



ENGEO Limited

8 Greydene Place, Takapuna, Auckland 0622

PO Box 33-1527, Takapuna, Auckland 0740

T: +64 9 972 2205

www.engeo.co.nz



Project Number 18670.000.001

Combined Preliminary and Detailed Site Investigation

76 - 80 Great South Road, Newmarket,
Auckland

Submitted to:
Dilworth Trust Board
2 Erin Street
Epsom
Auckland 1051

Contents

1 Introduction 4

2 Background 4

3 Objectives of the Assessment 5

4 Site Description 5

5 Site History 6

 5.1 Auckland Council Site Contamination Enquiry 6

 5.2 Auckland Council Property File Review 7

 5.3 Historical Aerial Photograph Review 7

6 Current Site Conditions 8

7 Ground Conditions 9

8 Potential HAIL Activities 9

9 Site Investigation 10

 9.1 Quality Assurance and Quality Control 12

 9.2 Investigation Criteria 12

10 Soil Analysis Results 13

 10.1 Summary of Soil Results 13

11 Conceptual Site Model 13

12 Conclusion 14

13 Recommendations 15

14 Limitations 16

15 References 17

Tables

Table 1:	Site Information
Table 2:	Site Setting
Table 3:	Historical Aerial Photograph Summary
Table 4:	April 2021 Site Walkover Observations
Table 5:	Potential Contaminants
Table 6:	Summary of Soil Samples Collected and Requested Analyses
Table 7:	Conceptual Site Model

Appendices

Appendix 1:	Development Plans
Appendix 2:	Site Contamination Enquiry Response
Appendix 3:	Historical Aerial Photographs
Appendix 4:	Results Summary
Appendix 5:	Laboratory Reports

ENGEO Document Control:

Report Title	Combined Preliminary and Detailed Site Investigation - 76 - 80 Great South Road, Newmarket			
Project No.	18670.000.001	Doc ID	03	
Client	Dilworth Trust Board	Client Contact	Kirsten Andrews	
Distribution (PDF)	Dilworth Trust Board			
Date	Revision Details / Status	Author	Reviewer	WP
06/04/2022	Issued to Client	TP	EM	DF

1 Introduction

ENGEО Ltd was requested by Dilworth Trust Board to undertake a combined preliminary and detailed site investigation of the property at 76 - 80 Great South Road, Newmarket, Auckland (herein referred to as 'the site'). This work has been carried out in accordance with our signed agreement, dated 17 March 2022. The purpose of the assessment was to support your resource consent application for redevelopment at the site.

The site is to be redeveloped for a mixture of commercial and high-density residential (apartments) land use. We have been provided with the WIP Architectural Plan Set by Jasmax Limited reference 220210 and dated 18 March 2022 (Appendix 1). The plan set shows two eight-storey buildings identified as the 'Great South Road' and "Mauranui" buildings, with paved and grassed areas surrounding the buildings and perimeter of the site.

We have also been provided with the WIP Concept Structural Plan Set prepared by Enovate Limited referenced 21-055 and dated January 2022 (Appendix 1), indicating a proposed basement structure for the 'Mauranui' building. No cut and fill plans have yet been provided.

2 Background

ENGEО has previously undertaken a due diligence assessment at 70 – 80 Great South Road, Newmarket, Auckland (ENGEО, 2021). The investigation involved a review of available environmental information, including former reports, historical aerial photographs and a site contamination enquiry. The investigation identified land uses included on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL; MfE, 2011a). Due to the identification of potential HAIL activities on-site, testing of exposed soil was recommended to assess whether consent for redevelopment works were required. As such, this Preliminary / Detailed Site Investigation (PSI / DSI) was undertaken to support the resource consent application for site redevelopment.

This combined Preliminary and Detailed Site Investigation (PSI / DSI) is intended to satisfy the requirements of the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulation 2011, herein referred to as the "NES" (NES, 2011). The investigation provides information regarding the presence of land contaminants that pose a potential human health risk to future site users and site redevelopment workers during earthworks and construction. The results of this investigation have been used to evaluate whether remediation is necessary prior to site redevelopment, and to assess resource consents required under the NES.

The investigation also addresses the requirements of regional regulations covering discharges to the environment from contaminated sites during and post-redevelopment works; namely, the Auckland Unitary Plan Operative in part – 15 November 2016 (herein referred to as the AUP; AC, 2016).

The investigation was undertaken in general accordance with;

- Ministry for the Environment's Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand (MfE, 2021a), and;
- Ministry for the Environment's Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Site Soils (MfE, 2021b).

3 Objectives of the Assessment

The PSI component of the work comprised a review of the site information gathered during the previous due diligence assessment (ENGEO, 2021).

The DSI was an intrusive investigation, and was undertaken to assess:

- The type, extent and level of contamination within the proposed development site.
- Whether contaminants of concern identified present an unacceptable risk to human health or identified environmental receptors.
- Disposal options for the potentially impacted soil that may be required to be removed from site during development.
- Whether the soils remaining on-site are suitable for the proposed end use.

The soil sampling locations were positioned to target areas on-site where activities listed on the HAIL (MfE, 2011a) may have been historically and / or are currently present at the site. Further details of the scope of works are provided in Sections 8 and 9.

4 Site Description

Site information is summarised in Table 1, and the site setting is summarised in Table 2.

Table 1: Site Information

Item	Description
Site Description	80 Great South Road (central and eastern portion) is occupied by two, two-storey commercial buildings set-out in an 'L' shaped configuration across the property, with paved areas for accessways and carparking. 76 Great South Road (western portion of the site) comprised an apartment building – which has been since been demolished.
Legal Description	Lot 42 Deeds Reg 976, and; Lot 1 DP 119624
Current Land Use	Motel and apartment building (now demolished)
Proposed Land Use	Mixed commercial and residential
Site Area	4,173 m ²
Territorial Authority	Auckland Council

Table 2: Site Setting

Item	Description
Topography	The site is generally flat.
Local Setting	The site is located in a Mixed Use Business Zone in Newmarket, Auckland.
Nearest Surface Water & Use	A tributary of Hobson Bay is located approximately 700 meters (m) to the north of the site.
Geology (GNS, 2022)	GNS maps the site as underlain by Auckland Basalt tuffs of the Auckland Volcanic field, comprising; <i>comminuted pre-volcanic materials with basaltic fragments, and unconsolidated ash and lapilli deposits.</i>
Hydrogeology	No groundwater was identified during the investigation. New Zealand Geotechnical Database (NZGD) contains a former borehole investigation on-site (2020) indicating groundwater was at approximately 8 meters below ground level (m bgl). Additionally, ENGEO undertook an assessment of groundwater as part of the geotechnical investigation (ENGEO, 2022), indicating on-site piezometers were dry (down to 8 m bgl at one location).

5 Site History

ENGEO obtained and reviewed available environmental and geological information relevant to the site, including geological maps, historical aerial photographs, certificates of title and the Auckland Council property files. Historical site information obtained during review of this information is summarised in this section.

5.1 Auckland Council Site Contamination Enquiry

The Site Contamination Enquiry (SCE) response provided by Auckland Council was received on 6 April 2021 (Appendix 2). In preparing the response, the former Auckland Regional Council and current databases were searched for records of closed landfills, bores, air discharges, industrial and trade process consents, contaminated site discharge consents and environmental assessment within approximately 200 meters of the site. The following items included in Council's response were considered potentially relevant to the investigation:

- 02/06/2017 – Consent was issued to authorise the discharge of stormwater from a refuelling facility at 7 Mauranui Avenue with stormwater from refuelling areas being discharged via a stormwater treatment device.

The cover letter of the response notes that no contamination information is held within Council records. However, due to the age of the structures on-site, there is potential for asbestos and / or lead based paint to have been used in the building materials.

5.2 Auckland Council Property File Review

ENGEO were provided property files for the lots comprising the site as part of the due diligence assessment (ENGEO, 2021). The information reviewed in these files primarily contained consent applications for the construction of, or additions to, the existing site buildings. No information was reviewed in these documents related to potential sources of contamination at the site.

5.3 Historical Aerial Photograph Review

Aerial photographs dating from 1940 to 2017 have been reviewed and are included in Appendix 3 for reference. The aerials were sourced from Auckland Council GeoMaps and Retrolens. Relevant visible features on the site and surrounding area are summarised in Table 3 below.

Table 3: Historical Aerial Photograph Summary

Date	Description
1940	The site is comprised of residential lots with single-family dwellings. The surrounding area is generally residential land. Great South Road is present to the southwest and the NIMT rail line is present to the northeast. Dilworth School grounds can be observed to the south, across Great South Road
1951	No significant changes to the site or surrounding area observed.
1961	A tennis court has been constructed in the northeast portion of 80 Great South Road.
1967	Mauranui Avenue is present between the site and the NIMT rail line. The Southern Motorway has been constructed to the north of the rail line.
1972	No significant changes to the site or surrounding area observed.
1979-81	A motel building has been constructed adjacent to the western boundary of 76 Great South Road. The dwelling at 76 Great South Road has been removed and replaced with an apartment building and carpark.
1986	The dwelling in the southern portion of 80 Great South Road has been removed.
1996	<i>Poor image quality – two motel buildings have been constructed on 80 Great South Road. Due to poor image quality, this aerial photograph has not been included in the appendix.</i>
2001 – 2012	No significant changes to the site or surrounding area observed.
2017	The Dilworth Footbridge has been constructed over the Southern Motorway to the northeast of 80 Great South Road.

6 Current Site Conditions

A site walkover was completed by ENGEO on 19 April 2021 as part of the due diligence assessment (ENGEO, 2021). Observations of activities and conditions present at the site are summarised in Table 4.

