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Project Number: 13451.003.001

Remedial Action Plan

Drury - Stage 2, Drury, Auckland

Submitted to:
Woods Limited
8 Nugent Street
Grafton
Auckland 1023

Remedial Action Plan Task Summary

Project Site:	**Drury Development Stage 2 – 64, 68, 108, 120 and 132 Flanagan Road**
Scope of Proposed Works	Soil disturbance work associated with bulk earthworks at the site.
Contaminants identified on-site	Concentrations of chromium and lead above naturally occurring background ranges. Concentrations of asbestos below the land use human health criterion.

The provisions of the RAP are mandatory during soil disturbing works for all persons entering the site and all contractor and sub-contractor employees who will be involved in implementing the procedures identified in this document.

Action Required	Section Ref.	Actioned	
		Date	Signature
Prior to Work Commencing			
• Ensure a Contaminated Land Specialist SQEP has been engaged.	1.3		
• A copy of Appendix 5 is displayed on-site.	6.7		
• Boundary Controls have been installed.	8.1.1		
• Sediment control measures have been installed.	8.1.2		
• Analysis data has been provided to proposed disposal site(s) and written confirmation received from them to confirm they are able to receive the excavated material.	8.1.5		
• Welfare area set up with appropriate decontamination facilities.	8.1.6 8.4		
• All workers issued with appropriate PPE and trained in its use.	8.2.2		
• Source of water is available for dust suppression.	8.3.2		
• Disposal options for disposal of water have been identified.	8.3.4 8.3.5		
• Workers have received non-certified training in asbestos identification, safe handling and suitable controls.	8.4 9		
• All workers have received training in the actions to take if unanticipated ground conditions are encountered.	9		

• A copy of the analytical laboratory test report for any material that is to be imported to the site as cleanfill on the basis of direct testing has been provided to the Contaminated Land Specialist SQEP.	10		
During Works			
• All workers (staff and contractors) and visitors are inducted with respect to the ground conditions on-site, the required PPE, site rules, and accidental discovery procedures.	8.2.1		
• All loads must be securely covered before the truck leaves the site.	8.1.3		
• All excavated material being removed from the site is disposed of to an appropriately licensed facility.	8.1.5		
• If evidence of unexpected ground conditions is observed, work shall be stopped and the Contaminated Land Specialist SQEP contacted to visit the site to assess the area and take samples as necessary.	9		
• All imported material complies with Auckland Council definition of 'cleanfill material'.	10		
Documentation to be provided to the Contaminated Land Specialist SQEP			
• Daily site photographs showing the site entrance, the area of work, sediment control measures and any stockpiles.	10		
• A plan showing location(s) where any soil is reused on-site.	10		
• Copies of disposal dockets / landfill receipts and confirmation from disposal site that they can accept the material.	10		
• Documentation for imported fill.	10		

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ENGEO Document Control:

Report Title	Remedial Action Plan - Drury - Stage 2, Drury		
Project No.	13451.003.001	**Doc ID**	11
Client	Woods Limited	**Client Contact**	Colin Dryland
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Date	Revision Details / Status	Author	Reviewer	WP
3/12/2024	Draft	VP	EM	--
6/12/2024	Issued to Client	VP	EM	BK
29/01/2025	Revised to include additional site data	VP	EM	JT
06/03/2025	Revised to include additional discussion on resource consents	VP	EM	DF
20/03/2025	Updated certifying statement	VP	EM	DF

SQEP Certifying Statement

I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

I certify that the site has been assessed in accordance with current New Zealand Regulations and guidance documents and that this report has been prepared in general accordance with the Ministry for the Environment's Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand, 2021.

I am considered by ENGEO Limited to be a suitably qualified and experienced practitioner (SQEP) able to certify reports pursuant to the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011, based on the company's definition of a SQEP as given below.

Erika McDonald

20 March 2025

ENGEO Limited requires that a SQEP has the following Qualifications / Experience:

- *Tertiary science or engineering qualification relevant to environmental assessment.* Erika has a Master of Science in Civil and Environmental Engineering from Stanford University (2003) and a Bachelor's Degree in Environmental Engineering from the State University of New York at Buffalo (2002).
- *A minimum of 10 years of relevant experience.* Erika has over 20 years of relevant experience.
- *Registration with a professional body that assess and certifies environmental professionals in the competency criteria of training, experience, professional conduct and ethical behaviour.* Erika is a Professional Member of Engineering New Zealand (CMEngNZ) and Professional Engineer in California (Civil).

Author's Experience and Qualifications

I, Vincent Pettinger, am an Environmental Scientist at ENGEO. ENGEO is a geotechnical and environmental consultancy with offices in New Zealand, Australia, California and Guam. I have been employed at ENGEO since July 2018.

I hold a Double Major Bachelor of Science in Geography and Geology and a Master of Science in Geology / Geochemistry (with Distinction) from the University of Otago. I am also a full member of the Australasian Land and Groundwater Association (ALGA) and currently sit on the Auckland branch committee. In November 2023, I was confirmed as a Certified Environmental Practitioner (CEnvP) by the CEnvP scheme certification board (registration number 1755).

I have a broad range of contaminated land investigation and remediation experience for a variety of land uses and contaminant profiles for sites in Auckland and across New Zealand.

I confirm that, in my capacity as author of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Vincent Pettinger

20 March 2025

1 Introduction

ENGEO Ltd was requested by Woods Limited to prepare a Remedial Action Plan ('RAP') for soil disturbance activities to be carried out in the Drury Development Stage 2 area (herein referred to as 'the site'; shown on Figure 1). This work has been carried out in accordance with our proposal dated 21 November 2024.

This RAP has been prepared to support the application for a restricted discretionary resource consent under *the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations 2011* (the 'NESCS').

Further, this RAP includes additional investigation and assessment work to be undertaken in support of a permit for the discharge of contaminants to the environment under The Auckland Unitary Plan, operative in part - 15 November 2016 (the "AUP").[1]

Included in this RAP is:

- A summary of previous investigations completed at the site.
- A summary of the investigation works that have and will be undertaken to inform this RAP and the need for a long-term discharge consent under the AUP (AC, 2016).
- Remedial actions for the site based on investigation results.
- An outline of requirements for oversight and validation during and following remedial works.
- An outline of monitoring and management procedures to be implemented during soil disturbing works to assist in:
    - Achieving a safe working environment for relevant personnel.
    - Protecting the environment from contaminants in site discharges during the redevelopment works.
- An outline of actions to be undertaken if unidentified contamination is encountered.

1.1 Relevance

This document has been prepared in general accordance with the Ministry for the Environment's (MfE's) Contaminated Land Management Guidelines No.1 – *Reporting on Contaminated Sites in New Zealand* (2021).

[1] As discussed in Section 5, given the identification of contaminants above environmental discharge criteria in the filled area at 108 Flanagan Road, a long-term discharge consent under the AUP will be required. Investigation and reporting works to support this consent are described in Section 4. The assumption is that the investigation and reporting works will confirm that permitted activity standards E30.6.2.4 will not be met thereby requiring controlled activity consent under Table E30.4.1(A6), or a discretionary activity consent if controlled activity standard E30.6.2.1 is not met.

The information and recommendations provided herein are to augment the processes on-site and are not intended to relieve any contractor or the controller of the place of work of their responsibility for the health and safety of their workers and contractors.

Nor is it intended to relieve contractors undertaking work on the site of their responsibilities under the Health and Safety at Work Act 2015 and subsequent amendments. It is expected that the contractor will develop a site-specific health and safety plan to complement this document and to address other health and safety requirements that may be applicable to their site works.

The provisions of this RAP are mandatory for all persons entering the site and all contractor and sub-contractor employees who will be involved in implementing the procedures identified in this document.

1.2 Document Review

This RAP is considered suitable to provide controls based on the contamination identified. If contamination is found that varies from what has been assumed in preparing this document, the RAP will need to be updated to account for the changed site understanding. If a revised RAP is prepared, it should be submitted to Auckland Council for review and approval and re-distributed to the project team (Table 1) as soon as practicable following Council's approval of the document.

1.3 Roles and Responsibilities under this RAP

The roles and responsibilities of various organisations under this RAP are listed in Table 1 below.

Table 1: Roles and Responsibilities

Role	Responsibility
Site Owner Kiwi Property Limited	To distribute this RAP and be responsible for ensuring that the site works are undertaken in accordance with this document and any revisions to this document.
Site Contractor (main contractor / general earthworks) Ross Reid Contractors Limited	To distribute the RAP (including updated versions) to employees and sub-contractors, and to ensure that the correct copy of the RAP is always available on-site. To provide control and oversight for the ground disturbing works. It is recommended that a designated, suitably trained Site Supervisor is present to oversee the works. This also includes ensuring that all site staff and sub-contractors are aware of and comply with the procedures and health and safety requirements contained within this document. The Site Supervisor should implement changes to site procedures, as necessary, if unanticipated conditions arise. It is anticipated that this Site Supervisor would represent the main site contractor. Should an incident occur on-site which may result in discharges, the Site Supervisor will take control of the situation and coordinate the efforts of all parties on-site to minimise the impact. Worker and public health and safety concerns will take precedence over environmental discharges, should it be unsafe to employ controls or emergency measures immediately. As a minimum, the Site Supervisor should have received non-certified training in asbestos identification, safe handling and suitable controls, to ensure that, if asbestos / asbestos containing materials (ACMs) are encountered they are identified and appropriately managed. Documentary evidence of the training shall be kept on record.
Contaminated Land Specialist ENGEO	A Contaminated Land Specialist company with Suitably Qualified and Experienced Practitioners (SQEPs) in contaminated land management shall be appointed to liaise with the contractor during the course of the works. Representatives from the Contaminated Land Specialist company shall: • Perform the additional investigation (Section 4). • Visit the site during remedial works to assess the controls and procedures on-site, as they relate to this RAP and to carry out validation works (Section 6). • Provide environmental support during site works (if required) and prepare a completion report (Section 11).

2 Previous Investigation Findings

The Stage 2 boundary and its constituent property addresses are shown in attached Figure 1 for reference.

2.1 Geotechnical and Environmental Due Diligence Investigation – 64 Flanagan Road (ENGEO, 2017a)

A due diligence investigation was undertaken to inform potential development considerations at the property. Four hand auger boreholes were advanced to a maximum depth of 4.4 m bgl (indicated on attached Figure 2). Undocumented fill was observed beneath the topsoil to depths ranging from 0.4 m bgl to 1.5 m bgl. Man-made materials (e.g., refuse, building materials) were not noted on the auger logs. Black staining was identified in the matrix of buried gravel in one location and buried, original topsoil was encountered below the fill in two locations in the west of the site. No soil samples were collected for laboratory analysis.

2.2 Geotechnical and Environmental Due Diligence Investigation – 120 Flanagan Road (ENGEO, 2017b)

A due diligence investigation was undertaken to inform potential development considerations at 68 - 132 Flanagan Road. Eleven hand auger boreholes were advanced to a maximum depth of 5 m bgl. Suspected fill was observed at two locations in the northern half of 120 Flanagan Road from the ground surface to depths of 0.7 m bgl and 1.0 m bgl, labelled HA20 and HA21 in attached Figure 3. No man-made materials (e.g., refuse, building materials) or indications of soil contamination (e.g., staining, odours) were noted in the boreholes. No soil samples were collected for laboratory analysis.

2.3 Drury Centre Project – Preliminary Site Investigation (Aurecon, 2020)

Aurecon Limited undertook a Preliminary Site Investigation (PSI) of the greater Drury Metropolitan Centre area owned and controlled by Kiwi Property Limited, to identify current or historical activities / land uses with the potential to cause ground contamination.

The PSI identified several activities that are included on the MfE Hazardous Activities and Industries List (HAIL) (MfE, Revised 2021) including super-phosphate fertiliser storage (Activity A6; 64 Flanagan Road), uncontrolled filling (Activity G5; 64 Flanagan Road and potentially 108 Flanagan Road), and the potential use of asbestos building materials (Activity E1; site wide) in residential dwellings and farm buildings that were built prior to 2000.

2.4 Drury Centre Project – Detailed Site Investigation (Aurecon, 2021)

Aurecon Limited undertook a Detailed Site Investigation (DSI) of the greater Drury Metropolitan Centre area owned and controlled by Kiwi Property Limited, to better quantify the contamination hazard associated with the potentially contaminating activities identified in the PSI. The intrusive investigation comprised six test pits and 13 surface (< 0.2 m bgl) soil sample locations across the Stage 2 area.

The relevant results tables from the Aurecon DSI (2021) are included in Appendix 1. Red boxes have been added to note data applicable to the current site. The balance of data presented is for samples collected from the Stage 1 area or has been remediated and validated.

The soil sampling analytical results showed that:

- Zinc was identified above the AUP Permitted Activity (environmental) criterion in a single sample collected from the southern side of the truck shed in the north of the 64 Flanagan Road property (labelled SS003 on attached Figure 2).
- Logs from the excavator test pits in the historical fill area in the west of the 108 Flanagan Road property note that the fill was 'waste bearing' with potential asbestos containing material, bricks, metal / steel, glass, plastic and concrete. The investigation locations are shown on attached Figure 4. Samples collected from excavator test pits identified the following:
    - Asbestos as asbestos fines (AF) and / or fibrous asbestos (FA) were detected in three samples collected from two locations in the uncontrolled fill material (labelled TP035 and TP036). One sample from 2.1 – 2.2 metres below ground level (bgl) at TP036 had a combined fibrous asbestos / asbestos fines weight equal to the 'all land use' human health criterion (BRANZ, 2017) of 0.001 % w/w.
    - Nickel was identified above the AUP Permitted Activity (environmental) criterion in fill material at 2.9 – 3.0 m bgl at investigation location TP035.
    - Lead was identified at location TP039 above the AUP Permitted Activity (environmental) criterion in the fill material at 1.6 – 1.7 m bgl.
- An arsenic concentration exceeding the human health-based criterion (high-density residential) was detected in one location near a farm building on the eastern extent of 120 Flanagan Road.
- Lead concentrations exceeding the commercial human health criterion were detected in the surficial soils in the vicinity of the residential dwellings located at 114 Flanagan Road and 108 Flanagan Road which have since been remediated and validated (discussed further in Section 2.5).
- Asbestos as AF and / or FA was detected in a sample of buried waste on the southern side of the dwelling at 120 Flanagan Road labelled TP040 on attached Figure 5, collected from 1.9 – 2.0 m bgl; a topsoil sample collected from 0.1 – 0.2 m bgl at location labelled SS005 also identified asbestos impacts however, in both instances the concentrations did not exceed the laboratory reporting limit or BRANZ human health guidelines.

