naphthalene	µg/L	0.1	29	40	60 - 140	72
		Phenanthrene	µg/L	0.1	30	40	60 - 140	75
		Pyrene	µg/L	0.1	32	40	60 - 140	80
	Surrogates	2-fluorobiphenyl (Surrogate)	µg/L	-	0.3	0.5	40 - 130	67
		d14-p-terphenyl (Surrogate)	µg/L	-	0.3	0.5	40 - 130	56
		d5-nitrobenzene (Surrogate)	µg/L	-	0.3	0.5	40 - 130	69

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

QC Sample	Sample Number	Parameter	Units	LOR

MATRIX SPIKE DUPLICATES

SE243986A R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: https://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
***	Indicates that both * and ** apply.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.
①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to relevant report comments for further information.

SGS EHS Alexandria Laboratory

SE243986A COC
Received: 10 – May – 2023

GEOTECHNIQUE PTY LTD

1 LEMKO PLACE PENRITH NSW 2750

CHAIN OF CUSTODY

Results Required By: 2 days — **Date: Friday, 12 May 2023**
Except pH Results Required By [redacted] — **Date:**
Your Reference No.: [redacted]

TO: SGS
UNIT 16, 33 MADDOX STREET
ALEXANDRIA NSW 2015

Sampled By: JH — Ref No: 20223/3 — Project Manager: ANWAR BARBHUYIA
Location: Warriewood

Location	Depth (m)	Date	Soil	Water	Material	Metals As Cd Cr Cu Pb Hg Ni Zn	pH	CEC	CL8 TRH BTEX PAH	CL10 Metals* TRH BTEX PAH	CL15 Metals* TRH BTEX PAH OC PCB	Be B Co Mn Se	Mn	BTEX	TRH & BTEX	TCLP PAH	OCP	PCB	OCP & PCB	OPP&PCB	OCP,OPP& PCB	Cyanide	VOC	Phenol	PFAS	TCLP PAH2	TCLP	Metals (Retest)
TP20A	0.0-0.15	1/03/2023	G		Sand											✓												

A1

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
ANWAR BARBHUYIA	AB	10/05/2023			10/5/23 2.05 pm

WG Water sample (glass bottle) — G Soil sample (glass jar) — FCP Fibro Cement Piece (plastic bag)
WP Water sample (plastic bottle) — P Soil sample (plastic bag) — ✓ Test required

SAMPLE RECEIPT ADVICE

SE243986A

CLIENT DETAILS

Contact	Anwar Barbhuyia
Client	Geotechnique
Address	P.O. Box 880 PENRITH NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	anwar@geotech.com.au
Project	**20223/3 Warriewood - Additional**
Order Number	**20223/3**
Samples	31

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Wed 10/5/2023
Report Due	Fri 12/5/2023
SGS Reference	**SE243986A**

SUBMISSION DETAILS

This is to confirm that 31 samples were received on Wednesday 10/5/2023. Results are expected to be ready by COB Friday 12/5/2023. Please quote SGS reference SE243986A when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	1 Sand	Type of documentation received	COC
Date documentation received	10/5/2023@9:08am	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	16.3°C
Sample container provider	SGS	Turnaround time requested	Two Days
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

COMMENTS

SAMPLE RECEIPT ADVICE

SE243986A

CLIENT DETAILS

Client Geotechnique

Project 20223/3 Warriewood - Additional

SUMMARY OF ANALYSIS

No.	Sample ID	PAH (Polynuclear Aromatic Hydrocarbons) in TCLP	TCLP (Toxicity Characteristic Leaching
007	TP20A 0.0-0.15	23	6

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref : ASET108300 / 111480 / 1 – 28
Your ref : 20223/3 - Warriewood
NATA Accreditation No: 14484

7 March 2023

Accredited for compliance with ISO/IEC 17025 - Testing.

Geotechnique Pty Ltd
1 Lemko Place
Penrith NSW 2750

Attn: Mr Anwar Barbhuyia

Dear Anwar

Asbestos Identification
This report presents the results of twenty eight samples, forwarded by Geotechnique Pty Ltd on 3 March 2023, for analysis for asbestos.

1.Introduction: Twenty eight samples forwarded were examined and analysed for the presence of asbestos on 6 March 2023.

2. Methods: The samples were examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining method **(Australian Standard AS 4964 - 2004 and Safer Environment Method 1 as the supplementary work instruction) (Qualitative Analysis only).**

The report also provides approximate weights and percentages, categories of asbestos forms appearing in the sample, such as **AF** (Asbestos Fines), **FA** (Friable Asbestos) and **ACM** (Asbestos Containing Material), also satisfying the requirements of the NEPM Guidelines.

3. Results : **Sample No. 1. ASET108300 / 111480 / 1. 20223/3 - D101-0.0-1.0.**
Approx dimensions 10.0 cm x 10.0 cm x 8.3 cm
Approximate total dry weight of soil = 1084.0g.
The sample consisted of a mixture of sandy soil, stones, organic fibres, ceramic tiles, cement like material, sandstones and plant matter.
No asbestos detected.

Sample No. 2. ASET108300 / 111480 / 2. 20223/3 - D103-0.0-1.0.
Approx dimensions 10.0 cm x 10.0 cm x 8.6 cm
Approximate total dry weight of soil = 1142.0g.
The sample consisted of a mixture of sandy soil, sandstones, organic fibres, stones and plant matter.
No asbestos detected.

Sample No. 3. ASET108300 / 111480 / 3. 20223/3 - D103-1.0-2.0.
Approx dimensions 10.0 cm x 10.0 cm x 8.3 cm
Approximate total dry weight of soil = 1040.0g.
The sample consisted of a mixture of sandy soil, sandstones, organic fibres, stones and plant matter.
No asbestos detected.

Sample No. 4. ASET108300 / 111480 / 4. 20223/3 - D106-0.0-1.0.
Approx dimensions 10.0 cm x 10.0 cm x 8.6 cm
Approximate total dry weight of soil = 1137.0g.
The sample consisted of a mixture of sandy soil, stones, bitumen like material containing organic fibres, sandstones, organic fibres and plant matter.
No asbestos detected.

Sample No. 5. ASET108300 / 111480 / 5. 20223/3 - D107-0.0-1.0.
Approx dimensions 10.0 cm x 10.0 cm x 8.7 cm
Approximate total dry weight of soil = 1179.0g.
The sample consisted of a mixture of sandy soil, stones, sandstones, organic fibres and plant matter.
No asbestos detected.

Sample No. 6. ASET108300 / 111480 / 6. 20223/3 - D107-1.0-2.0.
Approx dimensions 10.0 cm x 10.0 cm x 9.4 cm
The sample consisted of a mixture of sandy soil, a fragment of fibre cement# (FA), sandstones, organic fibres, stones and plant matter.
Chrysotile# (Approximate estimated weight = 0.002g) asbestos detected.
Approximate total dry weight of soil = 1309.0g.
Approximate estimated weight of asbestos in soil in the form of FA = 0.002g.
Approximate w/w percentage of asbestos in soil in the form of FA = 0.00015%.

Sample No. 7. ASET108300 / 111480 / 7. 20223/3 - D108-0.0-1.0.
Approx dimensions 10.0 cm x 10.0 cm x 9.0 cm
The sample consisted of a mixture of sandy soil, stones, a fragment of fibre cement* (ACM), fibre cement# (AF), sandstones, organic fibres, brick like material, cement like material, soft fibrous material containing organic fibres and plant matter.
Chrysotile*# (Approximate estimated weight as ACM = 0.21g, as AF = 0.001g) asbestos detected.
Approximate total dry weight of soil = 1256.0g.
Approximate total weight of ACM = 1.98g.
Approximate estimated weight of asbestos in soil in the form of ACM = 0.21g.
Approximate w/w percentage of asbestos in soil in the form of ACM = 0.017%.
Approximate estimated weight of asbestos in soil in the form of AF = 0.001g.
Approximate w/w percentage of asbestos in soil in the form of AF = 0.00008%.

Sample No. 8. ASET108300 / 111480 / 8. 20223/3 - D109-0.0-1.0.
Approx dimensions 10.0 cm x 10.0 cm x 8.6 cm
Approximate total dry weight of soil = 1125.0g.
The sample consisted of a mixture of clayish sandy soil, stones, organic fibres, sandstones and plant matter.
No asbestos detected.

Sample No. 9. ASET108300 / 111480 / 9. 20223/3 - D110-0.0-1.0.
Approx dimensions 10.0 cm x 10.0 cm x 7.1 cm
Approximate total dry weight of soil = 876.0g.
The sample consisted of a mixture of clayish sandy soil, stones, sandstones, organic fibres and plant matter.
No asbestos detected.