Table 4: April 2021 Site Walkover Observations

Site Conditions	Comments
Surface Water Appearance	Surface water was not observed during the walkover or investigation.
Current Surrounding Land Use	The current surrounding land use comprises a motel to the west, rail line to the north, a medical facility to the west, and Dilworth School grounds to the south (across Great South Road).
Local Sensitive Environments	None observed in the immediate vicinity of the site.
Visible Signs of Plant Stress	No plant stress observed during the site walkover.
Ground Cover	The ground cover is primarily asphalt / concrete. Minimal areas of exposed soil are present on-site, near the site boundaries.
Potential for On – Or – Off – Site Migration of Contaminants	Auckland Council Geomaps indicates there is an overland flow path (OVFP) present in the northern portion of the site. There is potential for contaminants to migrate on / off-site via this OVFP.
Visible Signs of Contamination	Debris and weathered paints were observed at 76 Great South Road. Weathered lead-based paints have the potential to contaminate the surrounding soils.
Significant Observations / Additional Comments	<p>Potential Asbestos Containing Material (PACM) was observed within building material at 80 Great South Road – primarily in the building soffits and external walls. The shed in the northern corner of 80 Great South Road was observed to contain PACM sheets.</p> <p>Given the urban site setting, including nearby commercial / industrial properties, adjacent high-traffic road, nearby rail line and motorway, there is potential for accumulation of contaminants such as heavy metals and polycyclic aromatic hydrocarbons (PAHs) in site soil from urban run-off.</p> <p>Fill material has been identified within ENGEO's geotechnical investigation (ENGEO, 2022), extending to a maximum depth of 0.6 meters below ground level (m bgl). Further details on this material is provided in Section 11.</p>

7 Ground Conditions

ENGEO performed a geotechnical investigation concurrent with the environmental investigation. A conceptual ground model is presented in Appendix 7 of ENGEO's geotechnical report (ENGEO, 2022), the investigation findings are broadly consistent with the published geology and are summarised as follows:

- The site is veneered with a surficial layer of topsoil to depths ranging from 0.10 m to 0.30 m bgl in gardened and lawn areas across the site.
- Existing fill was encountered in all investigations both beneath grassed and paved areas. Fill generally comprised a stiff to hard silt, with the exception of hardfill which was observed in 76 Great South Road where buildings were recently demolished. Cohesive fill is volcanic in origin indicating materials are likely locally sourced. No evidence of potential contamination was observed in this fill material. Depth of fill ranged from 0.3 m to 1.2 m bgl.
- Auckland Volcanic Field (AVF) Tuff underlies the surficial fill from 0.3 m to 4.6 m bgl.
- AVF Basalt was encountered across the entire site, the upper surface ranging from 2.2 m to 5.2 m bgl. Based on surrounding boreholes, (Section 4.3) the basalt is inferred to be in the order of 20 m+ thick.

8 Potential HAIL Activities

Activities included on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL; MfE, 2011a) trigger the requirement for an intrusive contaminated land investigation (DSI) prior to redevelopment. Based on the information reviewed as part of this PSI, the following activity listed on the HAIL may have been historically and / or is currently present at the site:

- **HAIL ID I: Any other land that may have been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment**
 - If lead-based paints and / or asbestos products have been used on site buildings, surrounding site soils have the potential to contain associated contaminants (i.e. lead and asbestos).
 - Potential for contamination associated with urban run-off (e.g. PAHs).

Given the identification of these potentially hazardous activities on-site, further intrusive works were recommended to assess if the site is suitable for the proposed end land use.

The potential contaminants of concern identified based on the findings of the PSI component of this investigation are summarised in Table 5.

Table 5: Potential Contaminants

Potential Source of Contamination	Primary Contaminants of Concern	Possible Extent of Contamination	HAIL Activity
Buildings containing lead-based paints in a weathered condition	Lead	Shallow soil surrounding site buildings	Category I
Buildings containing asbestos products in a weathered condition	Asbestos	Shallow soil surrounding site buildings	Category I
Contamination associated with urban run-off	Heavy metals / metalloids and polycyclic aromatic hydrocarbons (PAHs)	Shallow soil	Category I

9 Site Investigation

ENGEO attended site on 25 January 2022 to undertake the intrusive investigation. As previously discussed, at the time of sampling the building at 76 Great South Road had been demolished. A walkover of the former building footprint was performed – the area is covered in hardfill and no evidence of contamination was observed (e.g. asbestos containing building material).

The investigation involved the collection of shallow soil samples from nine location across the site. Samples were collected from the surface to a maximum depth of 0.5 meters below ground level (m bgl). A sub-set of samples were analysed for lead, polycyclic aromatic hydrocarbons (PAHs) and asbestos (semi-quantitative).

One sample of building material was collected (BM1) from the southern portion of the site, adjacent to sample location S09.

Table 6 provides a summary of the soil samples analysed. Refer to attached Figure 1 for sample locations.

Table 6: Summary of Soil Samples Collected and Requested Analyses

Sample ID	Sample Depth (m bgl)	Sampling Rationale	Requested Analyses
S01	0.1	Potential contamination from adjacent buildings and urban run-off.	Lead, PAHs and asbestos.

Sample ID	Sample Depth (m bgl)	Sampling Rationale	Requested Analyses
S02	0.1	Potential contamination from adjacent buildings (near shed containing PACM sheets observed during walkover; however no PACM was observed in shed during sampling).	Lead and asbestos.
S03	0.1	Potential contamination from adjacent buildings (near shed containing PACM sheets observed during walkover; however no PACM was observed in shed during sampling).	Lead and asbestos.
	0.25	<i>Not analysed – put on ‘cold hold’ at laboratory.</i>	
S04	0.1	Potential contamination from adjacent buildings and urban run-off.	Lead, PAHs and asbestos.
	0.2	<i>Not analysed – put on ‘cold hold’ at laboratory.</i>	
S05	0.0 – 0.1	Potential contamination from former buildings.	Lead and asbestos.
S06	0.0 – 0.2	Potential contamination from former buildings and urban run-off.	Lead, PAHs and asbestos.
	0.4 – 0.5	<i>Not analysed – put on ‘cold hold’ at laboratory.</i>	
S07	0.0 – 0.15	Potential contamination from former buildings.	Lead and asbestos.
S08	0.2 – 0.4	Potential contamination from adjacent buildings and urban run-off.	Lead, PAHs and asbestos.
S09	0.0 – 0.1	Potential contamination from adjacent buildings (collected near BM1).	Lead and asbestos.
BM1 (building material sample potentially containing asbestos)	Surface	<i>Not analysed – presumed to be asbestos containing.</i>	

The following was undertaken during the investigation:

- Soil samples were screened for visual and olfactory evidence of contamination.
- Samples were compressed directly into laboratory supplied containers using a new pair of nitrile gloves for each sample. Prior to sampling, the equipment was decontaminated using a triple wash procedure with potable water, Decon 90 solution and deionised water.
- Samples were placed directly into a cooled container prior to transport to Eurofins under ENGEO standard chain of custody.
- Fieldwork and sampling was undertaken in general accordance with the procedures for the appropriate handling of potentially contaminated soils as described in the MfE Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils (MfE, 2021b).

9.1 Quality Assurance and Quality Control

The quality assurance / quality control (QA / QC) procedures undertaken during the works included:

- The used of standard sample registers and chain of custody records for all samples collected.
- Each soil sample was given a unique identification number.
- Sampling equipment was decontaminated using the triple wash method (as previously stated) between each sample location.
- Eurofins are accredited by International Accreditation New Zealand (IANZ) for analyses performed. Additionally, Eurofins are accredited to AS-4694-2.4: *Method for the Qualitative Identification of Asbestos in Bulk Storage* for the analysis of suspected asbestos in soil samples, and to the international standards NZ ISO/IEC 17205:2-5 *General requirements for the competence testing and calibration laboratories* in accordance with The Building Research Association New Zealand (BRANZ) Guidelines for Assessing and Managing Asbestos in Soil.

9.2 Investigation Criteria

Human Health Criteria

The human health criteria referenced in this report were selected from the NES (NES, 2011). Development plans indicate the site is to be used for mixed residential and commercial purposes. Therefore, the Soil Contaminant Standard (SCS) for high-density residential and commercial / industrial land use were selected for comparison to site data.

For contaminants where human health criteria were not available in the NES, criteria were sourced in accordance with the MfE's Contaminated Land Management Guidelines No.2: Hierarchy and Application in New Zealand of Environmental Guideline Values (MfE, 2011b).

Environmental Discharge Criteria

In the Auckland region, potential discharges to the environment from land containing elevated levels of contaminants are managed through the AUP (AC, 2016), operative in part on 15 November 2016. Therefore, the Auckland Council permitted activity criteria referenced in this report were adopted from the AUP.

Background Criteria

The soil analysis results have also been compared to the background concentrations for volcanic soils in the Auckland region (AC, 2001). This comparison allows for further assessment of consenting requirements under the NES and provides information regarding disposal options for excess spoil.

10 Soil Analysis Results

Appendix 4 (Table A) compares soil contaminants concentrations in the samples tested with the adopted investigation criteria. Full analytical laboratory reports are included in Appendix 5.

10.1 Summary of Soil Results

A summary of the chemical and asbestos testing results is provided below.

- No exceedances of the adopted human health criteria were detected.
- Lead was detected at one location (S07) in excess of the environmental discharge criterion.
- Polycyclic aromatic hydrocarbons (PAHs) were detected in three of the four samples analysed. As PAHs are not naturally occurring, any detection is considered an exceedance of regional background criteria.
- Asbestos was not detected.

11 Conceptual Site Model

A conceptual site model has been developed to assess the potential exposure pathways present at the site. A contamination conceptual site model consists of three primary components. For a contaminant to present a risk to human health or an environmental receptor, all three components are required to be present and connected. The three components of a conceptual site model are:

- Source of contamination.
- An exposure route, where the receptor and contaminants come into contact (e.g. ingestion, inhalation, dermal contact).
- Receptor(s) that may be exposed to the contaminants.

The potential source, pathway, receptor linkages at this subject site are provided in Table 7.

Table 7: Conceptual Site Model

Source	Exposure Pathway	Potential Receptor	Acceptable Risk
Buildings containing lead-based paints in a weathered condition	Soil ingestion, inhalation of dust, and / or dermal contact	Site redevelopment workers Future site users	Yes Contaminant concentrations were below the adopted human health criteria
	Leaching of contaminants	Surrounding environment	No – in limited areas Lead concentrations were detected in excess of the environmental discharge criteria in one sample (S07)
Buildings containing asbestos products in a weathered condition	Soil ingestion, inhalation of dust, and / or dermal contact	Site redevelopment workers Future site users	Yes Asbestos was not detected in soil samples.
Contamination associated with urban run-off	Soil ingestion, inhalation of dust, and / or dermal contact	Site redevelopment workers Future site users	Yes Contaminant concentrations were below the adopted human health criteria
	Leaching of contaminants	Surrounding environment	Yes Contaminant concentrations were below the environmental discharge criteria

12 Conclusion

ENGEO was engaged to undertake a combined Preliminary and Detailed Site Investigation (PSI / DSI) on the property at 76 - 80 Great South Road, Newmarket, Auckland. The desktop component of the site identified the following potential HAIL land use:

HAIL ID 1: Any land that has been subject to the accidental or intentional release of a substance in sufficient quantity that it could be a risk to human health or the environment.