2.5 Drury Development Stage 2, 64 – 120 Flanagan Road - Site Management Plan (ENGEO, 2024)

ENGEO conducted supplementary soil investigations at 108 and 120 Flanagan Road to inform statutory obligations and appropriate handling and management procedures for lead impacted material around the former dwelling halos and the historical fill identified around a farm building in the ENGEO DD investigation (2017b). The methodology and results of these investigations were reported in a Site Management Plan (SMP) dated 03 April 2024. In summary, surface soils around former residences contained concentrations of lead at concentrations exceeding the AUP Permitted Activity (environmental) criterion and / or the published range of background concentrations. The SMP outlined contamination-related procedures to enact during soil disturbance in "Management Areas", defined as areas with concentrations of lead that exceeded the AUP Permitted Activity (environmental) criterion (250 mg/kg).

Four investigation locations (labelled HA08 – HA11) targeted the historical fill identified in the ENGEO DD investigation (ENGEO, 2017b) at 68 Flanagan Road (shown on attached Figure 3). Topsoil samples were analysed for asbestos (semi-quantitative analysis), heavy metals / metalloids and PAHs.

Asbestos was not identified in the samples analysed, PAHs were not identified above the lower laboratory limit of reporting and heavy metals / metalloids were within published naturally occurring background concentrations (AC, 2016). Samples collected from the historical fill below the topsoil at location HA21 are discussed in Section 2.7.

2.6 Draft – Drury Stage 2 - Site Validation Report

At the time of writing, the lead impacted topsoil material identified in the Aurecon DSI from around the former dwellings at 108 and 120 Flanagan Road has been successfully remediated. A handheld x-ray fluorescence (XRF) was used to delineate the likely extent of exceedances in the field. If XRF readings indicated that remaining material exceeded the AUP Permitted Activity (environmental) criterion for lead, additional removal works were undertaken. To confirm the readings from the XRF analysis, soil samples collected from the base and extents of the excavations were submitted to Hill Laboratories for analysis.

These results will be presented in a Site Validation Report, discussed in Section 11.

Concentrations of lead in localised portions of the remedial areas exceed the range of background concentrations but are considered suitable to remain on-site and do not require specific contaminated soil handling protocols. The project engineer, Glenn Wright of Woods, confirmed to ENGEO that the material identified as being above the published maximum background lead concentration has been removed from site.

2.7 2024 Additional Characterisation

64 Flanagan Road – Undocumented Fill and Fertiliser Storage

ENGEO observed the excavation of seven test pits across the 64 Flanagan Road address. Test pits were excavated until native soil was encountered (maximum depth of 1.7 m bgl). Samples were collected from test pits to characterise the undocumented fill identified in the due diligence investigation (Section 2.1) and soil in the vicinity of the super-phosphate fertiliser storage shed (identified in the Aurecon PSI, Section 2.3). Geotechnical consultancy CMW were jointly involved in this investigation and detailed logs can be found in their Geotechnical Investigation Report (CMW, 2024).

Locations TP01, TP02 and TP03 in the north of the site (Figure 2) had GAP gravel at the surface to approximately 0.3 m below ground level (bgl), which had a brown silty matrix sampled for chemical and asbestos analysis. Below this unit was inferred native East Coast Bays Formation residual soils.

Locations TP05 and TP06 encountered fill material below topsoil which contained mixed refuse including broken glass, iron and plastic. Fragments of corrugated fibre cement tile (suspected to contain asbestos) were encountered at TP05 (shown in Photo 1 below).

Photo 1: Fibre cement fragment (‘Super-6’ roofing tile)

Investigation location TP04 intersected an unused terracotta stormwater pipe service line surrounded by inferred reworked native East Coast Bays Formation clays to a depth of 0.5 m bgl where it became undisturbed native material.

Location TP07 was not included in the geotechnical scope of works but was included in the investigation as it was in the centre of the retained material behind the former wall and the front of the former dwelling (indicated on Figure 2). The excavation encountered rock fill containing concrete bricks and tiles between the surface and 1.0 m bgl, after which native East Coast Bays Formation was observed.

Collected samples were transported under chain of custody to Hill Laboratories for analysis of contaminants of concern, namely heavy metals / metalloids, polycyclic aromatic hydrocarbons (PAHs) and asbestos (semi-quantitative analysis).

Concentrations of heavy metals / metalloids were elevated above naturally occurring background concentrations in samples collected from the undocumented fill / top of native in three locations, TP02, TP03, TP05. The heavy metal / metalloid remedial criteria presented in Section 6.6 were not exceeded. PAHs were not identified above the laboratory lower limit of reporting for the samples analysed. A results summary table is included as Appendix 2 and laboratory transcripts are included as Appendix 3.

No asbestos was detected in the soil samples analysed for this contaminant. However, the fragments of fibre cement tiles were considered likely to contain asbestos. Controls for earthworks involving asbestos in soil / fill are discussed in Section 7.4.

64 Flanagan Road – Zinc Impacts

Hand tools were used to collect delineation samples from around the area where zinc had been previously identified above the AUP Permitted Activity (environmental) criterion (Section 2.4). Surface soil samples were collected from eight locations (labelled A-G in Figure 2) around the vicinity of 2021 Aurecon sample SS003. Aurecon noted in Table 8 of their DSI (Aurecon, 2021) that the material sampled was 'topsoil.' During the investigation on 27 November 2024, material which may be classified as 'topsoil' was observed at analysed locations marked 'C' and 'E' however 'topsoil' was not observed at other sample locations or at the original SS003 investigation location; rather, the surface material at these locations comprised gravel or clay fill. Two rings of step-out samples were collected from around the location of the original zinc impact. Samples were scheduled in an iterative matter whereby closer samples were scheduled first and if impacts were identified, the second, outer ring was to be analysed.

Soil sample results did not identify zinc above naturally occurring background concentrations (AC, 2016) in the inner ring of samples analysed. Further, a sample collected from the presumed location where Aurecon collected the impacted sample did not replicate the identified zinc impacts. ENGEO considers that topsoil was likely removed from site during clearance of buildings in 2022-2023 and that further assessment and remediation of zinc impacts is not required.

120 Flanagan Road – Historical Fill

ENGEO returned to site on 2 December 2024 to collect a sample of what had been logged as fill during the due diligence investigation (Section 2.2; ENGEO, 2017b). This material is likely to be reworked East Coast Bays formation soil. This reworked material was present between grassed topsoil and undisturbed native material from 0.25 – 0.6 m bgl. A sample was collected from this (named HA21 as it was at the same location; Figure 3) and analysed for common contaminants associated with fill / reworked material, including heavy metals / metalloids, PAHs and asbestos (semi-quantitative analysis).

The sample contained heavy metals / metalloids within naturally occurring background ranges (AC, 2016) and did not contain detectable concentrations of PAHs. No asbestos was identified in this sample. Results are presented in Appendix 2.

No investigation or characterisation is planned to assess this area further.

During the investigation on 2 December 2024, four locations around the former farm dump were targeted to delineate its extent (indicated on attached Figure 5). Samples collected were scheduled for heavy metals / metalloids, PAHs and asbestos (presence / absence) analysis. Note that the laboratory results from the initial sample did not exceed the remedial criteria so delineation sampling was undertaken to inform disposal options of the surrounding material, so has been excluded from discussion of the Conceptual Site Model (Section 2.8). Similarly, a sample of deeper material from location SS005 (shown on Figure 5), where an 'isolated farm shed' had once stood and low-level asbestos impacts were identified at 0.1 – 0.2 m bgl (Section 2.4; Aurecon, 2021). This sample was scheduled for asbestos (presence / absence) analysis. Similarly to the farm dump discussed above, this sampling was intended to inform delineation of low-level impacts as the remedial criteria were not exceeded.

2.8 Contamination Summary

The report(s) and more recent soil testing has identified the following material exceeding the established remedial criteria:

- 64 Flanagan Road
    - Asbestos is present as ‘asbestos containing material’ above published human health criteria in an area of undocumented fill.
- 108 Flanagan Road
    - Historical fill contains asbestos detected at a concentration equivalent to the human health criterion. Two additional samples from this area contained asbestos below this criterion.
    - Heavy metals (nickel and lead) were identified above the AUP Permitted Activity (environmental) criteria from material at two locations in the historical fill area.

2.8.1 Updated Conceptual Site Model

The CSM from the Aurecon DSI (2021) has been updated to account for the remedial works and validation testing as well as the recent intrusive investigation. This is summarised in Table 2. 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.

Table 2: Conceptual Site Model

Potential Source of Contamination	Potential Pathway	Potential Receptor	Acceptable Risk?
64 Flanagan Road Weathering of fertiliser storage building *[Zinc]*	Soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents	**Yes** Zinc impacted topsoil was likely remediated during removal of site buildings and building materials
	Leaching of contaminants	Surrounding environment	
64 Flanagan Road Fertilizer bulk storage *[Heavy metal / metalloids]*	Soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents	**Yes** Concentrations of heavy metals / metalloids were below relevant remedial criteria
	Leaching of contaminants	Surrounding environment	
64 Flanagan Road Historical fill material from unknown source *[Heavy metals / metalloids, PAHs, Asbestos]*	Soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents	**No** Fragments of asbestos containing fibre cement were identified in undocumented fill
	Leaching of contaminants	Surrounding environment	**Yes** Contaminants of heavy metals / metalloids and PAHs were below environmental discharge criteria
68 Flanagan Road Historical fill material from unknown source *[Heavy metals / metalloids, PAHs, Asbestos]*	Soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents	**Yes** Contaminants of heavy metals / metalloids and PAHs were below relevant remedial criteria while asbestos was not detected
	Leaching of contaminants	Surrounding environment	

Potential Source of Contamination	Potential Pathway	Potential Receptor	Acceptable Risk?
108 Flanagan Road Historical fill material from unknown source *[Heavy metals / metalloids, PAHs, Asbestos]*	Soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents	**Yes** The concentration of contaminants of concern were below the human health criteria in the samples analysed
	Leaching of contaminants	Surrounding environment	**No** Concentrations of lead and nickel exceed the environmental discharge criteria in samples from TP039 and TP035, respectively (Figure 4)

3 Proposed Development Works

The site is former pastoral land that is being developed for commercial use. The majority of the development area will be sealed below buildings or paving (e.g., parking, accessways, roads) with some greenspace / landscaped areas including Hingaia Reserve North on the western side of the development area and in a park in the north-eastern area of site. Development works will require soil disturbance to prepare the ground surface, install foundation elements / subsurface utilities, and achieve the final design contours. Cut / fill plans (Appendix 4) indicate 259,136 m^3 of earthworks within the Stage 2 boundaries.

The extent of earthworks does not include the area of historical fill at 108 Flanagan Road (indicated on attached Figure 4).

3.1 Summary of Relevant Development Activities

Site Preparation

Site preparation activities include site establishment (i.e., mobilisation, erecting fences, and establishing site security) and set-up of stormwater / silt control measures.

Earthworks

All soil disturbance works including excavations for utility installation, construction of building platforms, and foundation excavations.

4 Additional Investigation Works

4.1 Scope – 108 Flanagan Road

An additional assessment of environmental discharge risks is required for the filled area at this address (Figure 4). Although it is outside of the earthworks area, it is within the project area site boundaries and therefore requires assessment. Given the heavy metal exceedances of environmental discharge criteria, a minimum of four shallow groundwater wells will be installed along the hydraulically downgradient edge of the filled area (western and southern boundaries). Two groundwater monitoring events will be performed – one during summer (dry season, low groundwater table) and one during the winter (wet season, high groundwater table). During these monitoring events a surface water sample will also be collected from the gully area (if feasible). Water samples will be analysed for contaminants exceeding environmental discharge criteria in the fill material, namely heavy metals / metalloids. Results will be compared to ANZECC (2000) criteria based on 80% species protection level for freshwater.

Considering the limited area of the fill, age of the fill and anticipated attenuation of any leaching contaminants from this material, it is likely that Controlled Activity clause E30.6.2.1 (4)(a) or (b) of the AUP will be met. However, this will be confirmed during the groundwater and surface water monitoring discussed above (only investigating overland stormwater at the site boundary if deemed to be required based on the results of the proposed monitoring).

If Controlled Activity clause E30.6.2.1 (4)(a) or (b) cannot be met, discretionary activity consent is required and additional assessment and / or remedial works will be required to address the fill material in this portion of the site. The results of this assessment are not considered to affect the planned development of the site; rather, to inform current site conditions and assess whether some additional controls or monitoring may be required to address discharges from the filled area to the surrounding environment.

4.2 Additional Reporting

The results of the additional water monitoring on 108 Flanagan Road discussed above will be summarised in a letter report for submission to Auckland Council.

If contamination is identified that requires modification to the remedial methodology (e.g. during site works or the additional water monitoring works), an updated version of this RAP or addendum to this RAP will be submitted to Auckland Council outlining the proposed amendments to the remediation methodology required as a result of the findings.

5 Consenting

Due to the exceedances of human health criteria within the earthworks area, this RAP is being submitted to Auckland Council in support of a Restricted Discretionary consent under Section 10 of the NESCS.

Further, given the identification of contaminants above environmental discharge criteria in the filled area at 108 Flanagan Road (Figure 4), a long-term discharge consent under the AUP will be required. Investigation and reporting works to support this consent are described in Section 4. The assumption is that the investigation and reporting works will reveal that a controlled or discretionary activity consent will be required under the AUP.

6 Remedial Works

Remedial earthworks will be necessary to remove the undocumented fill at 64 Flanagan Road which was identified to contain fragments of asbestos containing material (Section 2.7).