Sample No. 10. ASET108300 / 111480 / 10. 20223/3 - D111-0.0-1.0.
Approx dimensions 10.0 cm x 10.0 cm x 9.1 cm
Approximate total dry weight of soil = 1228.0g.
The sample consisted of a mixture of sandy soil, stones, organic fibres, sandstones and plant matter.
No asbestos detected.

Sample No. 11. ASET108300 / 111480 / 11. 20223/3 - D112-0.0-1.0.
Approx dimensions 10.0 cm x 10.0 cm x 7.8 cm
The sample consisted of a mixture of clayish sandy soil, stones, a fragment of fibre cement# (AF), fibres^ (AF), sandstones, organic fibres and plant matter.
Chrysotile#^ (Approximate estimated weight as fragment = 0.0032g, as loose fibres = 0.001g) asbestos detected.
Approximate total dry weight of soil = 937.0g.
Approximate estimated weight of asbestos in soil in the form of AF = 0.0042g.
Approximate w/w percentage of asbestos in soil in the form of AF = 0.00045%.

Sample No. 12. ASET108300 / 111480 / 12. 20223/3 - D113-0.0-1.0.
Approx dimensions 10.0 cm x 10.0 cm x 8.4 cm
Approximate total dry weight of soil = 1144.0g.
The sample consisted of a mixture of clayish sandy soil, stones, organic fibres, sandstones and plant matter.
No asbestos detected.

Sample No. 13. ASET108300 / 111480 / 13. 20223/3 - D114-0.0-1.0.
Approx dimensions 10.0 cm x 10.0 cm x 8.3 cm
Approximate total dry weight of soil = 1068.0g.
The sample consisted of a mixture of sandy soil, stones, cement like material, organic fibres, sandstones and plant matter.
No asbestos detected.

Sample No. 14. ASET108300 / 111480 / 14. 20223/3 - TP14-1-0.0-0.5.
Approx dimensions 10.0 cm x 10.0 cm x 8.4 cm
Approximate total dry weight of soil = 1087.0g.
The sample consisted of a mixture of sandy soil, stones, cement like material, sandstones, organic fibres and plant matter.
No asbestos detected.

Sample No. 15. ASET108300 / 111480 / 15. 20223/3 - TP14-2-0.0-0.5.
Approx dimensions 10.0 cm x 10.0 cm x 7.6 cm
Approximate total dry weight of soil = 941.0g.
The sample consisted of a mixture of sandy soil, stones, sandstones, organic fibres and plant matter.
No asbestos detected.

Sample No. 16. ASET108300 / 111480 / 16. 20223/3 - TP14-3-0.0-0.5.
Approx dimensions 10.0 cm x 10.0 cm x 8.6 cm
Approximate total dry weight of soil = 1188.0g.
The sample consisted of a mixture of sandy soil, sandstones, ceramic tiles, organic fibres, stones and plant matter.
No asbestos detected.

Sample No. 17. ASET108300 / 111480 / 17. 20223/3 - TP14-4-0.0-0.5.
Approx dimensions 10.0 cm x 10.0 cm x 8.5 cm
The sample consisted of a mixture of sandy soil, fibres^ (AF), sandstones, organic fibres, stones and plant matter.
Chrysotile^ (Approximate weight = 0.0004g) asbestos detected.
Approximate total dry weight of soil = 1176.0g.
Approximate estimated weight of asbestos in soil in the form of AF = 0.0004g.
Approximate w/w percentage of asbestos in soil in the form of AF = 0.000034%.

Sample No. 18. ASET108300 / 111480 / 18. 20223/3 - TP25-1-0.0-1.0.
Approx dimensions 10.0 cm x 10.0 cm x 8.3 cm
Approximate total dry weight of soil = 1008.0g.
The sample consisted of a mixture of clayish sandy soil, stones, organic fibres, sandstones and plant matter.
No asbestos detected.

Sample No. 19. ASET108300 / 111480 / 19. 20223/3 - TP25-1-1.0-1.3.
Approx dimensions 10.0 cm x 10.0 cm x 8.0 cm
Approximate total dry weight of soil = 961.0g.
The sample consisted of a mixture of clayish sandy soil, stones, sandstones, organic fibres and plant matter.
No asbestos detected.

Sample No. 20. ASET108300 / 111480 / 20. 20223/3 -TP25-2-0.0-1.0.
Approx dimensions 10.0 cm x 10.0 cm x 7.0 cm
Approximate total dry weight of soil = 848.0g.
The sample consisted of a mixture of clayish sandy soil, stones, organic fibres, sandstones and plant matter.
No asbestos detected.

Sample No. 21. ASET108300 / 111480 / 21. 20223/3 - TP25-2-1.0-1.3.
Approx dimensions 10.0 cm x 10.0 cm x 8.3 cm
Approximate total dry weight of soil = 1064.0g.
The sample consisted of a mixture of sandy soil, stones, organic fibres, sandstones and plant matter.
No asbestos detected.

Sample No. 22. ASET108300 / 111480 / 22. 20223/3 - TP25-3-0.0-1.0.
Approx dimensions 10.0 cm x 10.0 cm x 6.1 cm
Approximate total dry weight of soil = 750.0g.
The sample consisted of a mixture of clayish sandy soil, stones, organic fibres, synthetic mineral fibres, sandstones and plant matter.
No asbestos detected.

Sample No. 23. ASET108300 / 111480 / 23. 20223/3 - TP25-4-0.0-1.0.
Approx dimensions 10.0 cm x 10.0 cm x 7.6 cm
Approximate total dry weight of soil = 932.0g.
The sample consisted of a mixture of clayish sandy soil, stones, sandstones, organic fibres and plant matter.
No asbestos detected.

λ Sample No. 24. ASET108300 / 111480 / 24. 20223/3 - FCP-D101.
Approx dimensions 5.5 cm x 3.6 cm x 0.5 cm
The sample consisted of a fragment of a fibre cement material.
Chrysotile asbestos detected.
Approximate total weight of fibre cement = 16.0g.

λ Sample No. 25. ASET108300 / 111480 / 25. 20223/3 - FCP-D103.
Approx dimensions 4.0 cm x 2.9 cm x 0.5 cm
The sample consisted of a fragment of a fibre cement material.
Chrysotile asbestos and Amosite asbestos detected.
Approximate total weight of fibre cement = 9.0g.

λ Sample No. 26. ASET108300 / 111480 / 26. 20223/3 - FCP-D112.
Approx dimensions 11.5 cm x 9.1 cm x 0.6 cm
The sample consisted of a fragment of a fibre cement material.
Chrysotile asbestos, Amosite asbestos and Crocidolite asbestos detected.
Approximate total weight of fibre cement = 89.0g.

λ Sample No. 27. ASET108300 / 111480 / 27. 20223/3 - FCP-D113.
Approx dimensions 11.0 cm x 8.0 cm x 0.5 cm
The sample consisted of a fragment of a fibre cement material.
Chrysotile asbestos detected.
Approximate total weight of fibre cement = 27.0g.

λ Sample No. 28. ASET108300 / 111480 / 28. 20223/3 - FCP-TP25-3.
Approx dimensions 5.0 cm x 5.0 cm x 0.5 cm
The sample consisted of a fragment of a fibro plaster cement material containing organic fibres.
No asbestos detected.

Reported by,

Mahen De Silva. BSc, MSc, Grad Dip (Occ Hyg)
Occupational Hygienist / Approved Identifier.
Approved Signatory

Accredited for compliance with ISO/IEC 17025 - Testing.

This report is consistent with the analytical procedures and reporting recommendations in the Western Australia Guidelines for the Assessment Remediation and Management of Asbestos contaminated sites in Western Australia and it also satisfies the requirements of the current NEPM Guidelines. NATA Accreditation does not cover the performance of this service.

Disclaimers;

The approx; weights given above can be used only as a guide. They do not represent absolute weights of each kind of asbestos, as it is impossible to extract all loose fibres from soil and other asbestos

containing building material samples using this method. However above figures may be used as closest approximations to the exact values in each case. Estimation and/ or reporting of asbestos fibre weights in asbestos containing materials and soil is out of the Scope of the NATA Accreditation. NATA Accreditation only covers the qualitative part of the results reported. This weight disclaimer also covers weight / weight percentages if given.

ACM - Asbestos Containing Material - Products or materials that contain asbestos in an inert bound matrix such as cement or resin. Here taken to be sound material, even as fragments and not fitting through a 7mm X 7 mm sieve.

AF -Includes asbestos free fibres, small fibre bundles and also ACM fragments that pass through a 7mm X 7 mm sieve.

FA -Friable asbestos material such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products.

^ denotes loose fibres of relevant asbestos types detected in soil/dust.
*** denotes asbestos detected in ACM in bonded form.**
 # denotes friable asbestos as soft fibro plaster, fragments of ACM smaller than 7mm which are considered as friable and / or highly weathered ACM that will easily crumble.
λ denotes samples that have been analysed only in accordance to AS 4964 – 2004.
Ω Sample volume criteria of 500mL have not been satisfied.