- If lead-based paints and / or asbestos products have been used on site buildings, surrounding site soils have the potential to contain associated contaminants (i.e. lead and asbestos).
- Potential for contamination associated with urban run-off (i.e. PAHs).

Due to the identification of a potential HAIL land use on-site, an intrusive investigation was undertaken (DSI).

The results of the laboratory analysis indicate that lead is present on-site in excess of the environmental discharge criteria. This elevated lead concentration was detected at only one location. It is possible that additional locations of elevated lead are present in shallow soils on site; however, they are expected to be limited to garden areas exposed to surface deposition of lead (e.g. from lead based paints) while the buildings were in-place.

PAHs are also present on-site, and, as they are not naturally occurring, represent an exceedance of background criteria (i.e. not “cleanfill” by AUP’s definition).

Due to contaminant concentrations on-site being below the adopted human health criteria, no remedial works to address human health exceedances are required. Future land development is likely to be considered a controlled activity under Regulation 9 of the NES (assuming the area of soil disturbance and soil disturbance volumes do not meet the permitted activity requirements of Regulation 8(1) to 8(3)).

Although lead has been identified on-site in excess of the regional environmental discharge criterion, a short-term environmental discharge consent is unlikely to be required under the AUP for soil disturbance at the site as the volume of contaminated material is expected to be below the permitted activity threshold of 200 m³.

The presence of contaminants above the regional background levels indicates excess surface soil generated during earthworks cannot be considered “cleanfill” for disposal purposes or reused at another earthworks site (AC, 2016). Note that it is likely that deeper soil may be classified as cleanfill; however, additional testing prior to or as part of redevelopment works is required to confirm this.

13 Recommendations

Based on the results of this investigation, the following is recommended:

Asbestos removal works (site buildings)

Asbestos demolition surveys should be performed prior to any demolition or removal works on the site or immediate surrounds (i.e. fences). Asbestos containing materials must be removed in accordance with national legislation to prevent contamination of site soils if these materials are to be disturbed.

Site Management Plan

Prepare a Site Management Plan (SMP) prior to earthworks. The SMP will outline controls to be implemented to manage the risk to human health and the environment during soil disturbance due to the presence of contaminants in soil above regional background levels. The SMP will also include procedures to stop work in the event of an unexpected contamination find and contact a contaminated land specialist for advice.

Completion Reporting

Auckland Council may require a summary of works report be prepared at the completion of earthworks. If soil is removed from the site, the summary of works report shall include evidence of appropriate disposal. The summary of works report may also include validation testing that allows council to update its records of the contamination status of the site, though this is not required.

14 Limitations

- i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Dilworth Trust Board, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.
- ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.
- iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.
- iv. This Limitation should be read in conjunction with the Engineering NZ/ACENZ Standard Terms of Engagement.
- v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (09) 972 2205 if you require any further information.

Report prepared by



Tyler Paterson

Environmental Scientist

Report reviewed by



Erika McDonald, CMEngNZ

Principal Environmental Engineer

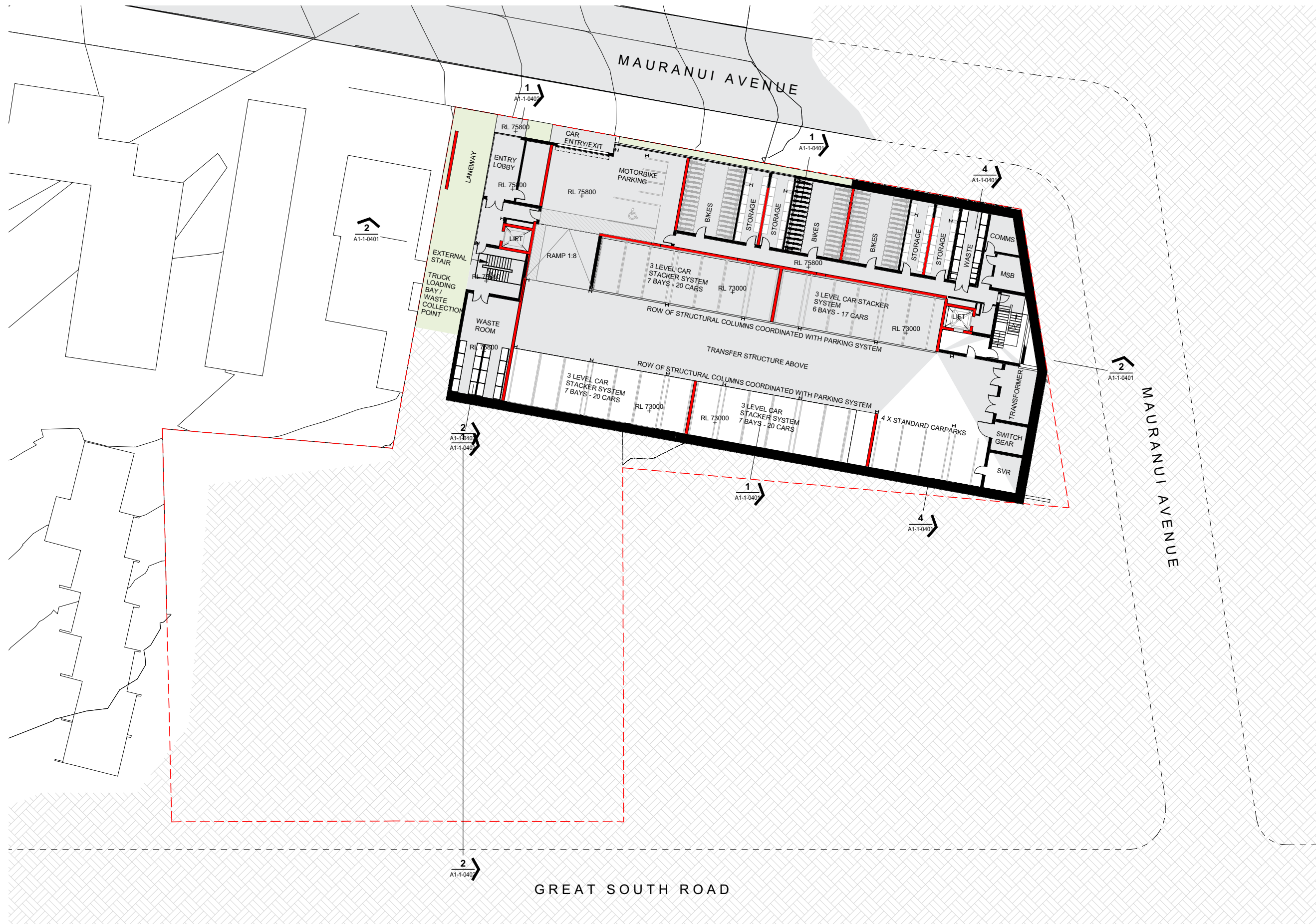
15 References

- AC, 2001. Auckland Regional Council. (2001). Background Concentrations of Inorganic Elements in Soils from the Auckland Region, Auckland Regional Council, Technical Publications No. 153.
- AC, 2016. Auckland Regional Council. (2016). The Auckland Unitary Plan (Operative in Part) notified 15 November 2016.
- ENGEO, 2022. ENGEO Limited. (2022). Geotechnical Investigation Report – 76 & 80 Great South Road, Newmarket, Auckland (report reference 18670.000.001_02).
- ENGEO, 2021. ENGEO Limited. (2021). Environmental Due Diligence Assessment – 70-80 Great South Road, Newmarket, Auckland (report reference 18670.000.001_01).
- GNS, 2022. Institute of Geological and Nuclear Sciences Limited. (2022). Map 1;250,000.
- MfE, 2021a. Ministry for the Environment. (2021). Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand (revised 2021).
- MfE, 2021b. Ministry for the Environment. (2021). Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils (Revised 2021).
- MfE, 2011a. Ministry for the Environment. (2011). Hazardous Activities and Industries List (HAIL).
- MfE, 2011b. Ministry for the Environment. (2011). Contaminated Land Management Guidelines No.2: Hierarchy and Application in New Zealand of environmental guideline values.
- NES, 2011. The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations (2011).



APPENDIX 1:
Development Plans

RESERVED SPACE
COUNCIL
BC STAMP



Revisions

Notes

If there are any discrepancies in the documents please seek clarification before proceeding with any work.
No building work shall proceed until Building Consent has been granted for the work described.