Currently, the filled area on 108 Flanagan Road (Figure 4) is not planned to be earthworked. As previously discussed, low-level asbestos (below the human health criterion) and elevated heavy metals (above the environmental discharge criteria) have been detected. The requirement to assess further or remediate this area to address the environmental discharge exceedances will be re-visited following completion of the groundwater monitoring discussed in Section 4.1. No remediation to address the low-level asbestos detections is required. However, even if the groundwater results indicate there is no need to remediate this area of site, the presence of this contamination will need to be identified in a long-term monitoring and management plan to ensure this material is appropriately managed into the future.

Note: An overview of the controls required is included in Appendix 5. It is anticipated that this will be displayed on-site for reference.

6.1 Purpose of Remedial Works

The remedial objective is to mitigate risks to future site users and environmental receptors.

6.2 Remedial Options

The following options have been identified for this site.

Off-site Disposal

Removal of soil from site that has been identified as containing contaminants either above the adopted human health criteria or environmental discharge limits.

Off-site disposal at an appropriately licensed landfill facility permanently removes risk to human health and environmental receptors, and also removes the requirement for long-term management.

Re-use

In some situations (generally when contaminant concentrations are below the human health and environmental guidelines but above regional background concentrations) material can be re-used on-site. If human health or environmental criteria are exceeded, management measures are required (e.g. being placed above the high groundwater table and below pavement / building slab if there is an exceedance of environmental criterial).

To ensure appropriate long-term management of the site, as built drawings should be prepared showing the area of the site where impacted material is placed. This will be accomplished by surveying the area prior to, and post, placement of the soil.

Encapsulation / Capping

This remedial strategy is considered to offer a more sustainable approach and be equally or more protective than disposing of this material at a landfill as it minimises disturbance and transport of contaminated material. A suitable capping layer will be placed where impacted material is proposed to be retained *in situ*.

Groundwater monitoring may be required around areas identified as exceeding the environmental discharge criterion to verify that contamination hasn't impacted groundwater and assess the need for a long-term discharge consent.

To ensure appropriate long-term management of the site, as-built drawings will be prepared. This will be accomplished by surveying the site prior to, and post placement of the capping layer. These drawings will confirm adequate placement of the capping layer and also provide information regarding depth of contaminated materials for future site excavation activities.

6.3 Remedial Strategy

The remedial strategy selected for the identified contamination site is removal of soil that has been identified as containing contaminants above the adopted human health and environmental criteria; namely, the undocumented fill at 64 Flanagan Road (Section 2.7).

The approximate remedial area is shown on the figure in Appendix 5 alongside a summary of controls. This figure also notes the areas of low-level asbestos and heavy metal / metalloid contamination for which some additional contaminated land oversight is required.

At this stage it is assumed that no remedial works will be required for the area of fill on 108 Flanagan Road. Groundwater and surface water monitoring is proposed to confirm that this material can remain *in situ* (refer to Sections 4 and 5).

6.4 Remedial Volume Estimate

The area of asbestos-containing undocumented fill has not been fully identified. The table below provides an approximate area and depth of the fill based on conservative assumptions and site topography. It is recommended that ahead of commencing remedial works, the Contaminated Land Specialist visit the site and advance excavator test pits to confirm the undocumented fill extent. This could also be done as the initial step to the remedial works, as noted in Section 6.5 below.

Table 3: Remedial Volume Estimation (based on current dataset)

Remedial Area	Sample Exceeding Relevant Criteria	Analyte Exceedance	Estimated Area of Impact (m^2)	Estimated Vertical Extent of Impacted Material (m bgl)	Estimated Volume Exceeding Remedial Goal (m^3) [2]
Undocumented Fill	Direct Observation of TP05	Asbestos	350	0.4 – 1.0 (0.6 m thick)	210

Notes

[1] Vertical and horizontal extent of contamination within native soils has not been specifically assessed. Depth stated is based on the depths of impacted material analysed during the intrusive investigation (ENGEO, 2024).

[2] Estimated area and volume is likely conservative. Additional sampling can inform this further.

[3] Volume estimate based on average depth of fill.

6.5 Remedial Methodology

Remedial works shall be completed prior to the bulk topsoil strip to minimise the potential for accidental mixing of impacted soils with non-impacted soils.

Remedial works should be undertaken in accordance with the controls listed in this RAP. During the remedial works, a Contaminated Land Specialist shall be engaged to be on-site for commencement of remedial works to confirm extent of undocumented fill is identified for removal. Additional days on-site may be required depending on timing for removal – the objectives of these visits is to verify that earthworks are being conducted in accordance with the agreed methodology and controls listed within this document, including soil validation sampling.

6.6 Assessment Criteria

Currently the only area being remediated is the undocumented fill at address for asbestos. The remedial criteria for asbestos will be referenced from the New Zealand Guidelines for Assessing and Managing Asbestos in Soil (GAMAS; BRANZ, 2017).

For completeness, the full list of remedial criteria source documents is presented below. These additional documents will be referenced in the event that additional contamination is encountered that requires remediation. In this case, the remedial criteria for the site will be selected from the lesser of the human health and environmental discharge criteria for each contaminant.

6.6.1 Human Health Criteria

The following guidelines were used to provide remedial criteria for future site users:

- The soil contaminant standards from the *Methodology for Deriving Contaminants in Soil to Protect Human Health* (“the Methodology”; MfE, 2011a) for commercial / industrial land use have been selected based on the anticipated land use.
- The soil guideline values for commercial / industrial land use from the *New Zealand Guidelines for Assessing and Managing Asbestos in Soil* (GAMAS; BRANZ, 2017).

- In accordance with Contaminated Land Management Guidelines No.2 – *Hierarchy and Application in New Zealand of Environmental Guideline Values* (CLMG 2; MfE, 2011b) for contaminants not listed above.

As discussed in Section 3.2.1 of the *Methodology* (MfE, 2011a), the NESCS does not assess a maintenance or excavation worker exposure scenario as the risks to those workers is more appropriately managed under New Zealand health and safety legislation. Therefore, potential risks to contractors responsible for small scale earthworks are not assessed as part of this investigation. However, the results of this assessment can be used to assist with establishing health and safety procedures and protocols to be implemented during future earthworks.

6.6.2 Environmental Criteria

In the Auckland region, potential discharges to the environment from land containing elevated levels of contaminants are managed through the AUP (AC, 2016). Therefore, the permitted activity criteria in the AUP (Chapter E30 – Contaminated Land) have been adopted as environmental criteria.

6.7 Soil Validation

Soil validation will comprise visual observation for asbestos containing debris within the undocumented fill area of 64 Flanagan Road. Once all observed debris is removed, the sidewalls and base of the remedial excavation will be sampled and tested for asbestos (semi-quantitative analysis). At a minimum, ten soil validation samples will be collected - assumed to comprise six from the sidewalls and four from the base; however, the actual location of validation samples will be decided on based on the shape / extent of the remedial area.

7 Assessment of Environmental Effects

Based on the requirements of Section 88 of the Resource Management Act (RMA, 1991) and the framework set out in the Fourth Schedule of the RMA, the actual and potential environmental effects associated with the proposed works are summarised below (see Table 4).

Asbestos is considered primarily a human health contaminant. The potential adverse effects of asbestos on environmental receptors is not currently understood due to the lack of available research data; as such environmental receptors are not addressed in this risk assessment. Asbestos fibres can, if disturbed in an uncontrolled manner, be transported in the air or stormwater onto other land and so therefore must be controlled.

Mitigation measures (outlined in this document) will be taken to limit stormwater and contaminated soil interaction.

Table 4: Assessment of Environmental Effects

Schedule Four Item	Assessment of Environmental Effects
Description of the proposal.	Resource consent application to excavate and dispose of asbestos impacted material.
Where the activity is likely to result in the significant adverse, a description of the alternatives.	Any actual or potential effects on the environment from the proposed remediation are likely to be minor due to the contaminant properties, site setting, short-term nature of the works and proposed mitigation measures to be employed.
An assessment of actual or potential effects on the environment.	Earthworks shall be conducted in line with consent conditions and mitigation measures discussed herein.
Where the activity includes the discharge of any contaminant, a description of: • Nature of the discharge; • Sensitivity of the receiving environment; and • Alternative methods of discharge.	**Dust** Potential for remedial works to generate minor amounts of dust during the excavation and removal of impacted material is considered low due to the mitigation measures to be employed. Mitigation will involve dust suppression, limiting drop heights and covering truck loads leaving the remedial area. **Stormwater** There is considered to be minimal potential for impact on surface water if suitable control measures are implemented. There this unlikely to an significant discharge to air or stormwater during works.
Any effects on ecosystems including plants, or animals, physical disturbances of habitats in the vicinity.	No significant ecological receptors have been identified within close proximity of the site.
Any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual or cultural, or other special values for present or future generations.	No significant effects anticipated.
Description of the mitigation measures (safeguards and contingency plans) where relevant to the undertaken to help prevent or reduce actual or potential effects.	See Section 8 for mitigation measures to be undertaken during remedial works.
Where the scale or significant of the activity's effect are such that monitoring is required, a description of how, once the proposal is approved, effects will be monitored and by whom.	The scale of the proposal is considered minor, however a suitably qualified and experienced practitioner (SQEP) will be engaged to monitor conditions on-site during the remedial works. The Site Supervisor will also qualitatively assess dust during the proposed remedial works.

Discharges from the land are considered highly unlikely to cause significant adverse effects on the environment following site redevelopment works; therefore, it is concluded that the potential environmental effects associated with the proposed programme of remedial works will be less than minor.

8 Site Management Practices and Controls

The site management practices in this section shall be implemented during all ground-disturbing work unless advised otherwise by the Contaminated Land Specialist (e.g., following identification of cleanfill areas on-site through additional testing). Many of the required control measures are standard construction site procedures; however, the relevance and effectiveness of these protocols shall be reviewed by the Site Supervisor on a daily basis during work at the site. Site management practices will change as potential identified impacts are identified or remediated. These will be communicated by the Contaminated Land Specialist prior to removing controls.

8.1 Site Control Procedures

8.1.1 Boundary Controls

Security fencing and appropriate warning signs should be erected around earthworks areas to prevent unauthorised access.

8.1.2 Sediment Control Measures

Appropriate sediment control measures, designed and installed in accordance with Auckland Council Guideline Document GD2016/005: Erosion and sediment control guide for land disturbing activities in the Auckland Region prepared by Beca Ltd and SouthernSkies Environmental for Auckland Council, 2018, shall be implemented to minimise sediment runoff from the site. Minimum controls shall include:

- A stabilised site entrance to minimise the movement of soil off-site.
- Suitable sediment controls (e.g. silt fencing) placed around the perimeter of the works area.
- Protection measures (filter socks, Enviropods etc.) around stormwater drains where there is a potential for runoff.
- Establishment of clean and dirty areas to minimise tracking of potentially impacted soils on and off-site.

8.1.3 Soil Management

During handling of soil in potential remedial area trucks shall be loaded within the area where runoff and possible spills during loading will be controlled and contained. Loads must be securely covered before the truck leaves the site and during transport.

Outside of remedial areas, soil / fill material being disturbed during redevelopment earthworks is suitable to remain on-site.

8.1.4 Stockpiling

Stockpiling of contaminated material shall be avoided. If temporary stockpiling of material is necessary, dust shall be controlled through wetting. If left overnight, or if the use of water is not suitable, the material may need to be covered (e.g., with plastic) and protected by erosion / sediment controls (e.g., bunded).

8.1.5 Off-site Disposal

Soil must be taken to a facility authorised to accept the contaminants present.

Prior to acceptance, the results of the soil testing, as well as Toxicity Characteristic Leaching Procedure (TCLP) testing, may be requested by the receiving facility. Requirements for additional testing and truck lining / soil wrapping should be confirmed with the receiving site.

Soil that needs to be removed from site may comply with the Auckland Council definition of cleanfill material however further testing is required to confirm this.

8.1.6 Decontamination of Equipment

Machinery used when handling impacted soil shall be cleaned of loose soil in a designated 'wash down' area (e.g. paved area or area of existing hardfill) prior to leaving site. Once loose soil has been removed, the cleaned item can be moved to the clean area. Wastewater generated should not be discharged off-site and should be allowed to drain back into the site.

Imported rock / utilised in the 'wash down area' and / or 'truck loading area' (if relevant) should be disposed of as contaminated material, unless tested.

8.2 Health and Safety Protection Measures

8.2.1 General

All contractor staff, sub-contractors and visitors entering or working in the immediate area of the ground disturbing works shall:

- Be inducted before entering the site or commencing work to ensure they are aware of the potential hazards relating to contaminated soil at the site.
- Avoid unnecessary contact with site soils.
- Wash their hands in a dedicated welfare area prior to eating, drinking, vaping or smoking.

Health and safety incidents shall be reported to the main contractor's health and safety advisor, or equivalent responsible person on-site as soon as practicable after the event.

8.2.2 Personal Protective Equipment (PPE)

To minimise the effects of potential contamination exposure via incidental ingestion of soil from future remedial areas, skin contact with soil, the following should be considered over-and-above standard PPE requirements for construction sites (e.g. safety boots):

- Dust mask (if dust is prevalent).
- Work gloves / Coveralls (if contact with soil unavoidable).
- Disposable gloves.
- Overalls rated type 5, category 3.
- Full face visors if wet conditions and splashes may occur.
- Goggles / safety glasses.

8.3 Environmental Management Procedures

8.3.1 General

All environmental incidents (spills, leaks, breaches to sediment control measures etc.) shall be reported to the Site Supervisor as soon as practicable after the incident.

8.3.2 Dust

Dust shall be managed in accordance with consent requirements and relevant regulations. The contractor shall consider the following (as appropriate):

- Limit vehicle access onto the excavated areas as far as possible.
- Dampen surface soil using a water truck or portable water sprays. Ensure that the volume of water used does not induce soil erosion, or cause surface ponding or runoff, that could discharge into natural water bodies or stormwater drains.
- Use wind screens or avoid work during windy conditions.
- Consider use of surfactants or polymers or covering soil with polythene where a reliable source of water is not available.