The results contained in this report relate only to the sample/s submitted for testing. Australian Safer Environment & Technology accepts no responsibility for whether or not the submitted sample/s is/are representative. Results indicating "No asbestos detected" indicates a reporting limit specified in AS4964 -2004 which is 0.1g/ Kg (0.01%). Any amounts detected at assumed lower level than that would be reported, however those assumed lower levels may be treated as "No asbestos detected" as specified and recommended by A4964-2004. Trace / respirable level asbestos will be reported only when detected and trace analysis have been performed on each sample as required by AS4964-2004. When loose asbestos fibres/ fibre bundles are detected and reported that means they are larger handpicked fibres/ fibre bundles, and they do not represent respirable fibres. Dust/soil samples are always subjected to trace analysis except where the amounts involved are extremely minute and trace analysis is not possible to be carried out. When trace analysis is not performed on dust samples it will be indicated in the report that trace analysis has not been carried out due to the volume of the sample being extremely minute.

Estimation of asbestos weights involves the use of following assumptions;
Volume of each kind of Asbestos present in broken edges have been visually estimated and its been assumed that volumes remain similar throughout the binding matrix and those volumes are only approximate and not exact. Material densities have been assumed to be similar to commonly found similar materials and may not be exact.

All samples indicating "No asbestos detected" are assumed to be less than 0.001% for friable AF and FA portions detected and 0.01 % for ACM detected unless the approximate weight is given.

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD
SUITE 710 / 90 GEORGE STREET, HORNSBY NSW 2077 – P.O. BOX 1644 HORNSBY WESTFIELD NSW 1635
PHONE: (02) 99872183 FAX: (02)99872151 EMAIL: info@ausset.com.au

CHAIN OF CUSTODY RECORD

ASET JOB NO ASET108300/111480/1-28				Contact Name:	ANWAR BARBHUYIA	Asbestos in Material	Asbestos in Soil (+/-)	Asbestos WA/ NEPM 500mL	Asbestos Fibre Count	Asbestos in Water	Asbestos in Dust	Lead Analysis
Name/ Company Name: Geotechnique				Job No:	20223/3							
Address: 1 Lemko Place Penrith				Project Address:	Warriewood							
				Purchase Order:								
Contact Ph: 0247222700				Email Results to:								
	Sample ID	Date	Type	Container	Sample Depth (m)							
1	D101	28/02/2023	Soil	P	0.0-1.0			√				
2	D103	28/02/2023	Soil	P	0.0-1.0			√				
3	D103	28/02/2023	Soil	P	1.0-2.0			√				
4	D106	28/02/2023	Soil	P	0.0-1.0			√				
5	D107	28/02/2023	Soil	P	0.0-1.0			√				
6	D107	28/02/2023	Soil	P	1.0-2.0			√				
7	D108	28/02/2023	Soil	P	0.0-1.0			√				
8	D109	28/02/2023	Soil	P	0.0-1.0			√				
9	D110	28/02/2023	Soil	P	0.0-1.0			√				
10	D111	28/02/2023	Soil	P	0.0-1.0			√				
11	D112	28/02/2023	Soil	P	0.0-1.0			√				
12	D113	28/02/2023	Soil	P	0.0-1.0			√				

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CHAIN OF CUSTODY RECORD

ASET JOB NO:				Contact Name:	ANWAR BARBHUYIA								
Name/ Company Name: Geotechnique				Job No:	20223/3								
Address: 1 Lemko Place Penrith				Project Address:	Warriewood								
				Purchase Order:									
Contact Ph: 0247222700				Email Results to:									
	Sample ID	Date	Type	Container	Sample Depth (m)	Asbestos in Material	Asbestos in Soil (+/-)	Asbestos WA/ NEPM 500mL	Asbestos Fibre Count	Asbestos in Water	Asbestos in Dust	Lead Analysis	
13	D114	28/02/2023	Soil	P	0.0-1.0			V					
14	TP14-1	28/02/2023	Soil	P	0.0-0.5			V					
15	TP14-2	28/02/2023	Soil	P	0.0-0.5			V					
16	TP14-3	28/02/2023	Soil	P	0.0-0.5			V					
17	TP14-4	28/02/2023	Soil	P	0.0-0.5			V					
18	TP25-1	1/03/2023	Soil	P	0.0-1.0			V					
19	TP25-1	1/03/2023	Soil	P	1.0-1.3			V					
20	TP25-2	1/03/2023	Soil	P	0.0-1.0			V					
21	TP25-2	1/03/2023	Soil	P	1.0-1.3			V					
22	TP25-3	1/03/2023	Soil	P	0.0-1.0			V					
23	TP25-4	1/03/2023	Soil	P	0.0-1.0			V					

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PHONE: (02) 99872183 FAX: (02)99872151 EMAIL: info@ausset.com.au

CHAIN OF CUSTODY RECORD

ASET JOB NO:				Contact Name:	ANWAR BARBHUYIA							
Name/ Company Name: Geotechnique				Job No:	20223/3							
Address: 1 Lemko Place Penrith				Project Address:	Warriewood							
				Purchase Order:								
Contact Ph: 0247222700				Email Results to:								
	Sample ID	Date	Type	Container	Sample Depth (m)	Asbestos in Material	Asbestos in Soil (+/-)	Asbestos WA/ NEPM 500mL	Asbestos Fibre Count	Asbestos in Water	Asbestos in Dust	Lead Analysis
24	FCP-D101	28/02/2023	Material	P	0.0-1.0	√						
25	FCP-D103	28/02/2023	Material	P	0.0-1.0	√						
26	FCP-D112	28/02/2023	Material	P	0.0-1.0	√						
27	FCP-D113	28/02/2023	Material	P	0.0-1.0	√						
28	FCP-TP25-3	1/03/2023	Material	P	0.0-1.0	√						
Relinquished By: ANWAR BARBHUYIA					Received By: THEVINI	Turn around time					Shipment Method	
Date & Time: 3/03/2023					Date & Time: 1.53	Same Day	24 hrs	48 hrs	3 Days	5 days		
Signature: AB					Signature: TR					√		

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03 MAR 2023
BY: TR

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 317757

Client Details

Client	Geotechnique Pty Ltd
Attention	Anwar Barbhuyia
Address	PO Box 880, Penrith, NSW, 2751

Sample Details

Your Reference	**20223/3 Warriewood**
Number of Samples	2 Soil
Date samples received	02/03/2023
Date completed instructions received	02/03/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	10/03/2023
Date of Issue	10/03/2023

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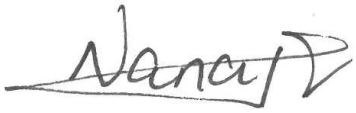
Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Josh Williams, Organics Supervisor
Kyle Gavrily, Senior Chemist
Loren Bardwell, Development Chemist
Steven Luong, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		317757-2
Your Reference	UNITS	DSS2
Date Sampled		01/03/2023
Type of sample		Soil
Date extracted	-	06/03/2023
Date analysed	-	07/03/2023
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
Naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	90

svTRH (C10-C40) in Soil		
Our Reference		317757-2
Your Reference	UNITS	DSS2
Date Sampled		01/03/2023
Type of sample		Soil
Date extracted	-	06/03/2023
Date analysed	-	06/03/2023
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
Total +ve TRH (C10-C36)	mg/kg	<50
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	65

PAHs in Soil			
Our Reference		317757-1	317757-2
Your Reference	UNITS	DSS1	DSS2
Date Sampled		01/03/2023	01/03/2023
Type of sample		Soil	Soil
Date extracted	-	06/03/2023	06/03/2023
Date analysed	-	08/03/2023	08/03/2023
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	0.2	<0.1
Pyrene	mg/kg	0.2	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1
Chrysene	mg/kg	0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	0.07
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1
Total +ve PAH's	mg/kg	0.80	0.07
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	96	99

Organochlorine Pesticides in soil		
Our Reference		317757-2
Your Reference	UNITS	DSS2
Date Sampled		01/03/2023
Type of sample		Soil
Date extracted	-	06/03/2023
Date analysed	-	08/03/2023
alpha-BHC	mg/kg	<0.1
HCB	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	98

PCBs in Soil		
Our Reference		317757-2
Your Reference	UNITS	DSS2
Date Sampled		01/03/2023
Type of sample		Soil
Date extracted	-	06/03/2023
Date analysed	-	08/03/2023
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCMX	%	98

Acid Extractable metals in soil		
Our Reference		317757-2
Your Reference	UNITS	DSS2
Date Sampled		01/03/2023
Type of sample		Soil
Date prepared	-	06/03/2023
Date analysed	-	07/03/2023
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	9
Copper	mg/kg	12
Lead	mg/kg	16
Mercury	mg/kg	<0.1
Nickel	mg/kg	4
Zinc	mg/kg	30

Moisture			
Our Reference		317757-1	317757-2
Your Reference	UNITS	DSS1	DSS2
Date Sampled		01/03/2023	01/03/2023
Type of sample		Soil	Soil
Date prepared	-	06/03/2023	06/03/2023
Date analysed	-	07/03/2023	07/03/2023
Moisture	%	10	17

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.