JASMAX

Client
Dilworth Property Trust

Consultant Team

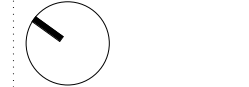
Project Number: 220210

Project Stellar

Enter address here

Sheet
SITEWIDE PLAN - LEVEL B1

SCALE @ A1= 1 : 200



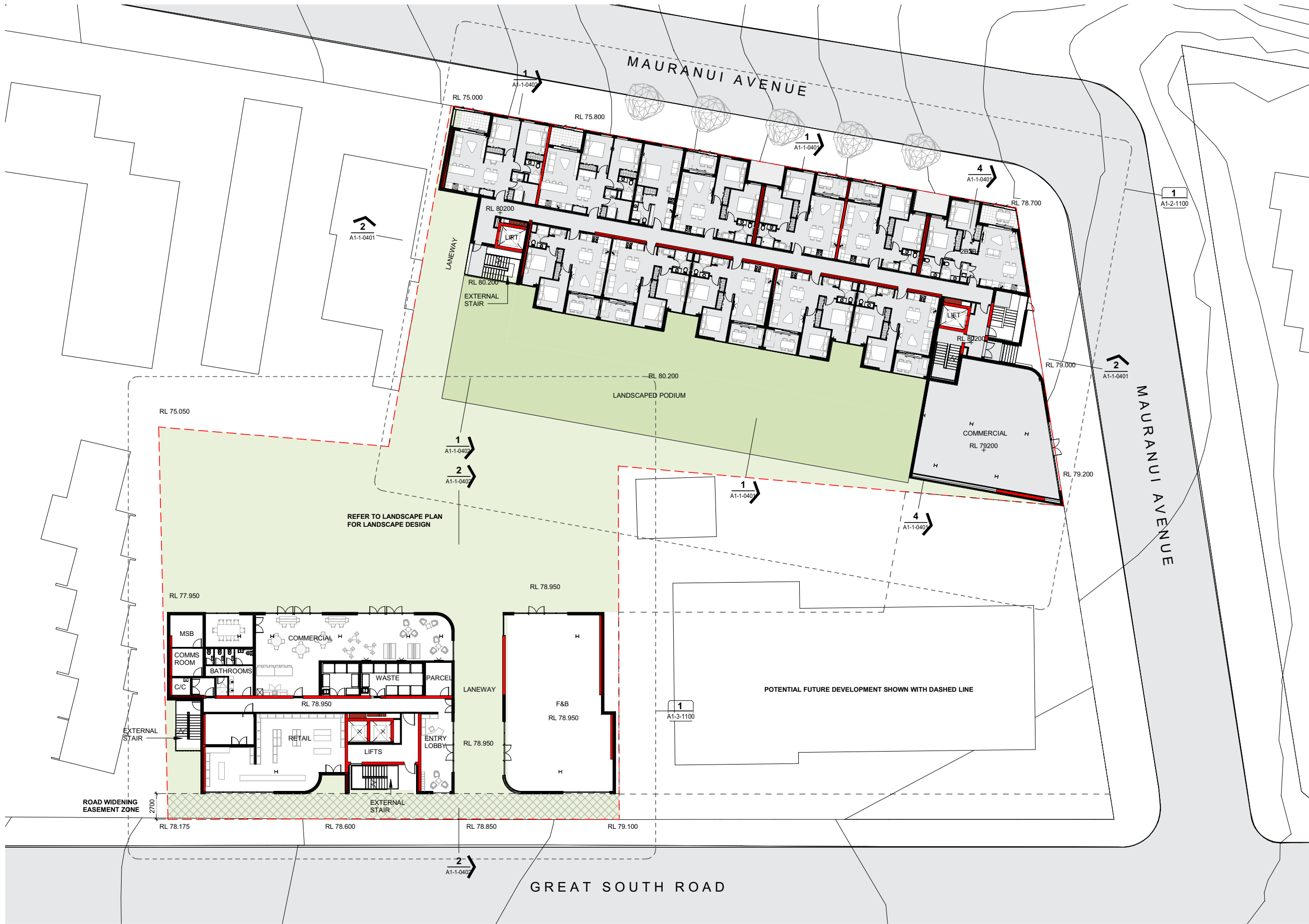
ARCHITECTURAL

Drawing Number
Revision
A1-1-0099

WORK IN PROGRESS:
ISSUED FOR INFORMATION ONLY
18/03/2022 4:48:14 pm

DO NOT SCALE OFF THIS DRAWING
CONTRACTOR MUST VERIFY ALL DIMENSIONS
ON SITE BEFORE COMMENCING ANY WORK
COPYRIGHT © JASMAX

RESERVED SPACE
COUNCIL
BC STAMP



Revisions

Notes

If there are any discrepancies in the documents please seek clarification before proceeding with any work.
No building work shall proceed until Building Consent has been granted for the work described.

JASMAX

Client
Dilworth Property Trust

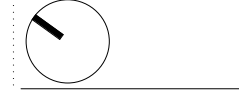
Consultant Team

Project Number: 220210

Project Stellar
Enter address here

Sheet
SITEWIDE PLAN - LEVEL 00

SCALE @ A1= 1 : 200



ARCHITECTURAL
Drawing Number Revision
A1-1-0100

WORK IN PROGRESS:
ISSUED FOR INFORMATION ONLY
18/03/2022 4:48:34 pm

DO NOT SCALE OFF THIS DRAWING
CONTRACTOR MUST VERIFY ALL DIMENSIONS
ON SITE BEFORE COMMENCING ANY WORK
COPYRIGHT © JASMAX

RESERVED SPACE
COUNCIL
BC STAMP

Revisions

Notes

If there are any discrepancies in the documents please seek clarification before proceeding with any work.
No building work shall proceed until Building Consent has been granted for the work described.

JASMAX

Client
Dilworth Property Trust

Consultant Team

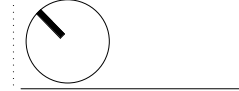
Project Number: 220210

Project Stellar

Enter address here

Sheet
SITEWIDE PLAN -
LEVEL 01-07 TYPICAL

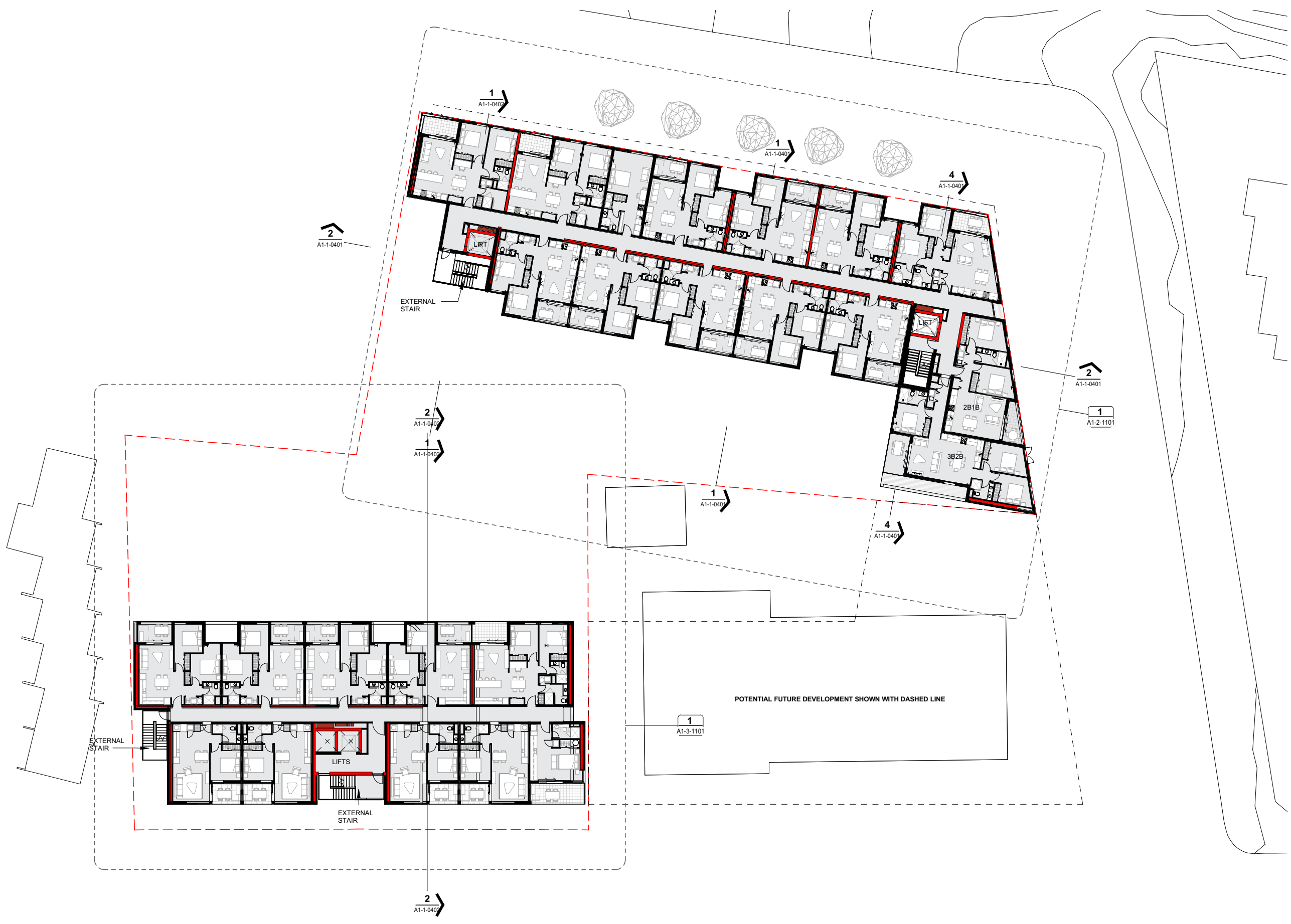
SCALE @ A1= 1 : 200



ARCHITECTURAL

Drawing Number Revision
A1-1-0101

DO NOT SCALE OFF THIS DRAWING
CONTRACTOR MUST VERIFY ALL DIMENSIONS
ON SITE BEFORE COMMENCING ANY WORK
COPYRIGHT © JASMAX



WORK IN PROGRESS:
ISSUED FOR INFORMATION ONLY
18/03/2022 4:48:53 pm

RESERVED SPACE
COUNCIL
BC STAMP



Revisions

Notes

If there are any discrepancies in the documents please seek clarification before proceeding with any work.
No building work shall proceed until Building Consent has been granted for the work described.