In the unlikely event that unsatisfactory dust emissions emanate from the site on a sustained basis, or complaints are received in relation to the works, mitigation of the adverse effects shall be applied in accordance with the hierarchy of control described in the Health and Safety at Work Act 2015 - eliminate the risk, so far as is reasonably practicable; and if it is not reasonably practicable to eliminate a risk, to minimise those risks so far as is reasonably practicable.

If the emission or discharges persist, professional advice shall be sought in order to define appropriate control measures. It is recommended that consultation with appropriate council representatives also be undertaken prior to recommencing works.

8.3.3 Odour

If excavated material is odorous, odour control measures shall be put in place. This could include covering the material with cleanfill, a polythene cover or instituting a deodoriser system.

8.3.4 Stormwater

Uncontrolled discharge of stormwater from areas of ground disturbing activities shall not be permitted. Mitigation of any unexpected discharges (e.g. breaches of sediment control measures) should be implemented immediately. If the on-site erosion and sediment control measures fail, the discharge shall be stopped / minimised as far as practicable by using measures such as hay bales, bunding or excavation of a temporary storage area and a vacuum truck shall be called to site immediately so that the discharge of stormwater from site is eliminated. If such water is to be removed off-site it may be necessary to test the water to identify an appropriate disposal site.

8.3.5 Groundwater

A groundwater assessment was not completed as part of previous investigation(s) at the site (refer Section 0). However, if dewatering is required, or water (surface water or groundwater) has gathered in areas of potential contamination and needs to be removed, it shall be disposed in one of the following ways.

Discharge to Land On-Site

The water may be discharged to land on-site (either directly or after interim storage on-site), provided it complies with the permitted activity standards outlined in Section E4.6.1 and E4.6.2.5 of the AUP (AC, 2016). These controls include restrictions on any changes to colour or visual clarity, odour emissions or effects on aquatic life.

Discharge to Stormwater or Surface Water

Approval shall be sought from Auckland Council prior to discharge to the stormwater or wastewater network.

Note: No free-phase hydrocarbons shall be permitted to be discharged into the stormwater system.

Removal Off-site to an Appropriately Licensed Disposal Facility

An appropriately licensed liquid waste contractor shall be engaged to remove the water using a vacuum truck and to dispose of the water at an appropriately licensed disposal facility. It may be necessary to test the water to identify an appropriate disposal site.

8.4 Controls for Work Involving Asbestos

Asbestos is considered primarily a human health contaminant and hence the objective of the controls for work involving asbestos is to eliminate, as far as reasonably practicable, personal exposure to airborne asbestos on and off-site. Regulation 9(1)(b) of the Health and Safety at Work (Asbestos) Regulations 2016 (HSW(A)R) requires that '*if it is not reasonably practicable to eliminate exposure to airborne asbestos, exposure is minimised so far as is reasonably practicable'*. This is achieved through controls such as those described in this section of the RAP.

The scope of works covered by this document includes the excavation, management and disposal of soil impacted with asbestos and the controls have been designed to meet the Safe Work Practices specified in WorkSafe's Approved Code of Practice (herein referred to as 'the ACOP'; 2016), and the Building Research Association of New Zealand (BRANZ) New Zealand Guidelines for Assessing and Managing Asbestos in Soil (NZGAMAS; 2017), including the requirement for the licensed asbestos removalist to prepare an Asbestos Removal Control Plan for all licensed asbestos removal. As the NZGAMAS is referenced in the WorkSafe ACOP, the guideline or higher level of controls are required to be adhered to.

The NZGAMAS introduces varying controls commensurate with the risk level based on the amount of asbestos identified in soil, and if applicable, air.

Given the low concentrations of ACM and / or asbestos fibres detected in soil within the earthworks areas (below 0.001% w/w), and with suitable controls, we anticipate that fibre concentrations within air will not exceed trace levels. Trace level is defined in the HSW(A)R as '*in air, an average concentration of less than 0.01 respirable asbestos fibres per millilitre of air*'.

8.4.1 Adopted Asbestos Controls

Due to the presence of asbestos containing cement fragments in the undocumented fill at 64 Flangan Road (Section 2.7), remedial earthworks is considered 'asbestos related works.' This area is indicated on the figure within Appendix 5 – Remedial Extent and Site Controls. Relevant asbestos specific controls are included in Appendix 6

Earthworks in the asbestos-impacted farm dump and isolated farm shed footprint at 120 Flanagan Road is considered ‘unlicensed asbestos work’ due to the low concentrations of identified asbestos fibres in the soil. Indicated as two green points in Appendix 5.

Additional asbestos controls for other types of work involving asbestos are included in Appendix 6 in the event that additional asbestos impacts are encountered during earthworks.

9 Unanticipated Ground Conditions

Should any unanticipated contaminated material be uncovered during earthworks, works shall stop in that area and a SQEP from the Contaminated Land Specialist company shall be called out to assess the potential risk and advise on what measures should be taken to manage the soil in that area.

Typical indicators of contamination include but are not limited to:

- Buried waste (for example drums or tanks with unknown liquid).
- Odour (petroleum hydrocarbons, oil).
- Discoloured soil (black, purple, or green staining most common).
- Asbestos containing materials (ACM) as fragments visible with the naked eye.
- Uncontrolled fill material.

Examples of typical indicators of contamination have been provided in Table 5.

Table 5: Typical Indicators of Contamination

Uncontrolled Filling Building debris may contain asbestos or other contaminants.	 
Asbestos Containing Material Intact sheets or broken into smaller pieces, may be mixed with other material.	
Separate-phase Hydrocarbons Black liquid, odours, sheen	

10 Documentation

In order to demonstrate that the requirements of this RAP have been adhered to, the documents listed in Table 6 should be forwarded to the Contaminated Land Specialist company in the timeframes stipulated. These documents will be included in a completion report for the site (discussed in Section 11).

Table 6: Contractor Documentation

Prior to Earthworks Commencing	• Written confirmation from the proposed disposal site(s) confirming that they are able to accept material from the site and stating which type of material. • For any material that is to be imported to the site as cleanfill on the basis of direct testing, a copy of the analytical laboratory test report must be provided prior to transport.

Within Two Weeks of Ground Disturbing Works Being Completed (on-site or within an area of site) or on an ongoing basis during works	• Daily site photographs showing the site entrance, the area of work, sediment control measures and any stockpiles resulting from the works.
	• A site plan showing any areas where site-won material (cleanfill or controlled material only) has been reused.
	• **Disposal dockets** for each load of material that is removed from the site. The dockets should contain the following information:
	  ○ Date and time dispatched.
	  ○ Material description.
	  ○ The volume of material in the load.
	  ○ Haulage contractor details (name, address, contact person, contact telephone number).
	  ○ Truck and trailer registration number.
	  ○ The destination of material.
	• Documentation for **all imported fill** which shall include:
	  ○ Date and time dispatched.
	  ○ Address of source site.
	  ○ Type and proposed use of material.
	  ○ Weight and / or volume of material carried.
	  ○ Basis for treating the material as cleanfill (e.g., directly tested and confirmed to be cleanfill or virgin excavated natural material (VENM) directly sourced from a licensed quarry).
	• Information relating to any incidents or complaints and how these were managed.

11 Completion Reporting

A Summary of Works Report or Site Validation Report will likely be required following completion of ground disturbing works. The report shall be prepared in accordance with MfE Contaminated Land Management Guideline No. 1 (2021) by a Contaminated Land Specialist SQEP who has monitored the ground disturbing works on-site. The report shall, as a minimum, include the following information:

- Summary of soil disturbance works on-site and information relating to discovery of additional contamination, or site observations.
- Summary of the remedial works undertaken, including the location and dimensions of the excavations carried out and the volume of soil excavated and / or capping undertaken.
- Documentation relating to the disposal of contaminated soil / fill and used PPE.
- Documentation relating to the importation of cleanfill (if relevant).
- Results of any validation sampling works.
- An assessment indicating whether soils on-site present an unacceptable risk to human health or environmental receptors and the need for long term controls or consents. This includes the filled area on 108 Flanagan Road, which by this time will have undergone additional groundwater and surface water monitoring (refer to Sections 4 and 5).

12 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, Woods Limited, 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

Vincent Pettinger, CEnvP

Environmental Scientist

Report reviewed by

Erika McDonald, CMEngNZ

Principal Environmental Engineer

13 References

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FIGURES

Legend

Site Boundary

0 50 m 100 m

ENGEO

Produced by **Datanest.earth**

Title: Site Location Plan		
Client: Woods Limited		Size: A4
Project: Drury - Stage 2 Fast Track	Drawn: VP	Figure No.: 1
Date: 29-11-2024	Checked: EM	
Proj No: 13451.002.001	Scale: 1:5000	Version: 2.0

Legend

- Site Boundary
- ENGEO (2017) Fill Characterisation
- Aurecon (2021) Investigation Locations
- ENGEO (2024) Delineation Sample Locations
- CMW (2024) Test Pit Excavation
- Former Retaining Wall

0 5 m 10 m

ENGEO

Produced by **Datanest.earth**

Title: 64 Flanagan Road - Investigations Plan		
Client: Woods Limited		Size: A3
Project: Drury - Stage 2 Fast Track	Drawn: CC	Figure No.: 1
Date: 02-12-2024	Checked: EM	
Proj No: 13451.003.001_01	Scale: 1:297	Version: draft

Legend

- Site Boundary
- ENGEO (2017) Fill Characterisation
- ENGEO (2023) Characterisation Samples

0 10 m 20 m

ENGEO

Produced by **Datanest.earth**

Title: 68 Flanagan Road - Identified Fill Locations		
Client: Woods Limited		Size: A4
Project: Drury - Stage 2 Fast Track	Drawn: VP	Figure No.: 3
Date: 03-12-2024	Checked: EM	
Proj No: 13451.002.001	Scale: 1:850	Version: 2.0

Legend

- Site Boundary
- Aurecon (2021) Investigation Locations
- Historical Fill Area (Aurecon DSI, 2021)
- Cut / Fill Extent (Woods: P23-315-02-1200-EW and P23-315-04-2000-RD)

0 25 m 50 m

© Mapbox

ENGEO

Produced by **Datanest.earth**

Title: 108 Flanagan Rd - Historical Fill Extent		
Client: Woods Limited		Size: A4
Project: Drury - Stage 2 Fast Track	Drawn: VP	Figure No.: 4
Date: 26-02-2025	Checked: EM	
Proj No: 13451.003.001_01	Scale: 1:1500	Version: 3.0

Legend

- Site Boundary
- Aurecon (2021) Investigation Locations
- ENGEO (2024) Delineation Sample Locations

0 10 m 20 m

ENGEO

Produced by **Datanest.earth**

Title: 120 Flanagan Road - Farm Dump		
Client: Woods Limited		Size: A4
Project: Drury - Stage 2 Fast Track	Drawn: VP	Figure No.: 8
Date: 03-12-2024	Checked: EM	
Proj No: 13451.002.001	Scale: 1:750	Version: 2.0

APPENDIX 1:

Aurecon Results Summary

Table E.2
Environmental Soil Results

aurecon

	Metals							TPH				PAH											
	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Nickel	Zinc	C7-C9	C10-C14	C15-C36	C7-C36	PAHs (Sum of total)	Benzo(a)pyrene	Perylene	1-Methylnaphthalene	2-methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Auckland Unitary Plan - Chapter E30 - Background - Volcanic Soils.	*12*	*0.65*	*125*[#1]	*90*	*65*[#2]	*320*	*1,160*																
Auckland Unitary Plan - Chapter E30 - Permitted Activity Criteria.	100	7.5	400[#3]	325	250	105	400														20[#4]		
Hazardous Waste Guidelines - Landfill WAC & Landfill Classification - Class A	100	20	100[#6]	100	100	200	200														300		
Module 4, Tier 1 Residential (SANDY SILT)								500 | 500 | 3,800[#13][#14][#15]	510 | 670 | 1,000[#13][#14][#15]														
0-1m								500[#13]	510[#15]														
1-4m								500[#13]	670[#15]														
>=4m								3,800[#14]	1,000[#14]														
NESCS - High density residential	45	230[#18]	1,500[#19]	10,000[#20]	500[#21]																		
NESCS - Commercial / Industrial	70	1,300[#18]	6,300[#19]	10,000[#20]	3,300[#21]																		