Method ID	Methodology Summary
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date extracted	-			06/03/2023	[NT]	[NT]	[NT]	[NT]	06/03/2023	[NT]
Date analysed	-			07/03/2023	[NT]	[NT]	[NT]	[NT]	07/03/2023	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	108	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	108	[NT]
Benzene	mg/kg	0.2	Org-023	<0.2	[NT]	[NT]	[NT]	[NT]	109	[NT]
Toluene	mg/kg	0.5	Org-023	<0.5	[NT]	[NT]	[NT]	[NT]	105	[NT]
Ethylbenzene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
m+p-xylene	mg/kg	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	112	[NT]
o-Xylene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	118	[NT]
Naphthalene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	93	[NT]	[NT]	[NT]	[NT]	90	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date extracted	-			06/03/2023	[NT]	[NT]	[NT]	[NT]	06/03/2023	[NT]
Date analysed	-			06/03/2023	[NT]	[NT]	[NT]	[NT]	06/03/2023	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	72	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	70	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	72	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	70	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate o-Terphenyl	%		Org-020	75	[NT]	[NT]	[NT]	[NT]	69	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date extracted	-			06/03/2023	[NT]	[NT]	[NT]	[NT]	06/03/2023	[NT]
Date analysed	-			08/03/2023	[NT]	[NT]	[NT]	[NT]	08/03/2023	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Fluorene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	120	[NT]
Anthracene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Pyrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	113	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	85	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	107	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	98	[NT]	[NT]	[NT]	[NT]	106	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date extracted	-			06/03/2023	[NT]	[NT]	[NT]	[NT]	06/03/2023	[NT]
Date analysed	-			08/03/2023	[NT]	[NT]	[NT]	[NT]	08/03/2023	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	120	[NT]
HCB	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	118	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	118	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	116	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	115	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	128	[NT]
Endrin	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	119	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	117	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	98	[NT]	[NT]	[NT]	[NT]	96	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date extracted	-			06/03/2023	[NT]	[NT]	[NT]	[NT]	06/03/2023	[NT]
Date analysed	-			08/03/2023	[NT]	[NT]	[NT]	[NT]	08/03/2023	[NT]
Aroclor 1016	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	125	[NT]
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-021	98	[NT]	[NT]	[NT]	[NT]	96	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			06/03/2023	[NT]	[NT]	[NT]	[NT]	06/03/2023	[NT]
Date analysed	-			07/03/2023	[NT]	[NT]	[NT]	[NT]	07/03/2023	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	94	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	95	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]

Result Definitions

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

Quality Control Definitions

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

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

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

COC: 2/3 1755

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 317757.

Date Received: 02/03/23.
Time Received: 4pm.
Received By: TGU.
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

GEOTECHNIQUE PTY LTD

1 LEMKO PLACE PENRITH NSW 2750

CHAIN OF CUSTODY

Results Required By: Normal Turnaround **Date:** Friday, 10 March 2023

Your Reference No.:

TO: ENVIROLAB SERVICES PTY LTD
12 ASHLEY STREET
CHATSWOOD NSW 2067

Sampled By: JH
Project Manager: ANWAR BARBHUYIA
Ref No: 20223/3
Location: Warriewood

Location	Depth (m)	Date	Soil	Material	Metals As Cd Cr Cu Pb Hg Ni Zn	TRH & BTEX	PAH	OCP	OP	PCB	PHENOL	CYANIDE	COMBO NO	PFAS (extended)	TCLP PFAS (water–routine level, short) (PFOS+PFHxS, PFOA)	PFAS (short suite)	COAL TAR (RTA Test Method T542)2
DSS1		1/03/2023	G				✔										
DSS2		1/03/2023	G		✔	✔	✔	✔		✔			5				

Relinquished by			Received by			
Name	Signature	Date	Name	Signature	Date	
ANWAR BARBHUYIA	AB	2/03/2023				

G Soil sample (glass jar) FCP Fibro Cement Piece (plastic bag) PFASC PFAS Container *: As,Cd,Cr,Cu,Pb,Hg,Ni & Zn (8 metals)
P Soil sample (plastic bag) ✔ Test required

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	Geotechnique Pty Ltd
Attention	Anwar Barbhuyia

Sample Login Details

Your reference	20223/3 Warriewood
Envirolab Reference	317757
Date Sample Received	02/03/2023
Date Instructions Received	02/03/2023
Date Results Expected to be Reported	10/03/2023

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	2 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	14
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	**Phone: 02 9910 6200**
Fax: 02 9910 6201	**Fax: 02 9910 6201**
Email: ahie@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	PCBs in Soil	Acid Extractable metalsin soil
DSS1			✓			
DSS2	✓	✓	✓	✓	✓	✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

APPENDIX C

WASTE CLASSIFICATION OF FILL MATERIALS IN AREA 1

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TABLE CC1
METALS
53A WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	METAL (mg/kg)							
		ARSENIC	CADMIUM	CHROMIUM (Total)	COPPER	LEAD	MERCURY	NICKEL	ZINC
FCP2-4	0.0-0.15	8	0.4	14	18	31	<0.05	1.5	160
Limit of Reporting (LOR) (SGS)		1	0.3	0.5	0.5	1	0.05	0.5	2
Maximum		8	0.4	14	18	31	<0.05	1.5	160

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TABLE CC2
ASBESTOS TEST RESULTS
53A WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	ASBESTOS
Soil Sample		
FCP2	0.0-0.1	**DETECTED**
FCP2a	0.0-0.15	NOT DETECTED
FCP2-1	0.0-0.15	NOT DETECTED
FCP2-2	0.0-0.15	NOT DETECTED
FCP2-3	0.0-0.15	NOT DETECTED
FCP2-4	0.0-0.15	**DETECTED**
FCP2-6	0.0-0.15	NOT DETECTED
FCP2-7	0.0-0.15	NOT DETECTED
Fibro-cement Piece		
FCP2	Ground surface	**DETECTED**
FCP2-4FCP	0.0-0.15	**DETECTED**

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TABLE CC3
WASTE CLASSIFICATION OF SOIL IN AREA 1
53A WARRIEWOOD ROAD, WARRIEWOOD

(Ref No: 20223/3-AA)

Analyte	Total Concentration (mg/kg)					Leachable Concentration (mg/L)			Classification
	Maximum	CT1	CT2	SCC1	SCC2	Maximum	TCLP1	TCLP2	
Asbestos	Friable asbestos detected in the soil samples and asbestos containing material fragments (ACM) were identified								Special (Asbestos) Waste
Metals									
Arsenic	8	100	400	500	2,000	ND	5	20	General Solid Waste **
Cadmium	0.4	20	80	100	400	ND	1	4	General Solid Waste **
Chromium (IV)	14*	100	400	1,900	7,600	ND	5	20	General Solid Waste **
Lead	31	100	400	1,500	6,000	ND	5	20	General Solid Waste **
Mercury	<0.05	4	16	50	200	ND	0.2	0.8	General Solid Waste **
Nickel	1.5	40	160	1,050	4,200	ND	2	8	General Solid Waste **

NOTES:

ND:	Not Determined
NA:	Not Applicable
TCLP:	Toxicity Characteristic Leaching Procedure
CT1:	Contaminant concentration for defining General Solid Waste (without TCLP)
CT2:	Contaminant concentration for defining Restricted Solid Waste (without TCLP)
SCC1:	Contaminant concentration for defining General Solid Waste when combined with TCLP
SCC2:	Contaminant concentration for defining Restricted Solid Waste when combined with TCLP
TCLP1:	Leachable concentration for defining General Solid Waste when combined with SCC1
TCLP2:	Leachable concentration for defining Restricted Solid Waste when combined with SCC2
*:	Total Chromium
**:	Non-putrescible

APPENDIX D

WASTE CLASSIFICATION OF FILL MATERIALS IN AREA 2

GEOTECHNIQUE
PTY LTD

TABLE DD1
METALS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	METAL (mg/kg) ARSENIC	CADMIUM	CHROMIUM (Total)	COPPER	LEAD	MERCURY	NICKEL	ZINC
Area 2									
D101	0.0-1.0	3	<0.3	11	17	24	<0.05	5.3	57
Limit of Reporting (LOR) (SGS)		1	0.3	0.5	0.5	1	0.05	0.5	2
Maximum		3	<0.3	11	17	24	<0.05	5.3	57