JASMAX

Client
Dilworth Property Trust

Consultant Team

Project Number: 220210

Project Stellar

Enter address here

Sheet
SITEWIDE PLAN - LEVEL 08

SCALE @ A1= 1 : 200



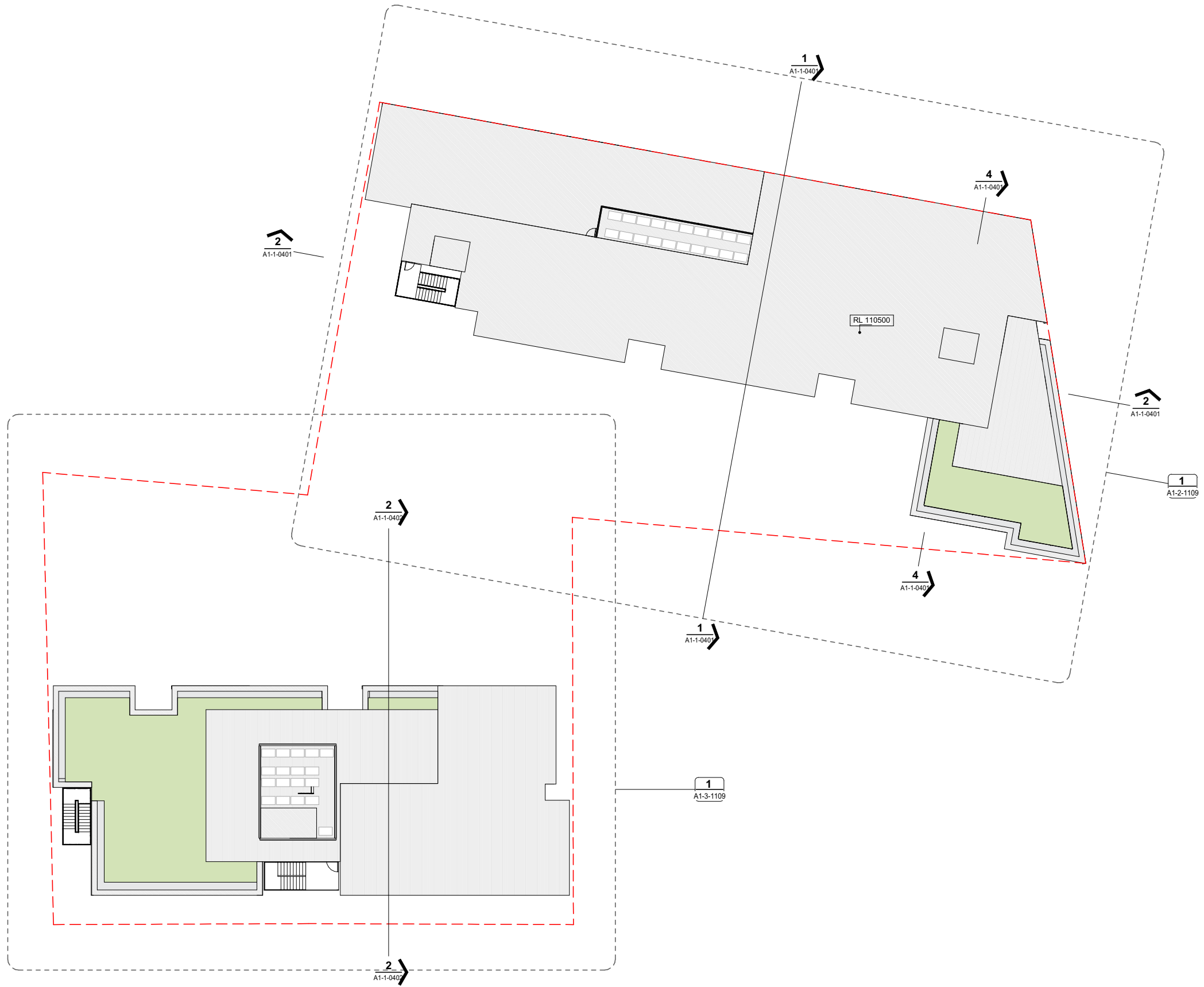
ARCHITECTURAL

Drawing Number Revision
A1-1-0108

WORK IN PROGRESS:
ISSUED FOR INFORMATION ONLY
18/03/2022 4:49:11 pm

DO NOT SCALE OFF THIS DRAWING
CONTRACTOR MUST VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING ANY WORK
COPYRIGHT © JASMAX

RESERVED SPACE
COUNCIL
BC STAMP



Revisions

Notes

If there are any discrepancies in the documents please seek clarification before proceeding with any work.
No building work shall proceed until Building Consent has been granted for the work described.

JASMAX

Client
Dilworth Property Trust

Consultant Team

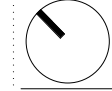
Project Number: 220210

Project Stellar

Enter address here

Sheet
SITEWIDE PLAN - ROOF

SCALE @ A1= 1 : 200



ARCHITECTURAL

Drawing Number Revision
A1-1-0109

**WORK IN PROGRESS:
ISSUED FOR INFORMATION ONLY**
18/03/2022 4:49:27 pm

DO NOT SCALE OFF THIS DRAWING
CONTRACTOR MUST VERIFY ALL DIMENSIONS
ON SITE BEFORE COMMENCING ANY WORK
COPYRIGHT © JASMAX

APPENDIX 2: Site Contamination Enquiry Response

6 April 2021

ENGEO Limited
8 Greydene Place
AUCKLAND 0622
Attention: Tyler Paterson

Dear Tyler

Site Contamination Enquiry – 70, 76, & 80 Great South Road, Remuera

This letter is in response to your enquiry requesting available site contamination information within Auckland Council records for the above site. Please note this report does not constitute a site investigation report; such reports are required to be prepared by a (third-party) Suitably Qualified and Experienced Practitioner.

The following details are based on information available to the Contamination, Air & Noise Team in the Resource Consent Department. The details provided may be from former regional council information, as well as property information held by the former district/city councils. For completeness the relevant property file should also be requested to obtain all historical records and reports via 09 3010101 or online at:

<https://www.aucklandcouncil.govt.nz/buying-property/order-property-report/Pages/order-property-file.aspx>.

1. Hazardous Activities and Industries List (HAIL) Information

This list published by the Ministry for the Environment (MfE) comprises activities and industries that are considered likely to cause land contamination as a result of hazardous substance use, storage, and/or disposal.

Records indicate the site 70 Great South Road, Remuera, has been utilised for the manufacture of methamphetamine. The affected building has since been declared safe for use.

There is no contamination information held within Council's records for the sites 76 & 80 Great South Road, Remuera.

Due to the age of the structures on these sites, the potential for asbestos and/or lead paint may need to be considered.

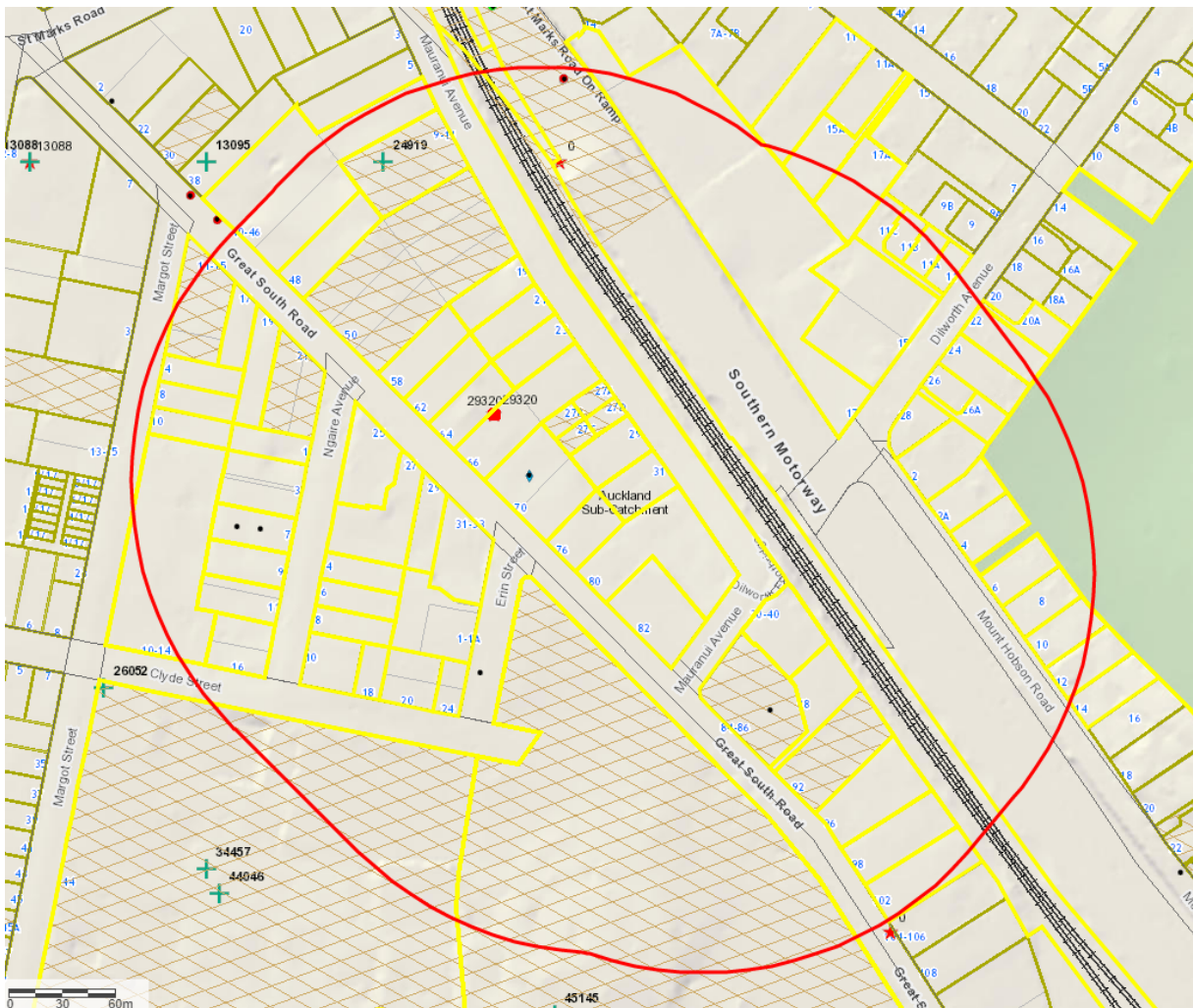
Please note:

- *If you are demolishing any building that may have asbestos containing materials (ACM) in it, you have obligations under the Health and Safety at Work (Asbestos) Regulations 2016 for the management and removal of asbestos, including the need to engage a Competent Asbestos Surveyor to confirm the presence or absence of any ACM.*
- *Paints used on external parts of properties up until the mid-1970's routinely contained lead, a poison and a persistent environmental pollutant. You are advised to ensure that soils affected by old, peeling or flaking paint are assessed in relation to the proposed use of the property, including high risk use by young children.*

2. Consents and Incidents Information (200m radius of the selected site)

The Council database was searched for records of the following activities within approximately 200 metres of the site:

- Pollution Incidents (including air discharges, oil or diesel spills)
- Bores
- Contaminated site and air discharges, and industrial trade process consents
- Closed Landfills
- Air quality permitted activities



Legend:

- | | |
|----------------------------|--|
| All Consents + | Closed Landfill (Auckland Council owned) □ |
| All Applications ■ | Closed Landfill (Privately owned) ■ |
| All Permitted Activities * | |
| All Bores ★ | |

Relevant details of any pollution incidents and consents are appended to this letter (Attachment A). Please refer to the column titled 'Property Address' on the spreadsheet to aid in identifying corresponding data on the map.