Lab Report Number	Field ID	Date																						
2509315_2	SS001 0.1-0.2	15/01/2021	*16*	*2.0*	35	44	14.4	56	280					<0.3	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011
2509315_2	SS003 0.1-0.2	15/01/2021	*17*	*2.2*	32	37	*86*	50	*2,500*					<0.4	0.016	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	0.015	0.018	0.016	<0.013
2509315_2	SS005 0.1-0.2	13/01/2021	6	<0.10	16	5	29	5	19					<0.3	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012
2509315_2	SS008 0.1-0.2	13/01/2021	*47*	0.38	47	45	29	9	220					<0.3	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	0.012	<0.012	<0.012
2509315_2	SS009 0.1-0.2	13/01/2021	9	0.60	21	29	27	10	171					<0.4	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
2509315_2	SS012 0.1-0.2	20/01/2021	*7*	*0.81*	19	16	40	8	210					<0.3	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013
2509315_2	SS013 0.1-0.2	15/01/2021	11	*0.81*	26	20	*66*	9	98					<0.4	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013
2509315_2	SS016 0.1-0.2	15/01/2021	11	0.39	23	25	*100*	8	96					<0.4	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
2509315_2	SS017 0.1-0.2	13/01/2021	9	0.52	20	21	*126*	9	129					2.7	0.21	0.067	<0.013	<0.013	<0.013	0.071	0.051	0.21	0.29	0.22	0.129
2509315_2	SS019 0.1-0.2	13/01/2021	*19*	0.51	23	26	26	8	121					<0.4	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
2509315_2	SS021 0.1-0.2	13/01/2021	6	0.24	*146*	39	18.4	37	75					<0.3	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012
2509315_2	SS023 0.1-0.2	13/01/2021	8	0.23	77	24	*128*	20	129					<0.4	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
2509315_2	SS025 0.1-0.2	20/01/2021	8	0.18	21	23	19.3	26	87					<0.3	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011
2509315_2	SS028 0.1-0.2	15/01/2021	*16*	0.51	22	24	48	15	130					<0.3	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012
2509315_2	SS030 0.1-0.2	15/01/2021	*33*	0.53	33	90	*250*	12	260					<0.4	0.016	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	0.017	0.019	<0.013	<0.013
2509315_2	SS032 0.1-0.2	13/01/2021	11	0.48	97	33	12.3	19	156																
2509315_2	SS034 0.1-0.2	13/01/2021	3	0.57	*115*	36	10.0	30	131																
2509315_2	SS035 0.1-0.2	15/01/2021	10	0.48	43	45	*850*	12	420					62	3.9	1.49	0.018	0.026	0.022	0.57	0.72	4.9	6.2	4.6	2.5
2509315_2	SS037 0.1-0.2	15/01/2021	*19*	*1.0*	25	48	*1,410*	17	940					3.3	0.21	0.069	<0.016	<0.016	<0.016	0.032	0.041	0.25	0.31	0.23	0.126
2509315_2	SS040 0.1-0.2	15/01/2021	12	0.23	15	18	24	9	250					0.6	0.038	0.012	<0.012	<0.012	<0.012	<0.012	0.014	0.050	0.061	0.046	0.024
2509315_2	SS043 0.1-0.2	18/01/2021	11	0.54	30	28	*4,200*	14	480					20	1.37	0.49	<0.012	<0.012	<0.012	0.22	0.194	1.48	2.0	1.61	0.86
2509315_2	SS045 0.1-0.2	18/01/2021	*38*	0.62	29	51	*118*	10	141					0.4	0.032	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	0.033	0.047	0.038	0.018
2509315_2	SS046 0.1-0.2	18/01/2021	10	0.28	16	14	*68*	8	102					0.5	0.039	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	0.041	0.055	0.040	0.022
2509315_2	SS050 0.1-0.2	13/01/2021	*14*	*2.1*	26	*630*	*870*	14	*1,620*					<0.3	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012
2509315_2	SS051 0.1-0.2	15/01/2021	10	*0.7*	20	33	*71*	11	470					<0.3	0.014	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	0.023	0.021	0.016	<0.013
2509315_2	SS053 0.1-0.2	15/01/2021	11	0.44	21	29	40	9	199					<0.3	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013
2509315_2	SS054 0.1-0.2	15/01/2021	11	0.51	22	24	*72*	9	151					<0.3	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013
2509315_2	SS055 0.1-0.2	13/01/2021	*14*	0.46	23	27	*91*	20	340					<0.3	0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	0.019	0.019	0.013	<0.013
2509315_2	SS058 0.1-0.2	13/01/2021	*18*	*1.04*	36	43	*1,890*	14	900					1.3	0.051	<0.013	<0.013	<0.013	<0.013	<0.013	0.046	0.075	0.049	0.045	0.026
2509315_2	SS059 0.1-0.2	13/01/2021	9	0.63	24	52	*1,950*	9	1,010					<0.3	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013
2509315_2	SS061 0.1-0.2	13/01/2021	*54*	0.42	36	59	*440*	10	290					<0.4	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
2509315_2	SS063 0.1-0.2	13/01/2021	*7*	0.28	*26*	11	*700*	6	210					<0.3	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013
2509315_2	TP035_1 0.1-0.2	14/01/2021	5	0.38	20	21	25	19	81	<8	<20	<40	<70	0.5	0.031	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	0.036	0.046	0.035	0.018
2509315_2	TP035_3 1.8-1.9	14/01/2021	3	0.23	14	20	45	14	81	<8	<20	<40	<70	<0.3	0.018	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	0.023	0.028	0.021	<0.013
2509315_2	TP035_4 2.9-3.0	14/01/2021	11	0.19	18	*173*	*172*	*470*	78									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2509315_2	TP036_1 0.1-0.2	14/01/2021	4	0.32	20	14	21	12	70	<8	<20	<40	<70	<0.3	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012
2509315_2	TP036_3 2.1-2.2	14/01/2021	9	*3.7*	22	46	63	26	131	<8	<20	<40	<70	0.4	0.028	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	0.031	0.040	0.029	0.015
2509315_2	TP036_4 2.5-2.6	14/01/2021	7	*5.2*	23	34	*97*	14	*270*	<8	<20	47	<70	<0.4	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
2509315_2	TP037_1 0.1-0.2	14/01/2021	8	0.39	26	36	61	20	110	<8	<20	<40	<70	0.7	0.045	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	0.047	0.068	0.042	0.027
2509315_2	TP037_3 1.0-1.1	14/01/2021	*13*	0.24	28	34	56	32	440	<8	<20	<40	<70	0.8	0.044	0.040	<0.015	<0.015	<0.015	<0.015	<0.015	0.053	0.070	0.051	0.031
2509315_2	TP039_1 0.1-0.2	14/01/2021	*47*	*4.3*	41	*98*	95	13	1,140	<8	<20	<40	<70	<0.4	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
2509315_2	TP039_3 1.6-1.7	14/01/2021	8	*1.48*	29	76	*300*	42	1,040	<8	<20	52	<70	0.8	0.059	0.019	<0.012	<0.012	<0.012	<0.012	<0.012	0.058	0.090	0.063	0.036
2509315_2	TP039_4 2.9-3.0	14/01/2021	4	0.17	41	12	17.3	14	89	<8	<20	<40	<70	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2509315_2	TP040_1 0.1-0.2	15/01/2021	7	0.63	59	23	49	14	*460*	<9	<20	<40	<70	<0.4	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
2509315_2	TP040_3 1.9-2.0	15/01/2021	5	<0.10	*300*	32	5.5	28	49	<9	<20	<40	<70	<0.4	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
2509315_2	TP041_1 0.1-0.2	14/01/2021	6	0.24	19	18	30	13	240	<8	<20	<40	<70	<0.4	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	0.013	<0.013	<0.013
2509315_2	TP041_3 2.6-2.7	14/01/2021	5	0.34	26	22	43	26	151	<10	<20	<40	<70	<0.4	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016

Comments
#1 Value for total chromium. Work suggests special cases have been found to apply for Ti Point Basalts (Cr), Mt Smart Volcanics (Pb) and as such these lithologies need to be considered individually.
#2 Work suggests special cases have been found to apply for Ti Point Basalts (Cr), Mt Smart Volcanics (Pb) and as such these lithologies need to be considered individually.
#3 Value is for total chromium
#4 Value is for benzo (a) pyrene (equivalent)
#5 Total DDT includes the sum of DDT (dichlorodiphenyltrichloroethane), DDD (dichlorodiphenyldichloroethane) and DDE (dichlorodiphenyldichloroethylene).
#6 Refer to value for Chromium (VI)
#7 Refer to value for Xylene (m,o,p)
#8 Refer to value for Dibromochloromethane.
#9 Refer to value for 1,2 Dichloroethene
#10 Refer to value for 1,3 Dichloropropene
#11 Refer to value for Endosulfan
#12 Refer to value for Carbon disulphide
#13 RSPH m
#14 RSPH v
#15 RSPH x
#16 v
#17 p
#18 Default value is for pH of 5. Concentrations increase with increasing pH (see methodology).
#19 Value for hexavalent chromium
#20 No limit. Derived value exceeds 10,000 mg/kg.
#21 Value is for inorganic lead
#22 The SCS value is applicable to either dieldrin or aldrin separately, or to the sum of aldrin and dieldrin if both are involved.
#23 DDT (as the sum of DDT and its metabolites DDD and DDE)

Environmental Standards
Auckland Council, 2016, Auckland Unitary Plan - Chapter E30 - Background - Volcanic Soils.
Auckland Council, 2016, Auckland Unitary Plan - Chapter E30 - Permitted Activity Criteria.
MfE, 2004, Hazardous Waste Guidelines - Landfill WAC & Landfill Classification - Class A
Ministry for the Environment, August 1999, Module 4, Tier 1 Residential (SANDY SILT)
Ministry for the Environment, 2012, NESCS - High density residential
Ministry for the Environment, 2012, NESCS - Commercial / Industrial

Project: Drury Precinct
Ref: 510611

Table E.3
Asbestos Soil Results

aurecon

			Asbestos																
			Asbestos in soil (<2mm AF/FA)		<2mm Subsample Weight	As Received Weight	Asbestos as Asbestos Fines as % of Total Sample	Asbestos as Fibrous Asbestos as % of Total Sample	Asbestos in ACM as % of Total Sample	Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample	Dry Matter	Dry Weight	Freon 113	Sample Fraction <10mm to >2mm	Sample Fraction >10mm	Weight of Asbestos as Asbestos Fines (Friable)	Weight of Asbestos as Fibrous Asbestos (Friable)	Weight of Asbestos in ACM (Non-Friable)
		Unit	g dry wt		g dry wt	g	% w/w	% w/w	% w/w	% w/w	g/100g as rcvd	g	mg/kg	g dry wt	g dry wt	g dry wt	g dry wt	g dry wt
		BRANZ (2017) - Residential								0.001								
2509328_1	SS005 0.1-0.2	13/01/2021	347.9		57.6	714.2	<0.001	<0.001	<0.001	<0.001	-	623.0	-	272.8	<0.1	0.00008	<0.00001	<0.00001
2509328_1	SS008 0.1-0.2	13/01/2021	293.7		52.8	531.5	<0.001	<0.001	<0.001	<0.001	-	426.6	-	118.9	13.6	<0.00001	<0.00001	<0.00001
2509328_1	SS009 0.1-0.2	13/01/2021	182.5		56.0	612.0	<0.001	<0.001	<0.001	<0.001	-	397.1	-	213.8	<0.1	<0.00001	<0.00001	<0.00001
2509328_1	SS012 0.1-0.2	15/01/2021	155.2		59.9	444.7	<0.001	<0.001	<0.001	<0.001	-	348.8	-	192.7	<0.1	0.00003	<0.00001	<0.00001
2509328_1	SS013 0.1-0.2	15/01/2021	117.1		56.2	670.5	<0.001	<0.001	<0.001	<0.001	-	509.3	-	320.9	70.9	0.00006	<0.00001	<0.00001
2509328_1	SS016 0.1-0.2	15/01/2021	232.8		54.6	592.1	<0.001	<0.001	<0.001	<0.001	-	446.1	-	180.6	31.8	<0.00001	<0.00001	<0.00001
2509328_1	SS017 0.1-0.2	13/01/2021	225.5		52.5	573.6	<0.001	<0.001	<0.001	<0.001	-	447.6	-	206.4	15.0	<0.00001	<0.00001	<0.00001
2509328_1	SS019 0.1-0.2	13/01/2021	135.3		55.1	635.9	<0.001	<0.001	<0.001	<0.001	-	480.4	-	220.5	124.3	<0.00001	<0.00001	<0.00001
2509328_1	SS028 0.1-0.2	15/01/2021	304.8		60.0	648.0	<0.001	<0.001	<0.001	<0.001	-	546.4	-	155.0	85.6	<0.00001	<0.00001	<0.00001
2509328_1	SS030 0.1-0.2	15/01/2021	309.0		59.2	575.9	<0.001	<0.001	<0.001	<0.001	-	425.1	-	109.9	5.6	<0.00001	<0.00001	<0.00001
2509328_1	SS035 0.1-0.2	15/01/2021	280.4		55.1	636.4	<0.001	<0.001	<0.001	<0.001	-	503.8	-	206.1	16.1	<0.00001	<0.00001	<0.00001
2509328_1	SS037 0.1-0.2	15/01/2021	176.7		56.8	450.6	<0.001	<0.001	<0.001	<0.001	-	289.9	-	104.5	8.3	<0.00001	<0.00001	<0.00001
2509328_1	SS040 0.1-0.2	15/01/2021	169.0		55.1	360.5	<0.001	<0.001	<0.001	<0.001	-	270.9	-	90.9	10.2	<0.00001	<0.00001	<0.00001
2509328_1	SS043 0.1-0.2	18/01/2021	322.5		58.0	573.9	<0.001	<0.001	<0.001	<0.001	-	464.6	-	141.1	<0.1	<0.00001	<0.00001	<0.00001
2509328_1	SS045 0.1-0.2	18/01/2021	338.6		55.9	530.1	<0.001	<0.001	<0.001	<0.001	-	391.6	-	50.9	2.2	<0.00001	<0.00001	<0.00001
2509328_1	SS046 0.1-0.2	18/01/2021	194.9		51.5	527.3	<0.001	<0.001	<0.001	<0.001	-	394.0	-	198.0	<0.1	<0.00001	<0.00001	<0.00001
2509328_1	SS050 0.1-0.2	13/01/2021	446.9		56.8	769.6	<0.001	<0.001	<0.001	<0.001	-	653.8	-	183.0	23.1	<0.00001	<0.00001	<0.00001
2509328_1	SS051 0.1-0.2	15/01/2021	238.7		56.3	553.5	<0.001	<0.001	<0.001	<0.001	-	414.4	-	118.0	57.3	<0.00001	<0.00001	<0.00001
2509328_1	SS053 0.1-0.2	15/01/2021	174.8		59.7	687.3	<0.001	<0.001	<0.001	<0.001	-	545.4	-	199.2	171.0	<0.00001	<0.00001	<0.00001
2509328_1	SS054 0.1-0.2	15/01/2021	216.8		58.1	652.0	<0.001	<0.001	<0.001	<0.001	-	499.2	-	273.6	8.7	<0.00001	<0.00001	<0.00001
2509328_1	SS055 0.1-0.2	13/01/2021	277.6		54.1	605.5	<0.001	<0.001	<0.001	<0.001	-	472.7	-	185.1	9.8	<0.00001	<0.00001	<0.00001
2509328_1	SS058 0.1-0.2	13/01/2021	291.9		56.4	681.2	<0.001	<0.001	<0.001	<0.001	-	507.1	-	210.1	5.0	<0.00001	<0.00001	<0.00001
2509328_1	SS059 0.1-0.2	13/01/2021	228.6		57.6	533.0	<0.001	<0.001	<0.001	<0.001	-	423.8	-	189.2	5.6	<0.00001	<0.00001	<0.00001
2509328_1	SS061 0.1-0.2	13/01/2021	221.6		57.9	547.7	<0.001	<0.001	<0.001	<0.001	-	359.0	-	131.2	6.0	0.00006	<0.00001	<0.00001
2509328_1	SS063 0.1-0.2	13/01/2021	254.7		52.8	598.6	<0.001	<0.001	<0.001	<0.001	-	469.3	-	211.6	3.0	<0.00001	<0.00001	<0.00001
2509328_1	TP035_1 0.1-0.2	14/01/2021	524.4		58.3	755.6	<0.001	<0.001	<0.001	<0.001	-	621.4	-	73.5	23.5	<0.00001	<0.00001	<0.00001
2509328_1	TP035_3 1.8-1.9	14/01/2021	223.4		57.9	713.2	<0.001	<0.001	0.245	<0.001	-	569.2	-	260.5	84.3	0.00288	<0.00001	1.3952
2509328_1	TP036_1 0.1-.02	14/01/2021	467.6		50.0	668.5	<0.001	<0.001	<0.001	<0.001	-	561.0	-	44.2	48.7	0.00032	<0.00001	<0.00001
2509328_1	TP036_3 2.1-2.2	14/01/2021	261.1		57.0	722.3	0.001	<0.001	<0.001	0.001	-	596.8	-	229.4	105.1	0.00613	<0.00001	<0.00001
2509328_1	TP037_1 0.1-0.2	14/01/2021	326.6		52.7	683.8	<0.001	<0.001	<0.001	<0.001	-	522.3	-	155.6	38.4	<0.00001	<0.00001	<0.00001
2509328_1	TP037_3 1.0-1.1	14/01/2021	255.8		58.1	729.8	<0.001	<0.001	<0.001	<0.001	-	576.4	-	146.1	172.9	<0.00001	<0.00001	<0.00001
2509328_1	TP039_1 0.1-0.2	14/01/2021	284.0		58.9	543.8	<0.001	<0.001	<0.001	<0.001	-	406.1	-	106.5	14.6	<0.00001	<0.00001	<0.00001
2509328_1	TP039_3 1.6-1.7	14/01/2021	297.2		56.3	596.2	<0.001	<0.001	<0.001	<0.001	-	470.0	-	121.3	51.0	<0.00001	<0.00001	<0.00001
2509328_1	TP040_1 0.1-0.2	15/01/2021	252.3		55.6	712.4	<0.001	<0.001	<0.001	<0.001	-	518.8	-	246.4	17.8	<0.00001	<0.00001	<0.00001
2509328_1	TP040_3 1.9-2.0	15/01/2021	258.4		57.6	679.6	<0.001	<0.001	<0.001	<0.001	-	466.7	-	190.3	17.2	0.00135	<0.00001	<0.00001
2509328_1	TP041_1 0.1-0.2	14/01/2021	431.4		58.4	740.0	<0.001	<0.001	<0.001	<0.001	-	580.6	-	138.8	8.5	<0.00001	<0.00001	<0.00001
2509328_1	TP041_3 2.6-2.7	14/01/2021	280.3		57.0	691.3	<0.001	<0.001	<0.001	<0.001	-	563.7	-	180.3	101.3	<0.00001	<0.00001	<0.00001