GEOTECHNIQUE PTY LTD

TABLE DD2
ASBESTOS TEST RESULTS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	ASBESTOS
Soil Sample in Area 2		
D101	0.0-1.0	NOT DETECTED
Limits of Reporting (LOR)		0.001
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)		
Health Screening Levels [a] - Residential A		0.001
Fibro-cement Piece in Area 2		
FCP D101	0.0-0.1	DETECTED

Notes:

ACM: Asbestos Containing Material

AF: Asbestos Fines

FA: Fibrous Asbestos

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

GEOTECHNIQUE PTY LTD

TABLE DD3
WASTE CLASSIFICATION OF FILL MATERIAL IN AREA 2
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Analyte	Maximum/95% UCL	Total Concentration (mg/kg)					Leachable Concentration (mg/L)			Classification
		Maximum	CT1	CT2	SCC1	SCC2	Maximum	TCLP1	TCLP2	
Asbestos		Asbestos containing material fragments (ACM) were identified								Special (Asbestos) Waste
Metals										
Arsenic	Maximum	3	100	400	500	2,000	ND	5	20	General Solid Waste **
Cadmium	Maximum	<0.3	20	80	100	400	ND	1	4	General Solid Waste **
Chromium (IV)	Maximum	11*	100	400	1,900	7,600	ND	5	20	General Solid Waste **
Lead	Maximum	24	100	400	1,500	6,000	ND	5	20	General Solid Waste **
Mercury	Maximum	<0.05	4	16	50	200	ND	0.2	0.8	General Solid Waste **
Nickel	Maximum	5.3	40	160	1,050	4,200	ND	2	8	General Solid Waste **

NOTES:

ND:	Not Determined
NA:	Not Applicable
TCLP:	Toxicity Characteristic Leaching Procedure
1:	Alpha, beta Endosulfan and Endosulfan Sulphate
CT1:	Contaminant concentration for defining General Solid Waste (without TCLP)
CT2:	Contaminant concentration for defining Restricted Solid Waste (without TCLP)
SCC1:	Contaminant concentration for defining General Solid Waste when combined with TCLP
SCC2:	Contaminant concentration for defining Restricted Solid Waste when combined with TCLP
TCLP1:	Leachable concentration for defining General Solid Waste when combined with SCC1
TCLP2:	Leachable concentration for defining Restricted Solid Waste when combined with SCC2
*:	Total Chromium
**:	Non-putrescible

APPENDIX E

WASTE CLASSIFICATION OF FILL MATERIALS IN AREA 3

GEOTECHNIQUE PTY LTD

TABLE EE1
METALS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	METAL (mg/kg) ARSENIC	CADMIUM	CHROMIUM (Total)	COPPER	LEAD	MERCURY	NICKEL	ZINC
Area 3									
TP14	0.0-0.15	3	<0.3	8.7	11	32	0.03	3.3	160
TP14	0.5-0.8	4	<0.3	17	1.8	16	<0.01	0.6	6.4
Limit of Reporting (LOR) (SGS)		1	0.3	0.5	0.5	1	0.05	0.5	2
Maximum		4	<0.3	17	11	32	0.03	3.3	160

GEOTECHNIQUE
PTY LTD

TABLE EE2
TOTAL PETROLEUM HYDROCARBONS (TPH), BTEX, POLYCYCLIC AROMATIC HYDROCARBONS (PAH) & ORGANOPHOSPHATE PESTICIDES (OPP) TEST RESULTS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

		TRH (mg/kg)		BTEX (mg/kg)				PAH(mg/kg)		OCP (mg/kg)
Sample Location	Depth (m)	C6-C9	C10-C36	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES (TOTAL)	BENZO(a)PYRENE (BaP)	TOTAL PAHs	ENDOSULFAN (TOTAL) [1]
TP14	0.5-0.8	<20	<110	<0.1	<0.1	<0.1	<0.3	0.7	300	<0.5
Limit of Reporting (LOR) (SGS)		20	110	0.1	0.1	0.1	0.3	0.1	0.1	0.5
Maximum		<20	<110	<0.1	<0.1	<0.1	<0.3	0.7	300	<0.5

Notes:
1: Alpha, beta Endosulfan and Endosulfan Sulphate

GEOTECHNIQUE PTY LTD

TABLE EE3
SCHEDULED CHEMICALS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	Scheduled Chemicals [1] (mg/kg)												
		HEXACHLOROBENZENE (HCB)	ALPHA, BETA, DELTA - BHC	GAMMA BHC (LINDANE)	HEPTACHLOR EPOXIDE	HEPTACHLOR	ALDRIN	DIELDRIN	ENDRIN	ENDRIN ALDEHYDE	ISODRIN	DDD+DDE+DDT	CHLORDANE (alpha & gamma)	**Scheduled Chemicals**
TP14	0.5-0.8	<0.1	<0.3	<0.1	<0.1	<0.1	<0.1	0.16	<0.1	<0.1	<0.1	<0.6	<0.2	<50
Limit of Reporting (LOR) (SGS)		0.1	0.3	0.1	0.1	0.1	0.1	0.05	0.1	0.1	0.1	0.6	0.2	-
Maximum		<0.1	<0.3	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.6	<0.2	<50

Notes:
1: Includes only Aldrin, Alpha BHC, Beta BHC, gamma BHC (Lindane), delta BHC, Chlordane, DDD, DDE, DDT, Dieldrin, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, HCB & Isodrin

GEOTECHNIQUE
PTY LTD

TABLE EE4
POLYCHLORINATED BIPHENYLS (PCB) TEST RESULTS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	Polychlorinated Biphenyls (PCB) (mg/kg)
TP14	0.5-0.8	<1
Limit of Reporting (LOR) (SGS)		1
Maximum		<1

GEOTECHNIQUE
PTY LTD

TABLE EE5
ASBESTOS TEST RESULTS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	ASBESTOS
Soil Sample in Area 3		
TP14	0.0-0.15	DETECTED
Limits of Reporting (LOR)		0.001
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)		
Health Screening Levels [a] - Residential A		0.001

Notes:

ACM: Asbestos Containing Material

AF: Asbestos Fines

FA: Fibrous Asbestos

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

GEOTECHNIQUE PTY LTD

TABLE EE6
WASTE CLASSIFICATION OF FILL MATERIAL IN AREA 3
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Analyte	Maximum/95% UCL	Total Concentration (mg/kg)					Leachable Concentration (mg/L)			Classification
		Maximum	CT1	CT2	SCC1	SCC2	Maximum	TCLP1	TCLP2	
Asbestos		Friable asbestos detected in the soil samples								Special (Asbestos) Waste
Arsenic	Maximum	4	100	400	500	2,000	ND	5	20	General Solid Waste **
Cadmium	Maximum	<0.3	20	80	100	400	ND	1	4	General Solid Waste **
Chromium (IV)	Maximum	17*	100	400	1,900	7,600	ND	5	20	General Solid Waste **
Lead	Maximum	32	100	400	1,500	6,000	ND	5	20	General Solid Waste **
Mercury	Maximum	0.03	4	16	50	200	ND	0.2	0.8	General Solid Waste **
Nickel	0.5-0.8	0.6	40	160	1,050	4,200	ND	2	8	General Solid Waste **
Total Petroleum Hydrocarbons										
C6-C9	Maximum	<20	650	2,600	650	2,600	NA	NA	NA	General Solid Waste **
C10-C36	Maximum	<110	10,000	40,000	10,000	40,000	NA	NA	NA	General Solid Waste **
Benzene	Maximum	<0.1	10	40	18	72	ND	0.5	2	General Solid Waste **
Toluene	Maximum	<0.1	288	1,152	518	2,073	ND	14.4	57.6	General Solid Waste **
EthylBenzene	Maximum	<0.1	600	2,400	1,080	4,320	ND	30	120	General Solid Waste **
Xylenes (Total)	Maximum	<0.3	1,000	4,000	1,800	7,200	ND	50	200	General Solid Waste **
Polycyclic Aromatic Hydrocarbons										
Benzo(a)pyrene (BaP)	Maximum	0.7	0.8	3.2	10	23	ND	0.04	0.16	General Solid Waste **
Total PAHs	Maximum	300	200	800	200	800	NA	NA	NA	Restricted Solid Waste
Organochlorine and Organophosphate Pesticides										
Endosulfan (total) [1]	Maximum	<0.5	60	240	108	432	ND	3	12	General Solid Waste **
Scheduled Chemicals [2]	Maximum	<50	<50	<50	<50	<50	NA	NA	NA	General Solid Waste **
Polychlorinated Biphenyls (PCB)	Maximum	<1	<50	<50	<50	<50	NA	NA	NA	General Solid Waste **

NOTES:

ND:	Not Determined
NA:	Not Applicable
TCLP:	Toxicity Characteristic Leaching Procedure
1:	Alpha, beta Endosulfan and Endosulfan Sulphate
2:	Includes only Aldrin, Alpha BHC, Beta BHC, gamma BHC (Lindane), delta BHC, Chlordane, DDD, DDE, DDT, Dieldrin, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, HCB & Isodrin
CT1:	Contaminant concentration for defining General Solid Waste (without TCLP)
CT2:	Contaminant concentration for defining Restricted Solid Waste (without TCLP)
SCC1:	Contaminant concentration for defining General Solid Waste when combined with TCLP
SCC2:	Contaminant concentration for defining Restricted Solid Waste when combined with TCLP
TCLP1:	Leachable concentration for defining General Solid Waste when combined with SCC1
TCLP2:	Leachable concentration for defining Restricted Solid Waste when combined with SCC2
*:	Total Chromium
**:	Non-putrescible

APPENDIX F

WASTE CLASSIFICATION OF FILL MATERIALS IN AREA 4

GEOTECHNIQUE
PTY LTD

TABLE FF1
ASBESTOS TEST RESULTS
53A, 53B & 53 Warriewood Road, Warriewood
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	ASBESTOS
Soil Sample in Area 4		
D108	0.0-1.0	DETECTED

GEOTECHNIQUE PTY LTD

TABLE FF2
WASTE CLASSIFICATION of FILL MATERIAL IN AREA 4
53A, 53B & 53 Warriewood Road, Warriewood
(Ref No: 20223/3-AA)

Analyte	Maximum/95% UCL	Total Concentration (mg/kg)					Leachable Concentration (mg/L)			Classification
		Maximum	CT1	CT2	SCC1	SCC2	Maximum	TCLP1	TCLP2	
Asbestos		Friable asbestos detected in the soil samples and asbestos containing material fragments (ACM) were identified								Special (Asbestos) Waste

NOTES:

ND:	Not Determined
NA:	Not Applicable
TCLP:	Toxicity Characteristic Leaching Procedure
1:	Alpha, beta Endosulfan and Endosulfan Sulphate
CT1:	Contaminant concentration for defining General Solid Waste (without TCLP)
CT2:	Contaminant concentration for defining Restricted Solid Waste (without TCLP)
SCC1:	Contaminant concentration for defining General Solid Waste when combined with TCLP
SCC2:	Contaminant concentration for defining Restricted Solid Waste when combined with TCLP
TCLP1:	Leachable concentration for defining General Solid Waste when combined with SCC1
TCLP2:	Leachable concentration for defining Restricted Solid Waste when combined with SCC2
*:	Total Chromium
**:	Non-putrescible

APPENDIX G

WASTE CLASSIFICATION OF FILL MATERIALS IN AREA 5

GEOTECHNIQUE
PTY LTD

TABLE GG1
METALS
53A, 53B & 53 Warriewood Road, Warriewood
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	METAL (mg/kg) ARSENIC	CADMIUM	CHROMIUM (Total)	COPPER	LEAD	MERCURY	NICKEL	ZINC
Area 5									
D112	0.0-1.0	3	<0.3	9.3	7.3	18	0.1	3.1	34
Limit of Reporting (LOR) (SGS)		1	0.3	0.5	0.5	1	0.05	0.5	2
Maximum		3	<0.3	9.3	7.3	18	0.1	3.1	34

GEOTECHNIQUE PTY LTD

TABLE GG2
ASBESTOS TEST RESULTS
53A, 53B & 53 Warriewood Road, Warriewood
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	ASBESTOS
Soil Sample in Area 5		
D112	0.0-1.0	NOT DETECTED
Limits of Reporting (LOR)		0.001
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)		
Health Screening Levels [a] - Residential A		0.001
Fibro-cement Piece in Area 5		
FCP D112	0.0-0.1	DETECTED

Notes:

ACM: Asbestos Containing Material

AF: Asbestos Fines

FA: Fibrous Asbestos

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

GEOTECHNIQUE PTY LTD

TABLE GG3
WASTE CLASSIFICATION for FILL MATERIAL IN AREA 5
53A, 53B & 53 Warriewood Road, Warriewood
(Ref No: 20223/3-AA)

Analyte	Maximum/95% UCL	Total Concentration (mg/kg)					Leachable Concentration (mg/L)			Classification
		Maximum	CT1	CT2	SCC1	SCC2	Maximum	TCLP1	TCLP2	
Asbestos		Asbestos containing material fragments (ACM) were identified								Special (Asbestos) Waste
Metals										
Arsenic	Maximum	3	100	400	500	2,000	ND	5	20	General Solid Waste **
Cadmium	Maximum	<0.3	20	80	100	400	ND	1	4	General Solid Waste **
Chromium (IV)	Maximum	9.3*	100	400	1,900	7,600	ND	5	20	General Solid Waste **
Lead	Maximum	18	100	400	1,500	6,000	ND	5	20	General Solid Waste **
Mercury	Maximum	0.1	4	16	50	200	ND	0.2	0.8	General Solid Waste **
Nickel	Maximum	3.1	40	160	1,050	4,200	ND	2	8	General Solid Waste **

NOTES:

ND:	Not Determined
NA:	Not Applicable
TCLP:	Toxicity Characteristic Leaching Procedure
1:	Alpha, beta Endosulfan and Endosulfan Sulphate
CT1:	Contaminant concentration for defining General Solid Waste (without TCLP)
CT2:	Contaminant concentration for defining Restricted Solid Waste (without TCLP)
SCC1:	Contaminant concentration for defining General Solid Waste when combined with TCLP
SCC2:	Contaminant concentration for defining Restricted Solid Waste when combined with TCLP
TCLP1:	Leachable concentration for defining General Solid Waste when combined with SCC1
TCLP2:	Leachable concentration for defining Restricted Solid Waste when combined with SCC2
*:	Total Chromium
**:	Non-putrescible

APPENDIX H

WASTE CLASSIFICATION OF FILL MATERIALS IN AREA 6

GEOTECHNIQUE
PTY LTD

TABLE HH1
METALS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	METAL (mg/kg) ARSENIC	CADMIUM	CHROMIUM (Total)	COPPER	LEAD	MERCURY	NICKEL	ZINC
Area 6	Soil Sample in Area 6								
D113	0.0-1.0	2	<0.3	9.4	5.1	10	<0.05	4.1	7
Limit of Reporting (LOR) (SGS)		1	0.3	0.5	0.5	1	0.05	0.5	2
Maximum		2	<0.3	9.4	5.1	10	<0.05	4.1	7

GEOTECHNIQUE
PTY LTD

TABLE HH2
ASBESTOS TEST RESULTS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	ASBESTOS
Soil Sample in Area 6		
D113	0.0-1.0	NOT DETECTED
Limits of Reporting (LOR)		0.001
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013) Health Screening Levels [a] - Residential A		0.001
Fibro-cement Piece		
FCP D113	0.0-0.1	DETECTED

Chryso

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

GEOTECHNIQUE PTY LTD

TABLE HH3
WASTE CLASSIFICATION OF FILL MATERIAL IN AREA 6
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Analyte	Maximum/95% UCL	Total Concentration (mg/kg)					Leachable Concentration (mg/L)			Classification
		Maximum	CT1	CT2	SCC1	SCC2	Maximum	TCLP1	TCLP2	
Asbestos		Asbestos containing material fragments (ACM) were identified								Special (Asbestos) Waste
Arsenic	Maximum	2	100	400	500	2,000	ND	5	20	General Solid Waste **
Beryllium	Maximum	<0.5	20	80	100	400	ND	1	4	General Solid Waste **
Cadmium	Maximum	<0.3	20	80	100	400	ND	1	4	General Solid Waste **
Chromium (IV)	Maximum	9.4*	100	400	1,900	7,600	ND	5	20	General Solid Waste **
Lead	Maximum	10	100	400	1,500	6,000	ND	5	20	General Solid Waste **
Mercury	Maximum	<0.05	4	16	50	200	ND	0.2	0.8	General Solid Waste **
Nickel	Maximum	4.1	40	160	1,050	4,200	ND	2	8	General Solid Waste **

NOTES:

ND: Not Determined
NA: Not Applicable
TCLP: Toxicity Characteristic Leaching Procedure
1: Alpha, beta Endosulfan and Endosulfan Sulphate
CT1: Contaminant concentration for defining General Solid Waste (without TCLP)
CT2: Contaminant concentration for defining Restricted Solid Waste (without TCLP)
SCC1: Contaminant concentration for defining General Solid Waste when combined with TCLP
SCC2: Contaminant concentration for defining Restricted Solid Waste when combined with TCLP
TCLP1: Leachable concentration for defining General Solid Waste when combined with SCC1
TCLP2: Leachable concentration for defining Restricted Solid Waste when combined with SCC2
*: Total Chromium
**: Non-putrescible