While the Auckland Council has carried out the above search using its best practical endeavours, it does not warrant its completeness or accuracy and disclaims any responsibility or liability in respect of the information. If you or any other person wishes to act or to rely on this information, or make any financial commitment based upon it, it is recommended that you seek appropriate technical and/or professional advice.

If you wish to clarify anything in this letter that relates to this site, please contact contaminatedsites@aucklandcouncil.govt.nz. Any follow up requests for information on other sites must go through the online order process.

Should you wish to request any of the files referenced above and/or listed in the attached spreadsheet for viewing, please contact the Auckland Council Call Centre on 301 0101 and note you are requesting former Auckland Regional Council records (the records department requires three working days' notice to ensure the files will be available).

Please note Auckland Council cost recovers officer's time for all site enquiries. As such an invoice for \$128 for the time involved in this enquiry will follow shortly.

Yours Sincerely,

**Contamination, Air and Noise Team
Specialist Unit | Resource Consents
Auckland Council**



APPENDIX 3:
Historical Aerial Photographs



1940 (Retrolens NZ)



1951 (Retrolens NZ)



1961 (Retrolens NZ)



1967 (Retrolens NZ)

Historical Aerial Photographs – 76-80 Great South Road, Newmarket, Auckland



1972 (Retrolens NZ)



1979-81 (Retrolens NZ)



1986 (Retrolens NZ)



2001 (Auckland Council GeoMaps)

Historical Aerial Photographs – 76-80 Great South Road, Newmarket, Auckland



2006 (Auckland Council GeoMaps)



2012 (Auckland Council GeoMaps)



2017 (Auckland Council GeoMaps)



APPENDIX 4:
Results Summary

Table A; Results Summary Table														
Sample Name	Samples Depth (m bgl)	Analyte Sample Date	Lead	Polycyclic Aromatic Hydrocarbons (mg/kg)									Asbestos (% w/w)	
				BaP EQ ⁸	Acenaphthene	Acenaphthylene	Anthracene	Benzo(g,h,i)perylene	Fluorene	Naphthalene	Phenanthrene	Pyrene	ACM	FA & AF
S01	0.1	26/01/2022	18	0.09	<0.03	<0.03	<0.03	0.05	<0.03	0.1	0.04	0.18	NAD	NAD
S02	0.1	26/01/2022	49	-	-	-	-	-	-	-	-	-	NAD	NAD
S03	0.1	26/01/2022	39	-	-	-	-	-	-	-	-	-	NAD	NAD
S04	0.1	26/01/2022	34	0.53	<0.03	<0.03	0.05	0.29	<0.03	<0.1	0.14	0.71	NAD	NAD
S05	0.1	26/01/2022	31	-	-	-	-	-	-	-	-	-	NAD	NAD
S06	0.0-0.2	26/01/2022	10	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	<0.1	<0.03	<0.03	NAD	NAD
S07	0.0-0.15	26/01/2022	<u>290</u>	-	-	-	-	-	-	-	-	-	NAD	NAD
S08	0.2-0.4	26/01/2022	25	0.24	<0.03	<0.03	0.05	0.11	<0.03	<0.1	0.05	0.55	NAD	NAD
S09	0.0-0.1	26/01/2022	44	-	-	-	-	-	-	-	-	-	NAD	NAD
Assessment Criteria														
Auckland Background Criteria – volcanic Soils ¹			< 5 - 65	< LOR	< LOR	< LOR	< LOR	< LOR	< LOR	< LOR	< LOR	< LOR	< LOR	< LOR
Commercial / Industrial Human Health Criteria ²			3,300	35	45,000 ⁴	NGV	230,000 ⁴	NGV	30,000 ⁴	230 ⁵	NA ⁷	NA ⁵	0.05 ⁹	0.001 ⁹
High-Density Residential Human Health Criteria ²			500	24	3,600 ⁴	NGV	18,000 ⁴	NGV	2,400 ⁴	69 ⁵	9,400 ⁷	1,600 ⁵	0.04 ⁹	0.001 ⁹
Environmental Discharge Criteria ³			250	20	NGV	NGV	NGV	NGV	NGV	NA ⁵	50 ⁶	NA ⁵	< LOR	< LOR

Full analytical laboratory reports are included in Appendix 5.

1. Background Concentrations of Inorganic Elements in volcanic range soils from the Auckland Region (Auckland Regional Council, 2001). Exceedances are **bold**.
2. Resource Management (National Environmental Standard for Assessing and managing Contaminants in Soil to Protect Human Health) Regulation 2012 (NES:CS). No exceedances detected.
3. Environmental discharge criteria from the AUP (AC, 2016). Exceedances underlined.
4. Criteria sourced from the USEPA Regional Screening Levels
5. Criteria sourced from TPH Guidelines (MfE, 1999). Assumed a silty clay soil type, depth of contamination <1 m, and depth of groundwater >4m (based on NZGD data of nearest borehole and ENGEO groundwater assessment). NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.
6. Criteria sourced from the Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. The criteria for phenanthrene is only applicable where the soil has the potential to impact fresh water bodies, the previous criterion of 50 mg/kg was used.
7. Criteria sourced from the MfE Guidelines for Assessing and Managing Contaminated Gassworks Sites in New Zealand (MfE, 1997). Table 4.2.7.4 (high-density residential) and Table 4.2.7.5 (commercial/industrial).
8. The benzo(a)pyrene equivalent (BaP EQ) is calculated using the concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, and indeno(1,2,3-c,d)pyrene. These individual results can be reviewed in the laboratory results, but they are not summarized in this table.
9. Criteria sourced from BRANZ, 2017. ACM: Asbestos Containing Material; FA & AF: Fibrous Asbestos and Asbestos Fines.

- sample not tested for analyte
 LOR laboratory limit of reporting
 NAD no asbestos detected

APPENDIX 5: Laboratory Reports

ENGEO Ltd
8 Greydene Place
Takapuna
Auckland New Zealand 0622



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

Attention: Erika McDonald
Report 860250-AID
Project Name GREAT SOUTH ROAD
Project ID 18670.000.001
Received Date Feb 03, 2022
Date Reported Feb 11, 2022

Methodology:

Asbestos Fibre Identification Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques.
NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.

Unknown Mineral Fibres Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity.
NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.

Subsampling Soil Samples The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) is employed.
NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.

Bonded asbestos-containing material (ACM) The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination. The resultant material is then further examined in accordance with AS 4964 - 2004.
NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.

Limit of Reporting The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w). The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence IANZ Accreditation does not cover the performance of this service (non-IANZ results shown with an asterisk).
NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos". This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.

Project Name GREAT SOUTH ROAD
Project ID 18670.000.001
Date Sampled Jan 26, 2022
Report 860250-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
S01 0.1	22-Fe04587	Jan 26, 2022	Approximate Sample 626g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No trace asbestos detected.
S02 0.1	22-Fe04588	Jan 26, 2022	Approximate Sample 681g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No trace asbestos detected.
S03 0.1	22-Fe04589	Jan 26, 2022	Approximate Sample 666g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No trace asbestos detected.
S04 0.1	22-Fe04590	Jan 26, 2022	Approximate Sample 583g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No trace asbestos detected.
S05 0.1	22-Fe04591	Jan 26, 2022	Approximate Sample 738g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No trace asbestos detected.
S06 0-0.2	22-Fe04592	Jan 26, 2022	Approximate Sample 533g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No trace asbestos detected.
S07 0-0.15	22-Fe04593	Jan 26, 2022	Approximate Sample 697g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No trace asbestos detected.
S08 0.2-0.4	22-Fe04594	Jan 26, 2022	Approximate Sample 549g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No trace asbestos detected.

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
S09 0-0.1	22-Fe04595	Jan 26, 2022	Approximate Sample 559g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.001% w/w.* Organic fibre detected. No trace asbestos detected.

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Auckland	Feb 11, 2022	Indefinite

Auckland

35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch

43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Melbourne

6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261 Site # 1254

Sydney

Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane

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

Newcastle

4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

Perth

46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 6253 4444
NATA # 2377 Site # 2370

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Company Name: ENGEO Ltd
Address: 8 Greydene Place
Takapuna
Auckland New Zealand 0622

Project Name: GREAT SOUTH ROAD
Project ID: 18670.000.001

Order No.:
Report #: 860250
Phone: 0011 64 9 9722 205
Fax:

Received: Feb 3, 2022 3:30 PM
Due: Feb 11, 2022
Priority: 5 Day
Contact Name: Erika McDonald

Eurofins Analytical Services Manager : Karishma Patel

Sample Detail						Asbestos - WA guidelines	HOLD	Lead	Moisture Set	Polycyclic Aromatic Hydrocarbons (NZ MHE)
Auckland Laboratory - IANZ# 1327						X	X	X	X	X
Christchurch Laboratory - IANZ# 1290										
External Laboratory										
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID					
1	S01 0.1	Jan 26, 2022		Soil	K22-Fe04587	X	X	X	X	
2	S02 0.1	Jan 26, 2022		Soil	K22-Fe04588	X	X	X		
3	S03 0.1	Jan 26, 2022		Soil	K22-Fe04589	X	X	X		
4	S04 0.1	Jan 26, 2022		Soil	K22-Fe04590	X	X	X	X	
5	S05 0.1	Jan 26, 2022		Soil	K22-Fe04591	X	X	X		
6	S06 0-0.2	Jan 26, 2022		Soil	K22-Fe04592	X	X	X	X	
7	S07 0-0.15	Jan 26, 2022		Soil	K22-Fe04593	X	X	X		
8	S08 0.2-0.4	Jan 26, 2022		Soil	K22-Fe04594	X	X	X	X	
9	S09 0-0.1	Jan 26, 2022		Soil	K22-Fe04595	X	X	X		
10	S03 0.25	Jan 26, 2022		Soil	K22-Fe04596		X			
11	S04 0.2	Jan 26, 2022		Soil	K22-Fe04597		X			
12	S06 0.4-0.5	Jan 26, 2022		Soil	K22-Fe04598		X			

Auckland

35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch

43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Melbourne

6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261 Site # 1254

Sydney

Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane

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

Newcastle

4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

Perth

46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 6253 4444
NATA # 2377 Site # 2370

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Company Name:	ENGE0 Ltd	Order No.:		Received:	Feb 3, 2022 3:30 PM
Address:	8 Greydene Place Takapuna Auckland New Zealand 0622	Report #:	860250	Due:	Feb 11, 2022
Project Name:	GREAT SOUTH ROAD	Phone:	0011 64 9 9722 205	Priority:	5 Day
Project ID:	18670.000.001	Fax:		Contact Name:	Erika McDonald

Eurofins Analytical Services Manager : Karishma Patel

Sample Detail						Asbestos - WA guidelines	HOLD	Lead	Moisture Set	Polycyclic Aromatic Hydrocarbons (NZ MHE)
Auckland Laboratory - IANZ# 1327						X	X	X	X	X
Christchurch Laboratory - IANZ# 1290										
External Laboratory										
13	BM1	Jan 26, 2022		Building Materials	K22-Fe04599		X			
Test Counts						9	4	9	9	4

Internal Quality Control Review and Glossary General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. Information identified on this report with the colour **blue** indicates data provided by customer that may have an impact on the results.
5. Information identified on this report with the colour **orange** indicates sections of the report not covered by the laboratory's scope of NATA accreditation.
6. This report replaces any interim results previously issued.