APPENDIX 2:

Results

Results Table 1: Soil Results

			Heavy Metals / Metalloids								Polycyclic Aromatic Hydrocarbons																				Asbestos (% w/w)	
											Benzo[a]pyrene Toxicity Equivalent Quotient										Other Polycyclic Aromatic Hydrocarbons												
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Benzo[a]anthracene	Benzo(b&j)fluoranthene	Benzo(k)fluoranthene	Benzo[a]pyrene	Chrysene	Dibenz[a,h]anthracene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Benzo[a]pyrene TEQ	Methylnaphthalene, 1-	Methylnaphthalene, 2-	Acenaphthene	Acenaphthylene	Anthracene	Benzo[e]pyrene	Benzo(g,h,i)perylene	Fluorene	Naphthalene	Perylene	Phenanthrene	Pyrene	Asbestos as ACM	Asbestos as AF/FA
Human Health Criteria - Commercial / Industrial [1]			70	1300	6300 [4]	10000 [5]	3300 [6]	4200 [7]	6000 [8]	400000	#N/A	- [9]	- [9]	- [9]	- [9]	- [9]	- [9]	- [9]	35 [10]	0.77 [11]	3000 [11]	45000 [11]	NGV [12]	2E+05 [11]	73 [11]	NGV [12]	30000 [11]	170 [13]	67 [11]	50 [14]	NA [15]	0.05 [16]	0.001 [16]
Environmental Discharge Criteria (AUP) [2]			100	7.5	400	325	250	0.75	105	400	#N/A	NA [9]	NA [9]	NA [9]	NA [9]	NA [9]	NA [9]	NA [9]	20 [10]	-	-	NGV [12]	NGV [12]	32 [12]	-	NGV [12]	-	0.043 [17]	-	[12]	1.2 [17]	-	-
Background (Auckland Non-Volcanic Soils) [3]			**0.4 - 12**	**< 0.1 - 0.65**	**2 - 55**	**1 - 45**	**< 1.5 - 65**	**<0.03 - 0.45**	**0.9 - 35**	**9 - 180**	#N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample Location	**Depth (m bgl)**	**Generalised Material Type**	**Date Sampled**																													
TP01	0.0-0.3	Gravel Fill	27-Nov-24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD
TP02	0.0-0.3	Gravel Fill	27-Nov-24	10	**2.6**	45	**124**	27	< 0.1	**47**	**182**	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.026	< 0.011	< 0.014	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.06	< 0.011	< 0.011	< 0.011	NAD	NAD
TP03	0.0-0.4	Gravel Fill	27-Nov-24	10	**0.89**	23	**46**	38	0.13	22	167	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.027	< 0.011	< 0.014	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.06	< 0.011	< 0.011	< 0.011	NAD	NAD
TP04	0.2-0.5	Reworked Native	27-Nov-24	4	0.22	10	12	30	0.11	6	42	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.031	< 0.013	< 0.016	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.07	< 0.013	< 0.013	< 0.013	NAD	NAD
TP05	0.4-1.0	Silty Fill	27-Nov-24	8	0.63	23	28	30	0.16	17	122	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.032	< 0.013	< 0.017	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.07	< 0.013	< 0.013	< 0.013	NAD	NAD
	1.0-1.05	Stained Native	27-Nov-24	6	**1.06**	21	22	29	< 0.1	16	121	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.028	< 0.012	< 0.015	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	< 0.06	< 0.012	< 0.012	< 0.012	-	-
TP06	0.2-1.3	Refuse Fill	27-Nov-24	3	< 0.1	10	11	20	< 0.1	4	30	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.032	< 0.013	< 0.017	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.07	< 0.013	< 0.013	< 0.013	NAD	NAD
TP07	0.0-1.0	Gravel Fill	27-Nov-24	7	0.26	25	25	19.5	0.11	18	83	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.027	< 0.011	< 0.014	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.011	< 0.06	< 0.011	< 0.011	< 0.011	NAD	NAD
SS003 (Aurecon)	0.1-0.2	Topsoil	15-Jan-21	**17**	**2.2**	32	37	**86**	-	**50**	**2500**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS003 (ENGEO)		Silty Fill	27-Nov-24	-	-	-	-	-	-	-	57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS003A	Surface	Silty Fill	27-Nov-24	-	-	-	-	-	-	-	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS003C	Surface	Silty Fill	27-Nov-24	-	-	-	-	-	-	-	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS003E	Surface	Silty Fill	27-Nov-24	-	-	-	-	-	-	-	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SS003G	Surface	Silty Fill	27-Nov-24	-	-	-	-	-	-	-	81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA21	0.25-0.6	Reworked Native	2-Dec-24	7	<0.1	20	26	34	0.29	12	42	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.035	<0.015	<0.03	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.08	<0.015	<0.015	<0.015	NAD	NAD

Table Notes:
All results and criteria are presented in milligram per kilogram (mg/kg) on a dry weight basis, except asbestos which is reported as % weight of asbestos / weight of sample (%w/w)
Results below Limit of Reporting or exceeding no criteria are shown in grey text
- : not analysed or no applicable criteria
m bgl: metres below ground level
ACM: Asbestos Containing Material; AF/FA: Asbestos Fines / Fibrous Asbestos; NAD: No Asbestos Detected

Criteria notes:
1: Human Health Criteria for Commercial / Industrial Land use selected in general accordance with CLMG No. 2 (MfE, 2011). Unless otherwise stated, criteria are from MfE (2011) Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health (Commercial / Industrial Land Use)
2: Permitted activity standards selected in accordance with Section E30.6.1.4 of the Auckland Unitary Plan (Auckland Council, 2016).
3: Background Ranges of Trace Elements in Auckland Soils (Auckland Regional Council Technical Publication No. 153 (October, 2001). Background ranges from Table 3 (Non-Volcanic Range)
4: Criterion applies to Cr(VI). Conservatively applied to total Cr laboratory result
5: No limit; 10,000 mg/kg conservatively applied. Derived human health value exceeds values likely to be encountered on-site and phytotoxicity threshold
6: Applies to inorganic lead only
7: Applies to inorganic mercury only
8: Australian National Environment Protection (Assessment of Site Contamination) Measure 2013; Health Investigation Levels for 'Commercial / Industrial D' Land Use
9: Included in Benzo[a]pyrene TEQ; individual criteria not presented
10: Benzo[a]pyrene Toxicity Equivalency Quotient calculated in accordance with MfE (2011) Methodology
11: US EPA Regional Screening Levels for Industrial Soil; values for TR = 10^{-6}, THQ = 1.0. Retrieved from online database April, 2024.
12: Canadian Council for Ministers for the Environment (CCME) Soil Quality Guidelines for the Protection of Environmental and Human Health (retrieved from online database April, 2024). Criteria for commercial land use
13: Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011) (MfE, 2011). Soil Acceptance Criteria for Commercial/Industrial Use; Most conservative value for any soil type and contamination depth
14: Canadian Council for Ministers for the Environment (CCME) Soil Quality Guidelines for the Protection of Environmental and Human Health (retrieved from online database April, 2024). Criteria for commercial land use; Interim Soil Quality Criteria calculated in 1991. Updated value was not calculated in 2010 due to no guideline for soil contact being available, however the guideline for protection of freshwater life was calculated at 0.046 mg/kg.
15: Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011) (MfE, 2011). Soil Acceptance Criteria for Commercial/Industrial Use; Most conservative value for any soil type and contamination depth; calculated value exceeds concentration likely to result in separate-phase hydrocarbons
16: New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ, 2017). Soil Guidelines Values for Commercial and Industrial land use; criteria as %w/w on a dry weight basis
17: Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011) (MfE, 2011). Criteria for Protection of Groundwater from Table 4.20; Most conservative value for any soil type, contamination depth and groundwater depth

APPENDIX 3:

Laboratory Transcripts

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Hamilton 3240 New Zealand

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Certificate of Analysis

Client:	Engeo Limited	**Lab No:**	3726979	SPv1
Contact:	Erika McDonald	**Date Received:**	28-Nov-2024	
	C/- Engeo Limited	**Date Reported:**	03-Dec-2024	
	PO Box 305136	**Quote No:**	82742	
	Triton Plaza	**Order No:**		
	Auckland 0757	**Client Reference:**	13451	
		Submitted By:	Vincent Pettinger	

Sample Type: Soil

Sample Name:		TP04 0.2-0.5	TP07 0.0-1.0	TP05 0.4-1.0	TP05 1.0-1.05	TP06 0.2-1.3
Lab Number:		3726979.2	3726979.4	3726979.7	3726979.8	3726979.11
Individual Tests						
Dry Matter	g/100g as rcvd	78	89	76	85	75
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	7	8	6	3
Total Recoverable Cadmium	mg/kg dry wt	0.22	0.26	0.63	1.06	< 0.10
Total Recoverable Chromium	mg/kg dry wt	10	25	23	21	10
Total Recoverable Copper	mg/kg dry wt	12	25	28	22	11
Total Recoverable Lead	mg/kg dry wt	30	19.5	30	29	20
Total Recoverable Mercury	mg/kg dry wt	0.11	0.11	0.16	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	6	18	17	16	4
Total Recoverable Zinc	mg/kg dry wt	42	83	122	121	30
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.3	< 0.4	< 0.3	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
2-Methylnaphthalene	mg/kg dry wt	< 0.016	< 0.014	< 0.017	< 0.015	< 0.017
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Acenaphthene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Anthracene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Benzo[a]anthracene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.031	< 0.027	< 0.032	< 0.028	< 0.032
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.031	< 0.027	< 0.031	< 0.028	< 0.032
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Benzo[e]pyrene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Benzo[k]fluoranthene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Chrysene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Fluoranthene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Fluorene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Naphthalene	mg/kg dry wt	< 0.07	< 0.06	< 0.07	< 0.06	< 0.07
Perylene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Phenanthrene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013
Pyrene	mg/kg dry wt	< 0.013	< 0.011	< 0.013	< 0.012	< 0.013

Sample Type: Soil						
Sample Name:		TP02 0.0-0.3	TP03 0.0-0.4	SS003 0.1-0.2	SS003 A	SS003 C
Lab Number:		3726979.15	3726979.17	3726979.20	3726979.21	3726979.23
Individual Tests						
Dry Matter	g/100g as rcvd	91	91	-	-	-
Total Recoverable Zinc	mg/kg dry wt	-	-	57	55	68
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	10	10	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	2.6	0.89	-	-	-
Total Recoverable Chromium	mg/kg dry wt	45	23	-	-	-
Total Recoverable Copper	mg/kg dry wt	124	46	-	-	-
Total Recoverable Lead	mg/kg dry wt	27	38	-	-	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	0.13	-	-	-
Total Recoverable Nickel	mg/kg dry wt	47	22	-	-	-
Total Recoverable Zinc	mg/kg dry wt	182	167	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.3	-	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Acenaphthene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Anthracene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.026	< 0.027	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.026	< 0.027	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Chrysene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Fluoranthene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Fluorene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Naphthalene	mg/kg dry wt	< 0.06	< 0.06	-	-	-
Perylene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Phenanthrene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Pyrene	mg/kg dry wt	< 0.011	< 0.011	-	-	-