APPENDIX I

WASTE CLASSIFICATION OF FILL MATERIALS IN AREA 7

GEOTECHNIQUE
PTY LTD

TABLE II1
METALS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	METAL (mg/kg) ARSENIC	CADMIUM	CHROMIUM (Total)	COPPER	LEAD	MERCURY	NICKEL	ZINC
Area 7									
TP25	0.0-0.15	3	0.8	7.1	14	23	0.02	2.7	56
TP25	0.5-0.8	14	3.5	22	15	59	0.03	3.8	45
TP25	1.0-1.3	8	4.7	18	41	46	0.06	4.5	130
TP25	1.5-1.8	16	2.8	23	83	58	0.02	6.2	130
Limit of Reporting (LOR) (SGS)		1	0.3	0.5	0.5	1	0.05	0.5	2
Maximum		16	4.7	23	83	59	0.06	6.2	130

GEOTECHNIQUE
PTY LTD

TABLE II2

TOTAL PETROLEUM HYDROCARBONS (TPH), BTEX, POLYCYCLIC AROMATIC HYDROCARBONS (PAH) & ORGANOPHOSPHATE PESTICIDES (OPP) TEST RESULTS

53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD

(Ref No: 20223/3-AA)

		TRH (mg/kg)		BTEX (mg/kg)				PAH(mg/kg)		OCP (mg/kg)
Sample Location	Depth (m)	C6-C9	C10-C36	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES (TOTAL)	BENZO(a)PYRENE (BaP)	TOTAL PAHs	ENDOSULFAN (TOTAL) [1]
TP25	0.0-0.15	<20	<110	<0.1	<0.1	<0.1	<0.3	0.7	300	<0.5
Limit of Reporting (LOR) (SGS)		20	110	0.1	0.1	0.1	0.3	0.1	0.1	0.5
Maximum		<20	<110	<0.1	<0.1	<0.1	<0.3	0.7	300	<0.5

Notes:

1: Alpha, beta Endosulfan and Endosulfan Sulphate

GEOTECHNIQUE PTY LTD

TABLE II3
SCHEDULED CHEMICALS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	Scheduled Chemicals [1](mg/kg)												
		HEXACHLOROBENZENE (HCB)	ALPHA, BETA, DELTA - BHC	GAMMA BHC (LINDANE)	HEPTACHLOR EPOXIDE	HEPTACHLOR	ALDRIN	DIELDRIN	ENDRIN	ENDRIN ALDEHYDE	ISODRIN	DDD+DDE+DDT	CHLORDANE (alpha & gamma)	**Scheduled Chemicals**
TP25	0.0-0.15	<0.1	<0.3	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.6	<0.2	<50
TP25	0.5-0.8	<0.1	<0.3	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.6	<0.2	<50
Limit of Reporting (LOR) (SGS)		0.1	0.3	0.1	0.1	0.1	0.1	0.05	0.1	0.1	0.1	0.6	0.2	-
Maximum		<0.1	<0.3	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.6	<0.2	<50

Notes:
1: Includes only Aldrin, Alpha BHC, Beta BHC, gamma BHC (Lindane), delta BHC, Chlordane, DDD, DDE, DDT, Dieldrin, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, HCB & Isodrin

GEOTECHNIQUE
PTY LTD

TABLE II4
POLYCHLORINATED BIPHENYLS (PCB) TEST RESULTS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	Polychlorinated Biphenyls (PCB) (mg/kg)
TP25	0.5-0.8	<1
Limit of Reporting (LOR) (SGS)		1
Maximum		<1

GEOTECHNIQUE PTY LTD

TABLE II5
ASBESTOS TEST RESULTS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	ASBESTOS
Soil Sample in Area 7		
TP25	1.5-1.8	DETECTED
Limits of Reporting (LOR)		0.001
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)		
Health Screening Levels [a] - Residential A		0.001
Fibro-cement Piece		
FCP TP25	0.0-0.1	DETECTED

Chryso

Notes: ACM: Asbestos Containing Material

GEOTECHNIQUE PTY LTD

TABLE II6
WASTE CLASSIFICATION OF FILL MATERIAL IN AREA 7
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Analyte	Maximum/95% UCL	Total Concentration (mg/kg)					Leachable Concentration (mg/L)			Classification
		Maximum	CT1	CT2	SCC1	SCC2	Maximum	TCLP1	TCLP2	
Asbestos		Friable asbestos detected in the soil samples and asbestos containing material fragments (ACM) were identified								Special (Asbestos) Waste
Arsenic	Maximum	16	100	400	500	2,000	ND	5	20	General Solid Waste **
Cadmium	Maximum	4.7	20	80	100	400	ND	1	4	General Solid Waste **
Chromium (IV)	Maximum	23*	100	400	1,900	7,600	ND	5	20	General Solid Waste **
Lead	Maximum	59	100	400	1,500	6,000	ND	5	20	General Solid Waste **
Mercury	Maximum	0.06	4	16	50	200	ND	0.2	0.8	General Solid Waste **
Nickel	Maximum	6.2	40	160	1,050	4,200	ND	2	8	General Solid Waste **
Total Petroleum Hydrocarbons										
C6-C9	Maximum	<20	650	2,600	650	2,600	NA	NA	NA	General Solid Waste **
C10-C36	Maximum	<110	10,000	40,000	10,000	40,000	NA	NA	NA	General Solid Waste **
Benzene	Maximum	<0.1	10	40	18	72	ND	0.5	2	General Solid Waste **
Toluene	Maximum	<0.1	288	1,152	518	2,073	ND	14.4	57.6	General Solid Waste **
EthylBenzene	Maximum	<0.1	600	2,400	1,080	4,320	ND	30	120	General Solid Waste **
Xylenes (Total)	Maximum	<0.3	1,000	4,000	1,800	7,200	ND	50	200	General Solid Waste **
Polycyclic Aromatic Hydrocarbons										
Benzo(a)pyrene (BaP)	Maximum	0.7	0.8	3.2	10	23	ND	0.04	0.16	General Solid Waste **
Total PAHs	Maximum	300	200	800	200	800	NA	NA	NA	Restricted Solid Waste
Organochlorine and Organophosphate Pesticides										
Endosulfan (total) [1]	Maximum	<0.5	60	240	108	432	ND	3	12	General Solid Waste **
Scheduled Chemicals [2]	Maximum	<50	<50	<50	<50	<50	NA	NA	NA	General Solid Waste **
Polychlorinated Biphenyls (PCB)	Maximum	<1	<50	<50	<50	<50	NA	NA	NA	General Solid Waste **

NOTES:

ND:	Not Determined
NA:	Not Applicable
TCLP:	Toxicity Characteristic Leaching Procedure
1:	Alpha, beta Endosulfan and Endosulfan Sulphate
2:	Includes only Aldrin, Alpha BHC, Beta BHC, gamma BHC (Lindane), delta BHC, Chlordane, DDD, DDE, DDT, Dieldrin, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, HCB & Isodrin
CT1:	Contaminant concentration for defining General Solid Waste (without TCLP)
CT2:	Contaminant concentration for defining Restricted Solid Waste (without TCLP)
SCC1:	Contaminant concentration for defining General Solid Waste when combined with TCLP
SCC2:	Contaminant concentration for defining Restricted Solid Waste when combined with TCLP
TCLP1:	Leachable concentration for defining General Solid Waste when combined with SCC1
TCLP2:	Leachable concentration for defining Restricted Solid Waste when combined with SCC2
*:	Total Chromium
**:	Non-putrescible

APPENDIX J

WASTE CLASSIFICATION OF FILL MATERIALS IN AREA 8

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TABLE JJ1
METALS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	METAL (mg/kg) ARSENIC	CADMIUM	CHROMIUM (Total)	COPPER	LEAD	MERCURY	NICKEL	ZINC
Area 8									
TP20	0.0-0.15	5	<0.3	13	13	54	0.08	4.1	68
TP20	0.5-0.8	5	<0.3	11	9.5	21	0.02	1.8	16
TP20	1.0-1.3	4	<0.3	5.3	4	15	0.04	1.7	38
Limit of Reporting (LOR) (SGS)		1	0.3	0.5	0.5	1	0.05	0.5	2
Maximum		5	<0.3	13	13	54	0.08	4.1	68

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TABLE JJ2
TOTAL PETROLEUM HYDROCARBONS (TPH), BTEX, POLYCYCLIC AROMATIC HYDROCARBONS (PAH) & ORGANOPHOSPHATE PESTICIDES (OPP) TEST RESULTS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