Holding Times

Please refer to the most recent version of the 'Sample Preservation and Container Guide' for holding times (QS3001).

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

% w/w:	Percentage weight-for-weight basis, e.g. of asbestos in asbestos-containing finds in soil samples (% w/w)
F/fld	Airborne fibre filter loading as Fibres (N) per Fields counted (n)
F/mL	Airborne fibre reported concentration as Fibres per millilitre of air drawn over the sampler membrane (C)
g, kg	Mass, e.g. of whole sample (M) or asbestos-containing find within the sample (m)
g/kg	Concentration in grams per kilogram
L, mL	Volume, e.g. of air as measured in AFM (V = r x t)
L/min	Airborne fibre sampling Flowrate as litres per minute of air drawn over the sampler membrane (r)
min	Time (t), e.g. of air sample collection period

Calculations

Airborne Fibre Concentration:
$$C = \left(\frac{A}{a}\right) \times \left(\frac{N}{n}\right) \times \left(\frac{1}{V}\right) \times \left(\frac{1}{r}\right) = K \times \left(\frac{N}{n}\right) \times \left(\frac{1}{Vr}\right)$$

Asbestos Content (as asbestos):
$$\% w/w = \frac{(m \times P_A)}{M}$$

Weighted Average (of asbestos):
$$\%_{WA} = \frac{\sum (m \times P_A) \times x}{x}$$

Terms

%asbestos	Estimated percentage of asbestos in a given matrix. May be derived from knowledge or experience of the material, informed by HSG264 <i>Appendix 2</i> , else assumed to be 15% in accordance with WA DOH <i>Appendix 2 (PA)</i> .
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded (non-friable) condition. For the purposes of the NEPM and WA DOH, ACM corresponds to material larger than 7 mm x 7 mm.
AF	Asbestos Fines. Asbestos contamination within a soil sample, as defined by WA DOH. Includes loose fibre bundles and small pieces of friable and non-friable material such as asbestos cement fragments mixed with soil. Considered under the NEPM as equivalent to "non-bonded / friable".
AFM	Airborne Fibre Monitoring, e.g. by the MFM.
Amosite	Amosite Asbestos Detected. Amosite may also refer to Fibrous Grunerite or Brown Asbestos. Identified in accordance with AS 4964-2004.
AS	Australian Standard.
Asbestos Content (as asbestos)	Total % w/w asbestos content in asbestos-containing finds in a soil sample (% w/w).
Chrysotile	Chrysotile Asbestos Detected. Chrysotile may also refer to Fibrous Serpentine or White Asbestos. Identified in accordance with AS 4964-2004.
COC	Chain of Custody.
Crocidolite	Crocidolite Asbestos Detected. Crocidolite may also refer to Fibrous Riebeckite or Blue Asbestos. Identified in accordance with AS 4964-2004.
Dry	Sample is dried by heating prior to analysis.
DS	Dispersion Staining. Technique required for Unequivocal Identification of asbestos fibres by PLM.
FA	Fibrous Asbestos. Asbestos containing material that is wholly or in part friable, including materials with higher asbestos content with a propensity to become friable with handling, and any material that was previously non-friable and in a severely degraded condition. For the purposes of the NEPM and WA DOH, FA generally corresponds to material larger than 7 mm x 7 mm, although FA may be more difficult to visibly distinguish and may be assessed as AF.
Fibre Count	Total of all fibres (whether asbestos or not) meeting the counting criteria set out in the NOHSC:3003
Fibre ID	Fibre Identification. Unequivocal identification of asbestos fibres according to AS 4964-2004. Includes Chrysotile, Amosite (Grunerite) or Crocidolite asbestos.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory's remit to assess degree of friability.
HSG248	UK HSE HSG248, <i>Asbestos: The Analysts Guide</i> , 2nd Edition (2021).
HSG264	UK HSE HSG264, <i>Asbestos: The Survey Guide</i> (2012).
ISO (also ISO/IEC)	International Organization for Standardization / International Electrotechnical Commission.
K Factor	Microscope constant (K) as derived from the effective filter area of the given AFM membrane used for collecting the sample (A) and the projected eyepiece graticule area of the specific microscope used for the analysis (a).
LOR	Limit of Reporting.
MFM (also NOHSC:3003)	Membrane Filter Method. As described by the Australian Government National Occupational Health and Safety Commission, <i>Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres</i> , 2nd Edition [NOHSC:3003(2005)].
NEPM (also ASC NEPM)	National Environment Protection (Assessment of Site Contamination) Measure, (2013, as amended).
Organic	Organic Fibres Detected. Organic may refer to Natural or Man-Made Polymeric Fibres. Identified in accordance with AS 4964-2004.
PCM	Phase Contrast Microscopy. As used for Fibre Counting according to the MFM.
PLM	Polarised Light Microscopy. As used for Fibre Identification and Trace Analysis according to AS 4964-2004.
SMF	Synthetic Mineral Fibre Detected. SMF may also refer to Man Made Vitreous Fibres. Identified in accordance with AS 4964-2004.
SRA	Sample Receipt Advice.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres (particularly asbestos) in a given sample matrix.
UK HSE HSG	United Kingdom, Health and Safety Executive, Health and Safety Guidance, publication.
UMF	Unidentified Mineral Fibre Detected. Fibrous minerals that are detected but have not been unequivocally identified by PLM with DS according the AS 4964-2004. May include (but not limited to) Actinolite, Anthophyllite or Tremolite asbestos.
WA DOH	Reference document for the NEPM. Government of Western Australia, <i>Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia</i> (updated 2021), including Appendix Four: <i>Laboratory analysis</i>
Weighted Average	Combined average % w/w asbestos content of all asbestos-containing finds in the given aliquot or total soil sample (%_{WA}).

Comments**Sample Integrity**

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

Asbestos Counter/Identifier:

Katyana Gausel Senior Analyst-Asbestos (Key Technical Personnel) (NSW)

Authorised by:

Kate Stuart Senior Analyst-Asbestos (NZS)



Katyana Gausel
Senior Analyst-Asbestos (Key Technical Personnel)

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates ISO/IEC 17025:2017 accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

ENGEO Ltd
8 Greydene Place
Takapuna
Auckland New Zealand 0622



All tests reported herein
 have been performed in
 accordance with the
 laboratory's scope of
 accreditation

Attention: Erika McDonald

Report 860250-S
 Project name GREAT SOUTH ROAD
 Project ID 18670.000.001
 Received Date Feb 03, 2022

Client Sample ID			S01 0.1	S02 0.1	S03 0.1	S04 0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K22-Fe04587	K22-Fe04588	K22-Fe04589	K22-Fe04590
Date Sampled			Jan 26, 2022	Jan 26, 2022	Jan 26, 2022	Jan 26, 2022
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	< 0.03	-	-	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.03	-	-	< 0.03
Anthracene	0.03	mg/kg	< 0.03	-	-	0.05
Benzo(a)anthracene	0.03	mg/kg	0.05	-	-	0.22
Benzo(a)pyrene	0.03	mg/kg	0.05	-	-	0.36
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	0.08	-	-	0.53
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.09	-	-	0.53
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.11	-	-	0.53
Benzo(b&j)fluoranthene ^{N07}	0.03	mg/kg	0.09	-	-	0.31
Benzo(g,h,i)perylene	0.03	mg/kg	0.05	-	-	0.29
Benzo(k)fluoranthene	0.03	mg/kg	0.05	-	-	0.27
Chrysene	0.03	mg/kg	0.14	-	-	0.34
Dibenz(a,h)anthracene	0.03	mg/kg	< 0.03	-	-	0.05
Fluoranthene	0.03	mg/kg	0.20	-	-	0.60
Fluorene	0.03	mg/kg	< 0.03	-	-	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	0.04	-	-	0.27
Naphthalene	0.1	mg/kg	< 0.1	-	-	< 0.1
Phenanthrene	0.03	mg/kg	0.04	-	-	0.14
Pyrene	0.03	mg/kg	0.18	-	-	0.71
p-Terphenyl-d14 (surr.)	1	%	80	-	-	72
2-Fluorobiphenyl (surr.)	1	%	73	-	-	68
Metals M8 (NZ MfE)						
Lead	0.1	mg/kg	18	49	39	34
% Moisture	1	%	44	43	41	17

Client Sample ID			S05 0.1	S06 0-0.2	S07 0-0.15	S08 0.2-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K22-Fe04591	K22-Fe04592	K22-Fe04593	K22-Fe04594
Date Sampled			Jan 26, 2022	Jan 26, 2022	Jan 26, 2022	Jan 26, 2022
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	-	< 0.03	-	< 0.03
Acenaphthylene	0.03	mg/kg	-	< 0.03	-	< 0.03
Anthracene	0.03	mg/kg	-	< 0.03	-	0.05
Benzo(a)anthracene	0.03	mg/kg	-	< 0.03	-	0.15
Benzo(a)pyrene	0.03	mg/kg	-	< 0.03	-	0.17
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	-	< 0.03	-	0.23
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	-	0.04	-	0.24
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	-	0.08	-	0.26
Benzo(b&j)fluoranthene ^{N07}	0.03	mg/kg	-	< 0.03	-	0.16
Benzo(g,h,i)perylene	0.03	mg/kg	-	< 0.03	-	0.11
Benzo(k)fluoranthene	0.03	mg/kg	-	< 0.03	-	0.16
Chrysene	0.03	mg/kg	-	< 0.03	-	0.27
Dibenz(a,h)anthracene	0.03	mg/kg	-	< 0.03	-	< 0.03
Fluoranthene	0.03	mg/kg	-	< 0.03	-	0.41
Fluorene	0.03	mg/kg	-	< 0.03	-	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	-	< 0.03	-	0.05
Naphthalene	0.1	mg/kg	-	< 0.1	-	< 0.1
Phenanthrene	0.03	mg/kg	-	< 0.03	-	0.05
Pyrene	0.03	mg/kg	-	< 0.03	-	0.55
p-Terphenyl-d14 (surr.)	1	%	-	102	-	74
2-Fluorobiphenyl (surr.)	1	%	-	64	-	50
Metals M8 (NZ MfE)						
Lead	0.1	mg/kg	31	10	290	25
% Moisture						
	1	%	10.0	25	11	25