Sample Name:		SS003 E	SS003 G
Lab Number:		3726979.25	3726979.27
Individual Tests			
Total Recoverable Zinc	mg/kg dry wt	72	81

Analyst's Comments

Appendix No.1 - Chain of Custody

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	2, 4, 7-8, 11, 15, 17, 20-21, 23, 25, 27

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	20-21, 23, 25, 27
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	2, 4, 7-8, 11, 15, 17
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	2, 4, 7-8, 11, 15, 17
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	2, 4, 7-8, 11, 15, 17
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	2, 4, 7-8, 11, 15, 17
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	20-21, 23, 25, 27
Total Recoverable Zinc	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	4 mg/kg dry wt	20-21, 23, 25, 27
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	2, 4, 7-8, 11, 15, 17
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	2, 4, 7-8, 11, 15, 17

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 29-Nov-2024 and 03-Dec-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

Hill Laboratories
TRIED, TESTED AND TRUSTED

ANALYSIS REQUEST

R J Hill Laboratories Limited
28 Duke Street Frankton 320
Private Bag 3205
Hamilton 3240 New Zealand

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T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Job No: 372 6979
Date Recv: 28-Nov-24 11:28
Received by: Olivia Tod

Quote No 82742
Primary Contact Erika McDonald
Submitted By Vince Pettinger
Client Name ENGEO

Address
Postcode
Phone
Mobile
Email
160117
Charge To Engeo Limited
Client Reference 13451
Order No

Results To — Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.
- [x] Email Primary Contact
- [x] Email Submitter
- [ ] Email Client
- [ ] Email Other
- [ ] Other

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
- [x] Tick if you require COC to be emailed back

Date & Time: 28/11/2024
Name: Vince Pettinger
Signature:

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition
- [ ] Room Temp
- [ ] Chilled
- [ ] Frozen

Temp:

- [ ] Sample & Analysis details checked

Signature:

ADDITIONAL INFORMATION

Scan CoC to submitter ASAP

Priority
- [ ] Low
- [ ] Normal
- [x] High
- [ ] Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

Requested Reporting Date:

Quoted Sample Types
Soil (Soil), Ground Water (GW), TCLP Extract (TCLP), Building Material (BM), 25mm cellulose ester membrane, 0.8µm gridded (cASF25CE), Miscellaneous Wipe (cMiscWipe)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	TP04	0.0-0.2	Tub+Jar	HOLD
2	"	0.2-0.5	"	HM(8), PAHs, Asbestos (Semi-Quant)
3	"	0.5-0.6	Jar	HOLD
4	TP07	0.0-1.0	Tub+Jar	HM(8), PAHs, Asbestos (Semi-Quant)
5	"	1.0-1.4	Jar	HOLD
6	TP05	0.1-0.4	Tub+Jar	HOLD
7	"	0.4-1.0	"	HM(8), PAHs, Asbestos (Semi-Quant)
8	"	1.0-1.05	Jar	HM(8), PAHs
9	"	1.05-1.1	"	HOLD
10	TP06	0.0-0.2	Tub+Jar	HOLD

No.	Sample Name	Sample Material	Sample Location	Sample Date	Tests Required (if not as per Quote)
13	TP06	0.2-1.3	Tub + Jar		HM(S), PAHs, Asbestos (Semi-Q
14	"	1.3-1.4	Jar		HOLD
15	TP01	0.0-0.3	Tub + Jar		Asbestos (Semi-Quant)
16	"	0.3-0.4	Jar		HOLD.
17	TP02	0.0-0.3	Tub + Jar		HM(S), PAHs, Asbestos (Semi-Q)
18	"	0.3-0.4	Jar		HOLD
19	TP03	0.0-0.4	Tub + Jar		HM(S), PAHs, Asbestos (Semi-Q)
20	"	0.4-0.6	Jar		HOLD
21	SS003	0.0-0.1	Jar		Zinc
22	"	0.1-0.2	"		Zinc
23	SS003A	"			Zinc
24	"	B	"		HOLD
25	"	C	"		Zinc
26	"	D	"		HOLD
27	"	E	"		Zinc
28	"	F	"		HOLD
29	"	G	"		Zinc
30	"	H	"		HOLD
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					

R J Hill Laboratories Limited
1/17 Print Place
Middleton
Christchurch 8024 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	Engeo Limited	**Lab No:**	3727381	A2Pv1
Contact:	Erika McDonald	**Date Received:**	28-Nov-2024	
	C/- Engeo Limited	**Date Reported:**	03-Dec-2024	
	PO Box 305136	**Quote No:**	82742	
	Triton Plaza	**Order No:**		
	Auckland 0757	**Client Reference:**	13451	
		Submitted By:	Vincent Pettinger	

Sample Type: Soil

Sample Name:		TPO4 0.2-0.5 27-Nov-2024	TPO7 0.0-1.0 27-Nov-2024	TPO5 0.4-1.0 27-Nov-2024	TPO6 0.2-1.3 27-Nov-2024	TPO1 0.0-0.3 27-Nov-2024
Lab Number:		3727381.2	3727381.3	3727381.5	3727381.7	3727381.8
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	745.1	876.9	783.8	764.7	707.1
Dry Weight	g	611.6	796.0	633.9	586.7	589.9
Moisture*	%	18	9	19	23	17
Sample Fraction >10mm	g dry wt	71.1	228.6	154.6	16.6	147.1
Sample Fraction <10mm to >2mm	g dry wt	390.3	415.7	311.4	298.2	274.3
Sample Fraction <2mm	g dry wt	149.1	150.5	165.6	270.7	166.6
<2mm Subsample Weight	g dry wt	51.8	59.8	57.3	59.1	50.9
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		TPO2 0.0-0.3 27-Nov-2024	TPO3 0.0-0.4 27-Nov-2024
Lab Number:		3727381.9	3727381.10
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001
As Received Weight	g	819.7	898.6
Dry Weight	g	761.0	842.8
Moisture*	%	7	6
Sample Fraction >10mm	g dry wt	248.8	244.8

Sample Type: Soil			
	Sample Name:	TPO2 0.0-0.3 27-Nov-2024	TPO3 0.0-0.4 27-Nov-2024
	Lab Number:	3727381.9	3727381.10
Sample Fraction <10mm to >2mm	g dry wt	384.8	414.0
Sample Fraction <2mm	g dry wt	126.7	183.2
<2mm Subsample Weight	g dry wt	58.7	56.2
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001

Glossary of Terms
• Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
• Trace - Trace levels of asbestos, as defined by AS4964-2004.
For further details, please contact the Asbestos Team.

Please refer to the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
https://www.branz.co.nz/asbestos

The following assumptions have been made:

1. Asbestos Fines in the <2mm fraction, after homogenisation, is evenly distributed throughout the fraction
2. The weight of asbestos in the sample is unaffected by the ashing process.

Results are representative of the sample provided to Hill Laboratories only.

Analyst's Comments

Appendix No.1 - Chain of Custody

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

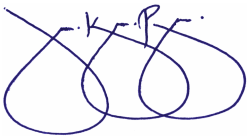
Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g	2-3, 5, 7-10
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g	2-3, 5, 7-10
Moisture*	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	2-3, 5, 7-10
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	2-3, 5, 7-10
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	2-3, 5, 7-10
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	2-3, 5, 7-10
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	2-3, 5, 7-10
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	2-3, 5, 7-10

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2-3, 5, 7-10
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2-3, 5, 7-10
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2-3, 5, 7-10
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2-3, 5, 7-10
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2-3, 5, 7-10
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2-3, 5, 7-10
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2-3, 5, 7-10

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed on 03-Dec-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.



John Keneth Paglingayen BApSc
Laboratory Technician - Asbestos

Hill Laboratories
TRIED, TESTED AND TRUSTED

ANALYSIS REQUEST

R J Hill Laboratories Limited
28 Duke Street Frankton 320
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Job No: 372 6979
Date Recv: 28-Nov-24 11:28
Received by: Olivia Tod

Quote No 82742
Primary Contact Erika McDonald
Submitted By Vince Pettinger
Client Name ENGEO

Address
Postcode
Phone
Mobile
Email
160117
Charge To Engeo Limited
Client Reference 13451
Order No

Results To — Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.
- [x] Email Primary Contact
- [x] Email Submitter
- [ ] Email Client
- [ ] Email Other
- [ ] Other

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
- [x] Tick if you require COC to be emailed back

Date & Time: 28/11/2024
Name: Vince Pettinger
Signature:

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition
- [ ] Room Temp
- [ ] Chilled
- [ ] Frozen

Temp:

- [ ] Sample & Analysis details checked

Signature:

ADDITIONAL INFORMATION

Scan CoC to submitter ASAP

Priority
- [ ] Low
- [ ] Normal
- [x] High
- [ ] Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

Requested Reporting Date:

Quoted Sample Types
Soil (Soil), Ground Water (GW), TCLP Extract (TCLP), Building Material (BM), 25mm cellulose ester membrane, 0.8µm gridded (cASF25CE), Miscellaneous Wipe (cMiscWipe)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	TP04	0.0-0.2	Tub+Jar	HOLD
2	"	0.2-0.5	"	HM(8), PAHs, Asbestos (Semi-Quant)
3	"	0.5-0.6	Jar	HOLD
4	TP07	0.0-1.0	Tub+Jar	HM(8), PAHs, Asbestos (Semi-Quant)
5	"	1.0-1.4	Jar	HOLD
6	TP05	0.1-0.4	Tub+Jar	HOLD
7	"	0.4-1.0	"	HM(8), PAHs, Asbestos (Semi-Quant)
8	"	1.0-1.05	Jar	HM(8), PAHs
9	"	1.05-1.1	"	HOLD
10	TP06	0.0-0.2	Tub+Jar	HOLD

No.	Sample Name	Sample Material	Sample Location	Sample Date	Tests Required (if not as per Quote)
13	TP06 0.2-1.3	Tub + Jar			HM(8), PAHs, Asbestos (Semi-Q
14	" 1.3-1.4	" Jar			HOLD
15	TP01 0.0-0.3	Tub + Jar			Asbestos (Semi-Quant)
16	" 0.3-0.4	Jar			HOLD.
17	TP02 0.0-0.3	Tub + Jar			HM(8), PAHs, Asbestos (Semi-Q)
18	" 0.3-0.4	Jar			HOLD
19	TP03 0.0-0.4	Tub + Jar			HM(8), PAHs, Asbestos (Semi-Q)
20	" 0.4-0.6	Jar			HOLD
21	SS003 0.0-0.1	Jar			~~Zinc~~ HOLD
22	" 0.1-0.2	"			Zinc
23	SS003A	"			Zinc
24	" B	"			HOLD
25	" C	"			Zinc
26	" D	"			HOLD
27	" E	"			Zinc
28	" F	"			HOLD
29	" G	"			Zinc
30	" H	"			HOLD
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					

R J Hill Laboratories Limited
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Parnell
Auckland 1052 New Zealand

0508 HILL LAB (44 555 22)
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mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	Engeo Limited	**Lab No:**	3729920	A2Pv1
Contact:	Erika McDonald	**Date Received:**	02-Dec-2024	
	C/- Engeo Limited	**Date Reported:**	05-Dec-2024	
	PO Box 305136	**Quote No:**	82742	
	Triton Plaza	**Order No:**		
	Auckland 0757	**Client Reference:**	13451.002.001	
		Submitted By:	Vincent Pettinger	

Sample Type: Soil

Sample Name:		HA21 0.25-0.6
Lab Number:		3729920.1
Asbestos Presence / Absence		Asbestos NOT detected.
Description of Asbestos Form		-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001
As Received Weight	g	621.2
Dry Weight	g	424.5
Moisture*	%	32
Sample Fraction >10mm*	g dry wt	94.5
Sample Fraction <10mm to >2mm*	g dry wt	250.7
Sample Fraction <2mm*	g dry wt	78.9
<2mm Subsample Weight*	g dry wt	51.5
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)*	g dry wt	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001

Glossary of Terms

• Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
• Trace - Trace levels of asbestos, as defined by AS4964-2004.
For further details, please contact the Asbestos Team.

Please refer to the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
https://www.branz.co.nz/asbestos

The following assumptions have been made:

1. Asbestos Fines in the <2mm fraction, after homogenisation, is evenly distributed throughout the fraction
2. The weight of asbestos in the sample is unaffected by the ashing process.

Results are representative of the sample provided to Hill Laboratories only.

Analyst's Comments

Appendix No.1 - Chain of Custody

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g	1
Moisture*	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1
Sample Fraction >10mm*	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1
Sample Fraction <10mm to >2mm*	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1
Sample Fraction <2mm*	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland.	0.1 g dry wt	1
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1
Weight of Asbestos as Fibrous Asbestos (Friable)*	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 28 Heather Street, Auckland. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed on 05-Dec-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Danielle Carter BSc, PGDipSci, MSc
Laboratory Technician - Asbestos

Hill Laboratories
TRIED, TESTED AND TRUSTED

ANALYSIS REQUEST

Job No: **372 9920**

Date Recv: 02-Dec-24 14:15

R J Hill Laboratories Limited
28 Duke Street Frankton 320
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Received by: Olivia Tod

3137299204

Quote No 82742

Primary Contact Erika McDonald

Submitted By Vince Pettinger

Client Name ENGEO

Address

Postcode

Phone *Mobile*

Email

Charge To Engeo Limited 160117

Client Reference 13451.002.001

Order No

Results To *Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.*

☐ Email Primary Contact ☐ Email Submitter ☐ Email Client

☐ Email Other

☐ Other

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

☑ Tick if you require COC to be emailed back

Date & Time: Vince Pettinger

Name: VP

Signature: 2/12/2024

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ Room Temp ☐ Chilled ☐ Frozen

Temp: 15.7

☐ Sample & Analysis details checked

Signature:

ADDITIONAL INFORMATION

Priority ☐ Low ☐ Normal ☑ High

☐ **Urgent** (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 5 working days following the day of receipt of the samples at the laboratory.