		TRH (mg/kg)		BTEX (mg/kg)				PAH(mg/kg)		OCP (mg/kg)
Sample Location	Depth (m)	C6-C9	C10-C36	BENZENE	TOLUENE	ETHYLBENZENE	XYLENES (TOTAL)	BENZO(a)PYRENE (BaP)	TOTAL PAHs	ENDOSULFAN (TOTAL) [1]
TP20	0.0-0.15	<20	<110	<0.1	<0.1	<0.1	<0.3	0.7	300	<0.5
Limit of Reporting (LOR) (SGS)		20	110	0.1	0.1	0.1	0.3	0.1	0.1	0.5
Maximum		<20	<110	<0.1	<0.1	<0.1	<0.3	0.7	300	<0.5

Notes:
1: Alpha, beta Endosulfan and Endosulfan Sulphate

GEOTECHNIQUE PTY LTD

TABLE JJ3
SCHEDULED CHEMICALS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	Scheduled Chemicals [1] (mg/kg)												
		HEXACHLOROBENZENE (HCB)	ALPHA, BETA, DELTA - BHC	GAMMA BHC (LINDANE)	HEPTACHLOR EPOXIDE	HEPTACHLOR	ALDRIN	DIELDRIN	ENDRIN	ENDRIN ALDEHYDE	ISODRIN	DDD+DDE+DDT	CHLORDANE (alpha & gamma)	**Scheduled Chemicals**
TP20	0.5-0.8	<0.1	<0.3	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.6	<0.2	<50
Limit of Reporting (LOR) (SGS)		0.1	0.3	0.1	0.1	0.1	0.1	0.05	0.1	0.1	0.1	0.6	0.2	-
Maximum		<0.1	<0.3	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.6	<0.2	<50

Notes:
1: Includes only Aldrin, Alpha BHC, Beta BHC, gamma BHC (Lindane), delta BHC, Chlordane, DDD, DDE, DDT, Dieldrin, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, HCB & Isodrin

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TABLE JJ4
POLYCHLORINATED BIPHENYLS (PCB) TEST RESULTS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	Polychlorinated Biphenyls (PCB) (mg/kg)
TP20	0.5-0.8	<1
Limit of Reporting (LOR) (SGS)		1
Maximum		<1

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TABLE JJ5
ASBESTOS TEST RESULTS
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Sample Location	Depth (m)	ASBESTOS
Soil Sample in Area 8		
TP14	0.0-0.15	DETECTED
Limits of Reporting (LOR)		0.001
NATIONAL ENVIRONMENT PROTECTION AMENDMENT MEASURE (2013)		
Health Screening Levels [a] - Residential A		0.001

Notes:

ACM: Asbestos Containing Material

AF: Asbestos Fines

FA: Fibrous Asbestos

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

GEOTECHNIQUE PTY LTD

TABLE JJ6
WASTE CLASSIFICATION OF FILL MATERIAL IN AREA 8
53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD
(Ref No: 20223/3-AA)

Analyte	Maximum/95% UCL	Total Concentration (mg/kg)					Leachable Concentration (mg/L)			Classification
		Maximum	CT1	CT2	SCC1	SCC2	Maximum	TCLP1	TCLP2	
Asbestos		Friable asbestos detected in the soil samples								Special (Asbestos) Waste
Arsenic	Maximum	5	100	400	500	2,000	ND	5	20	General Solid Waste **
Cadmium	Maximum	<0.3	20	80	100	400	ND	1	4	General Solid Waste **
Chromium (IV)	Maximum	13*	100	400	1,900	7,600	ND	5	20	General Solid Waste **
Lead	Maximum	54	100	400	1,500	6,000	ND	5	20	General Solid Waste **
Mercury	Maximum	0.08	4	16	50	200	ND	0.2	0.8	General Solid Waste **
Nickel	Maximum	4.1	40	160	1,050	4,200	ND	2	8	General Solid Waste **
Total Petroleum Hydrocarbons										
C6-C9	Maximum	<20	650	2,600	650	2,600	NA	NA	NA	General Solid Waste **
C10-C36	Maximum	<110	10,000	40,000	10,000	40,000	NA	NA	NA	General Solid Waste **
Benzene	Maximum	<0.1	10	40	18	72	ND	0.5	2	General Solid Waste **
Toluene	Maximum	<0.1	288	1,152	518	2,073	ND	14.4	57.6	General Solid Waste **
EthylBenzene	Maximum	<0.1	600	2,400	1,080	4,320	ND	30	120	General Solid Waste **
Xylenes (Total)	Maximum	<0.3	1,000	4,000	1,800	7,200	ND	50	200	General Solid Waste **
Polycyclic Aromatic Hydrocarbons										
Benzo(a)pyrene (BaP)	Maximum	0.7	0.8	3.2	10	23	ND	0.04	0.16	General Solid Waste **
Total PAHs	Maximum	300	200	800	200	800	NA	NA	NA	Restricted Solid Waste
Organochlorine and Organophosphate Pesticides										
Endosulfan (total) [1]	Maximum	<0.5	60	240	108	432	ND	3	12	General Solid Waste **
Scheduled Chemicals [2]	Maximum	<50	<50	<50	<50	<50	NA	NA	NA	General Solid Waste **
Polychlorinated Biphenyls (PCB)	Maximum	<1	<50	<50	<50	<50	NA	NA	NA	General Solid Waste **

NOTES:

ND: Not Determined
NA: Not Applicable
TCLP: Toxicity Characteristic Leaching Procedure
1: Alpha, beta Endosulfan and Endosulfan Sulphate
2: Includes only Aldrin, Alpha BHC, Beta BHC, gamma BHC (Lindane), delta BHC, Chlordane, DDD, DDE, DDT, Dieldrin, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, HCB & Isodrin

CT1: Contaminant concentration for defining General Solid Waste (without TCLP)
CT2: Contaminant concentration for defining Restricted Solid Waste (without TCLP)
SCC1: Contaminant concentration for defining General Solid Waste when combined with TCLP
SCC2: Contaminant concentration for defining Restricted Solid Waste when combined with TCLP
TCLP1: Leachable concentration for defining General Solid Waste when combined with SCC1
TCLP2: Leachable concentration for defining Restricted Solid Waste when combined with SCC2
*: Total Chromium
**: Non-putrescible

APPENDIX K

UNEXPECTED FINDS MANAGEMENT PROTOCOL

GEOTECHNIQUE® PTY LTD

ABN 64 002 841 063

UNEXPECTED FINDS MANAGEMENT PROTOCOL

LOTS 2 & 3 IN DP1115877 AND PART LOT 3 IN DP942319 53A, 53B & 53 WARRIEWOOD ROAD, WARRIEWOOD

If unexpected finds and/or suspect materials (identified by unusual staining, odour, discolouration, or inclusions such as building rubble, asbestos sheeting/pieces/pipes, ash material, etc.) are encountered during any stage of future earthworks/site preparation, remediation, and demolition or between the sampling locations, the following actions are to be undertaken.

Management of unexpected finds and/or suspect materials
If unexpected finds and/or suspect materials are encountered:

- Works are to be ceased.
- An Environmental consultant is to be engaged to take appropriate sampling and testing of contaminants of potential concern at a nominated rate in accordance with current NSW EPA guidelines.
- If contamination is identified, the contaminated materials must be disposed of at an EPA licensed landfill facility with an appropriate waste classification.

Management of bonded asbestos containing material (ACM)
If ACM is encountered, the following measures are implemented:

- Engage a Class B Licence for bonded asbestos contractor.
- Removal of the asbestos waste must be carried out in accordance with the requirements of the regulators, such as SafeWork NSW and NSW EPA.
- Competent personnel or a SafeWork NSW Licensed Asbestos Assessor or a Professional Hygienist should be engaged to provide a clearance certificate.

Management of friable asbestos within the soil
It is recommended that the following measures are implemented if friable asbestos is encountered:

- Engage a Class A licensed contractor for friable asbestos
- Removal of the asbestos waste must be carried out in accordance with the requirements of the regulators, such as SafeWork NSW and NSW EPA
- A SafeWork NSW Licensed Asbestos Assessor or a Professional Hygienist must be engaged to provide a clearance certificate

APPENDIX L

ENVIRONMENTAL NOTES

IMPORTANT INFORMATION REGARDING YOUR ENVIRONMENTAL SITE ASSESSMENT

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

REASONS FOR AN ENVIRONMENTAL ASSESSMENT

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

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

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

ENVIRONMENTAL SITE ASSESSMENT LIMITATIONS

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

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

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

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

ENVIRONMENTAL SITE ASSESSMENT FINDINGS ARE PROFESSIONAL ESTIMATES

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

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

STABILITY OF SUB-SURFACE CONDITIONS

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

ENVIRONMENTAL SITE ASSESSMENTS ARE PERFORMED FOR SPECIFIC PURPOSES AND CLIENTS

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

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

MISINTERPRETATION OF ENVIRONMENTAL SITE ASSESSMENTS

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

LOGS SHOULD NOT BE SEPARATED FROM THE REPORT

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

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

READ RESPONSIBILITY CLAUSES CLOSELY

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