Client Sample ID			S09 0-0.1
Sample Matrix			Soil
Eurofins Sample No.			K22-Fe04595
Date Sampled			Jan 26, 2022
Test/Reference	LOR	Unit	
Metals M8 (NZ MfE)			
Lead	0.1	mg/kg	44
% Moisture			
	1	%	17

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Polycyclic Aromatic Hydrocarbons (NZ MfE) - Method: LTM-ORG-2130 PAH and Phenols in Soil and Water by GC MSMS	Auckland	Feb 04, 2022	14 Days
Metals M8 (NZ MfE) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Auckland	Feb 09, 2022	28 Days
% Moisture - Method: LTM-GEN-7080 Moisture Content in Soil by Gravimetry	Auckland	Feb 04, 2022	14 Days

Auckland

35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch

43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Melbourne

6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261 Site # 1254

Sydney

Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane

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

Newcastle

4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

Perth

46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 6253 4444
NATA # 2377 Site # 2370

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Company Name: ENGEO Ltd
Address: 8 Greydene Place
Takapuna
Auckland New Zealand 0622

Project Name: GREAT SOUTH ROAD
Project ID: 18670.000.001

Order No.:
Report #: 860250
Phone: 0011 64 9 9722 205
Fax:

Received: Feb 3, 2022 3:30 PM
Due: Feb 11, 2022
Priority: 5 Day
Contact Name: Erika McDonald

Eurofins Analytical Services Manager : Karishma Patel

Sample Detail						Asbestos - WA guidelines	HOLD	Lead	Moisture Set	Polycyclic Aromatic Hydrocarbons (NZ MHE)
Auckland Laboratory - IANZ# 1327						X	X	X	X	X
Christchurch Laboratory - IANZ# 1290										
External Laboratory										
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID					
1	S01 0.1	Jan 26, 2022		Soil	K22-Fe04587	X	X	X	X	
2	S02 0.1	Jan 26, 2022		Soil	K22-Fe04588	X	X	X		
3	S03 0.1	Jan 26, 2022		Soil	K22-Fe04589	X	X	X		
4	S04 0.1	Jan 26, 2022		Soil	K22-Fe04590	X	X	X	X	
5	S05 0.1	Jan 26, 2022		Soil	K22-Fe04591	X	X	X		
6	S06 0-0.2	Jan 26, 2022		Soil	K22-Fe04592	X	X	X	X	
7	S07 0-0.15	Jan 26, 2022		Soil	K22-Fe04593	X	X	X		
8	S08 0.2-0.4	Jan 26, 2022		Soil	K22-Fe04594	X	X	X	X	
9	S09 0-0.1	Jan 26, 2022		Soil	K22-Fe04595	X	X	X		
10	S03 0.25	Jan 26, 2022		Soil	K22-Fe04596		X			
11	S04 0.2	Jan 26, 2022		Soil	K22-Fe04597		X			
12	S06 0.4-0.5	Jan 26, 2022		Soil	K22-Fe04598		X			

Auckland

35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch

43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Melbourne

6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261 Site # 1254

Sydney

Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane

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

Newcastle

4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

Perth

46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 6253 4444
NATA # 2377 Site # 2370

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Company Name:	ENGEO Ltd	Order No.:		Received:	Feb 3, 2022 3:30 PM
Address:	8 Greydene Place Takapuna Auckland New Zealand 0622	Report #:	860250	Due:	Feb 11, 2022
Project Name:	GREAT SOUTH ROAD	Phone:	0011 64 9 9722 205	Priority:	5 Day
Project ID:	18670.000.001	Fax:		Contact Name:	Erika McDonald

Eurofins Analytical Services Manager : Karishma Patel

Sample Detail						Asbestos - WA guidelines	HOLD	Lead	Moisture Set	Polycyclic Aromatic Hydrocarbons (NZ MHE)
Auckland Laboratory - IANZ# 1327						X	X	X	X	X
Christchurch Laboratory - IANZ# 1290										
External Laboratory										
13	BM1	Jan 26, 2022		Building Materials	K22-Fe04599		X			
Test Counts						9	4	9	9	4

Internal Quality Control Review and Glossary

General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	µg/L: micrograms per litre
ppm: parts per million	ppb: parts per billion	%: Percentage
org/100 mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100 mL: Most Probable Number of organisms per 100 millilitres

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (<i>bis</i> -tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
- For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test			Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Method Blank								
Polycyclic Aromatic Hydrocarbons (NZ MfE)								
Acenaphthene			mg/kg	< 0.03		0.03	Pass	
Acenaphthylene			mg/kg	< 0.03		0.03	Pass	
Anthracene			mg/kg	< 0.03		0.03	Pass	
Benz(a)anthracene			mg/kg	< 0.03		0.03	Pass	
Benzo(a)pyrene			mg/kg	< 0.03		0.03	Pass	
Benzo(b&j)fluoranthene			mg/kg	< 0.03		0.03	Pass	
Benzo(g,h,i)perylene			mg/kg	< 0.03		0.03	Pass	
Benzo(k)fluoranthene			mg/kg	< 0.03		0.03	Pass	
Chrysene			mg/kg	< 0.03		0.03	Pass	
Dibenz(a,h)anthracene			mg/kg	< 0.03		0.03	Pass	
Fluoranthene			mg/kg	< 0.03		0.03	Pass	
Fluorene			mg/kg	< 0.03		0.03	Pass	
Indeno(1,2,3-cd)pyrene			mg/kg	< 0.03		0.03	Pass	
Naphthalene			mg/kg	< 0.1		0.1	Pass	
Phenanthrene			mg/kg	< 0.03		0.03	Pass	
Pyrene			mg/kg	< 0.03		0.03	Pass	
Method Blank								
Metals M8 (NZ MfE)								
Lead			mg/kg	< 0.1		0.1	Pass	
LCS - % Recovery								
Polycyclic Aromatic Hydrocarbons (NZ MfE)								
Acenaphthene			%	110		70-130	Pass	
Acenaphthylene			%	85		70-130	Pass	
Anthracene			%	120		70-130	Pass	
Benz(a)anthracene			%	114		70-130	Pass	
Benzo(a)pyrene			%	125		70-130	Pass	
Benzo(b&j)fluoranthene			%	123		70-130	Pass	
Benzo(g,h,i)perylene			%	109		70-130	Pass	
Benzo(k)fluoranthene			%	92		70-130	Pass	
Chrysene			%	124		70-130	Pass	
Dibenz(a,h)anthracene			%	118		70-130	Pass	
Fluoranthene			%	85		70-130	Pass	
Fluorene			%	89		70-130	Pass	
Indeno(1,2,3-cd)pyrene			%	126		70-130	Pass	
Naphthalene			%	101		70-130	Pass	
Phenanthrene			%	86		70-130	Pass	
Pyrene			%	92		70-130	Pass	
LCS - % Recovery								
Metals M8 (NZ MfE)								
Lead			%	97		80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Polycyclic Aromatic Hydrocarbons (NZ MfE)								
Fluoranthene	Z22-Fe05259	NCP	%	118		70-130	Pass	
Spike - % Recovery								
Metals M8 (NZ MfE)								
Lead	K22-Fe04588	CP	%	98		75-125	Pass	
Spike - % Recovery								
Polycyclic Aromatic Hydrocarbons (NZ MfE)								
				Result 1				

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Acenaphthene	K22-Fe04590	CP	%	99			70-130	Pass	
Acenaphthylene	K22-Fe04590	CP	%	110			70-130	Pass	
Anthracene	K22-Fe04590	CP	%	115			70-130	Pass	
Benzo(a)anthracene	K22-Fe04590	CP	%	105			70-130	Pass	
Benzo(a)pyrene	K22-Fe04590	CP	%	120			70-130	Pass	
Benzo(b&j)fluoranthene	K22-Fe04590	CP	%	106			70-130	Pass	
Benzo(g,h,i)perylene	K22-Fe04590	CP	%	84			70-130	Pass	
Benzo(k)fluoranthene	K22-Fe04590	CP	%	82			70-130	Pass	
Chrysene	K22-Fe04590	CP	%	108			70-130	Pass	
Dibenz(a,h)anthracene	K22-Fe04590	CP	%	111			70-130	Pass	
Fluorene	K22-Fe04590	CP	%	100			70-130	Pass	
Indeno(1,2,3-cd)pyrene	K22-Fe04590	CP	%	112			70-130	Pass	
Naphthalene	K22-Fe04590	CP	%	101			70-130	Pass	
Phenanthrene	K22-Fe04590	CP	%	76			70-130	Pass	
Pyrene	K22-Fe04590	CP	%	127			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Metals M8 (NZ MfE)				Result 1	Result 2	RPD			
Lead	K22-Fe04587	CP	mg/kg	18	21	15	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	K22-Fe02668	NCP	%	38	38	1.0	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1	Result 2	RPD			
Acenaphthene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Acenaphthylene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Anthracene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(a)anthracene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(a)pyrene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(b&j)fluoranthene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(g,h,i)perylene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(k)fluoranthene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Chrysene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Dibenz(a,h)anthracene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Fluoranthene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Fluorene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Indeno(1,2,3-cd)pyrene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Naphthalene	K22-Fe04592	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Phenanthrene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Pyrene	K22-Fe04592	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	

Comments
Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

Authorised by:

Karishma Patel	Analytical Services Manager
Michael Ritchie	Senior Analyst-Organic (NZN)
Shasti Ramachandran	Senior Analyst-Metal (NZN)


Michael Ritchie
Head of Semi Volatiles (Key Technical Personnel)

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please [click here](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.