Requested Reporting Date:

Quoted Sample Types

Soil (Soil), Ground Water (GW), TCLP Extract (TCLP), Building Material (BM), 25mm cellulose ester membrane, 0.8µm gridded (cASF25CE), Miscellaneous Wipe (cMiscWipe)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	~~HA0~~ HA21 0.25-0.6			HM(8), PAHs, Asbestos (Semi-Quant)
2				
3				
4				
5				
6				
7				
8				
9				
10				

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	Engeo Limited	**Lab No:**	3730050 SPv1
Contact:	Erika McDonald C/- Engeo Limited PO Box 305136 Triton Plaza Auckland 0757	**Date Received:** **Date Reported:** **Quote No:** **Order No:** **Client Reference:** **Submitted By:**	02-Dec-2024 09-Dec-2024 82742 13451.002.001 Vincent Pettinger

Sample Type: Soil

Sample Name:		HA21 0.25-0.6 02-Dec-2024
Lab Number:		3730050.1
Individual Tests		
Dry Matter	g/100g as rcvd	70
Heavy Metals with Mercury, Screen Level		
Total Recoverable Arsenic	mg/kg dry wt	7
Total Recoverable Cadmium	mg/kg dry wt	< 0.10
Total Recoverable Chromium	mg/kg dry wt	20
Total Recoverable Copper	mg/kg dry wt	26
Total Recoverable Lead	mg/kg dry wt	34
Total Recoverable Mercury	mg/kg dry wt	0.29
Total Recoverable Nickel	mg/kg dry wt	12
Total Recoverable Zinc	mg/kg dry wt	42
Polycyclic Aromatic Hydrocarbons Screening in Soil*		
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.015
2-Methylnaphthalene	mg/kg dry wt	< 0.03
Acenaphthylene	mg/kg dry wt	< 0.015
Acenaphthene	mg/kg dry wt	< 0.015
Anthracene	mg/kg dry wt	< 0.015
Benzo[a]anthracene	mg/kg dry wt	< 0.015
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.015
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.035
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.035
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.015
Benzo[e]pyrene	mg/kg dry wt	< 0.015
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.015
Benzo[k]fluoranthene	mg/kg dry wt	< 0.015
Chrysene	mg/kg dry wt	< 0.015
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.015
Fluoranthene	mg/kg dry wt	< 0.015
Fluorene	mg/kg dry wt	< 0.015
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.015
Naphthalene	mg/kg dry wt	< 0.08
Perylene	mg/kg dry wt	< 0.015
Phenanthrene	mg/kg dry wt	< 0.015
Pyrene	mg/kg dry wt	< 0.015

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	1
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	1

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 05-Dec-2024 and 09-Dec-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Kim Harrison MSc
Client Services Manager - Environmental

APPENDIX 4:

Cut Fill Plan

LEGEND

- PROPOSED CUT
- PROPOSED FILL
- CUT CONTOUR -2-
- FILL CONTOUR 2
- ZERO CONTOUR
- SHARED PATH EXTENT
- EXTENT OF INTERIM EWs
- EXTENT OF STAGE 2 EWs
- 110kV TRANSMISSION POWERLINES
- 220kV TRANSMISSION POWERLINES
- EXISTING STREAM

EARTHWORKS VOLUME STAGE 2

VOLUME OF EARTHWORKS: 259,136m³ (EXCLUDING INTERIM & SHARED PATH QUANTITIES)

AREA OF EARTHWORKS = 165,095 m2 (INCLUDES ALL AREAS ENCLOSED WITHIN ORANGE DASHED LINE)

CHANNEL D IDENTIFIED BY TONKIN AND TAYLOR (OCTOBER 2022)

SHARED PATH CONSENT - LUC60431681
INTERIM EARTHWORKS AREA = 11,725m²
TOTAL EARTHWORKS VOLUME = 25,035m³

INTERIM EARTHWORKS CONSENT - LUC60435472:
INTERIM EARTHWORKS AREA = 27,411m²
TOTAL CUT VOLUME = 133,501m³

WETLAND 2 IDENTIFIED BY TONKIN AND TAYLOR (OCTOBER 2022)

WETLAND 1 IDENTIFIED BY TONKIN AND TAYLOR (OCTOBER 2022)

DRURY CENTRE STAGE 2

DRURY CENTRE STAGE 1

LOT 3 DP 165262

LOT 5 DP 165262

LOT 2 DP 165262

LOT 4 DP 165262

LOT 7 DP 165262

LOT 10

LOT 11

LOT 12

LOT 13

LOT 14

SCALEBAR (m) 0 25 50 125 SCALE | 1:2500 @A3 | 1:1250 @A1|

REVISION DETAILS		INT	DATE	SURVEYED	
2	ISSUED FOR DISCUSSION	JK	07/02/24	DESIGNED	JK
3	ISSUED FOR DISCUSSION	MK	24/07/24	DRAWN	JK
4	UPDATE EARTHWORKS VOLUME	NS	06/08/24	CHECKED	GW
5	ISSUED FOR RESOURCE CONSENT	NS	03/10/24	APPROVED	GW

BUILDING B, LEVEL 1
8 NUGENT ST, GRAFTON,
AUCKLAND 1023
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Kiwi Property

DRURY CENTRE

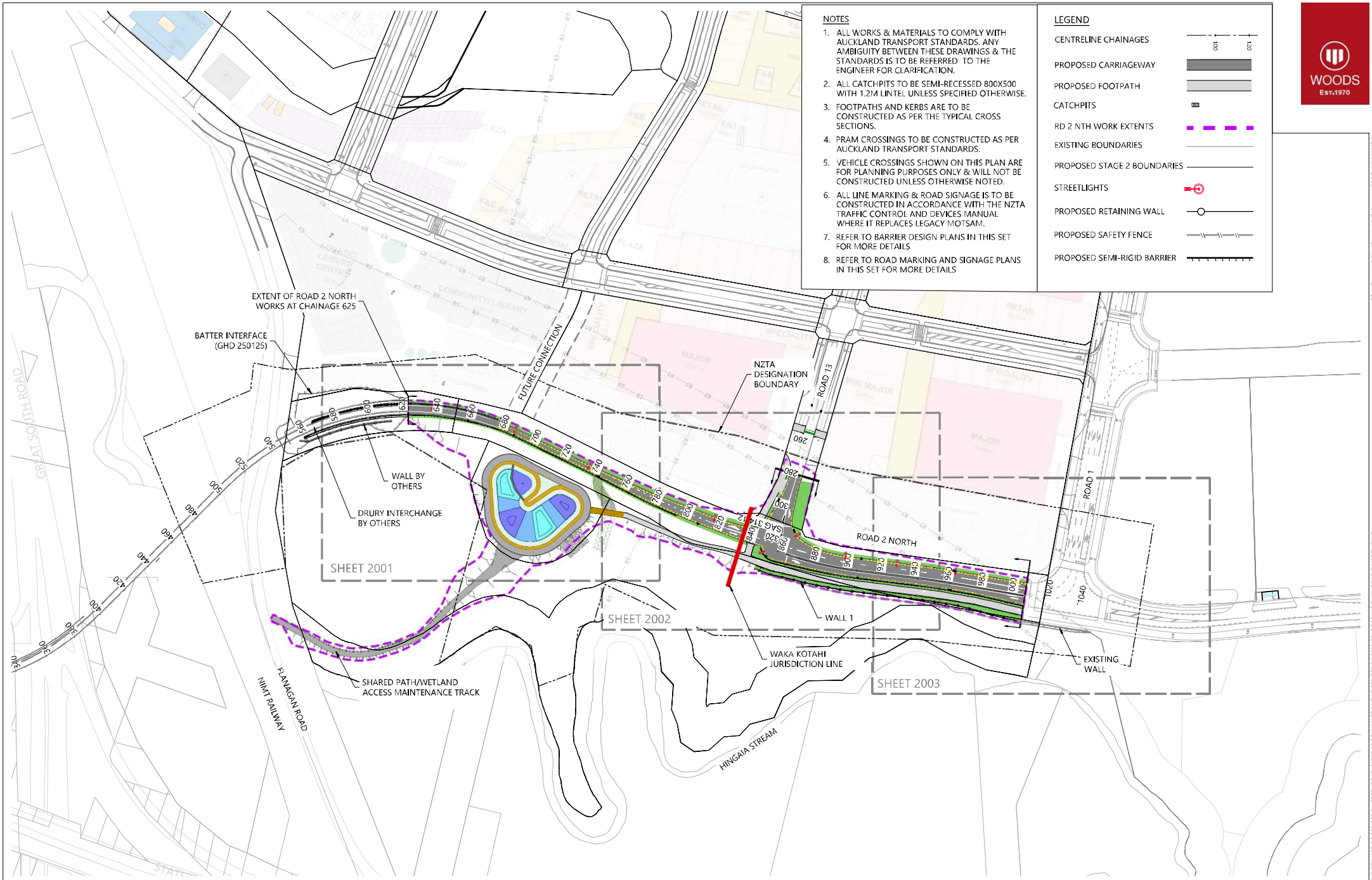
STAGE 2 CUT FILL PLAN

N

STATUS	FOR RESOURCE CONSENT	REV
SCALE	1:2500 @ A3	5
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P23-315-02-1200-EW	

Plot Date: 2:56:08 pm,4 October 2024, NANDINIS

File: C:\12DSYNERGY\DATA\WP-PEN-APP-01\P23-315 - DRURY CENTRE_21429\02 DRAWINGS\02 ENG STAGE 2\P23-315-02-1200-EW_CUT FILL PLAN.DWG



REVISION DETAILS		INT	DATE	SURVEYED	
1	FOR 50% DETAILED DESIGN	AC	29/08/2024	DESIGNED	AC
2	FOR 85% DETAILED DESIGN	AC	09/12/2024	DRAWN	JLC
3	FOR 85% DETAILED DESIGN	EW	10/02/2025	CHECKED	JLC
4	JURISDICTION LINE MOVED	JLC	13/02/25	APPROVED	CD

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DRURY CENTRE

ROAD 2 NORTH
OVERALL ROADING LAYOUT PLAN

STATUS	85% DESIGN	REV
SCALE	1:2000 @ A3	4
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P23-315-04-2000-RD	

Plot Date: 10:01:43 am, 14 February 2025, JOAN.NEC

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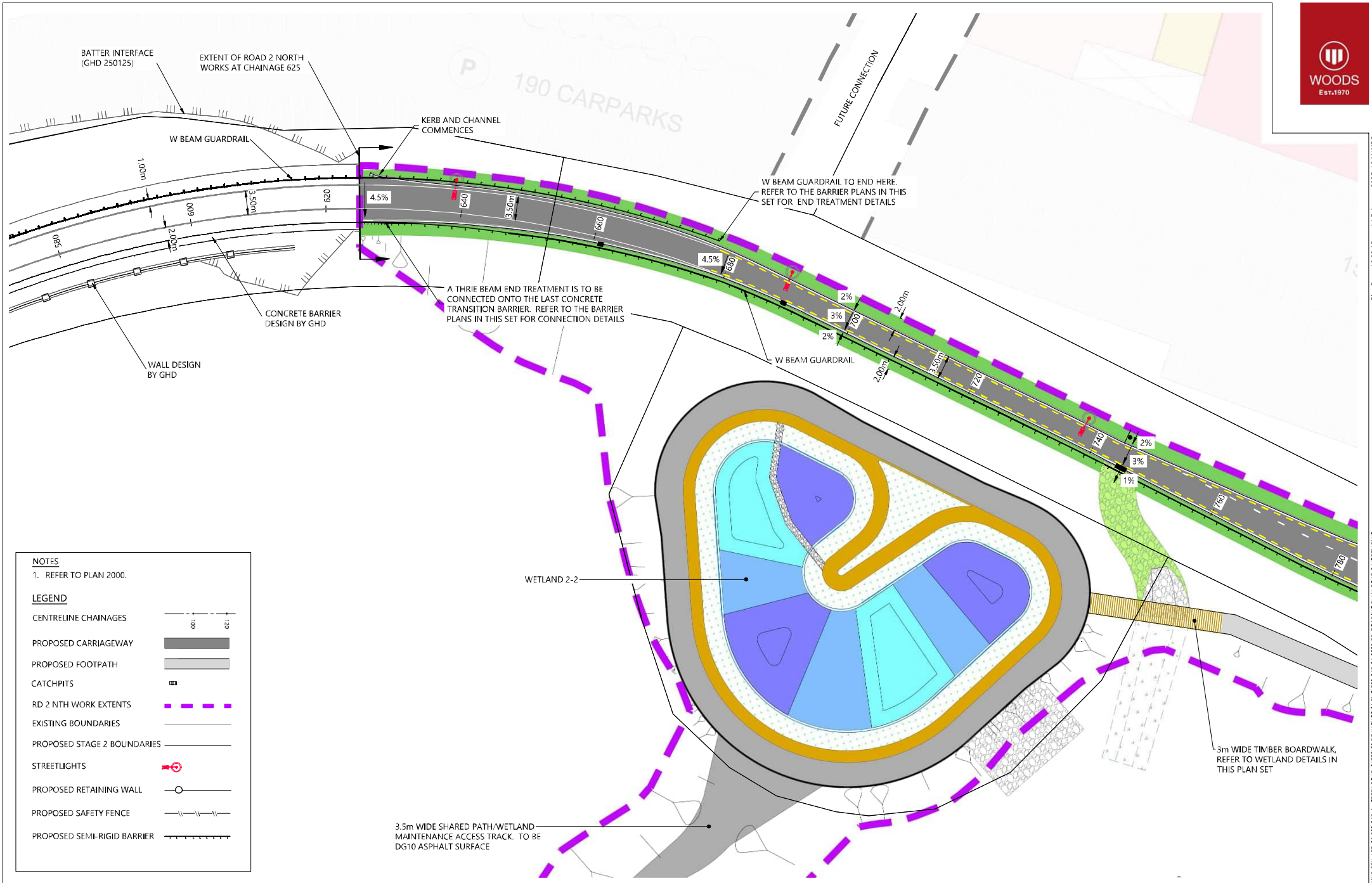

NOTES

1. REFER TO PLAN 2000.

LEGEND

- CENTRELINE CHAINAGES
- PROPOSED CARRIAGEWAY
- PROPOSED FOOTPATH
- CATCHPITS
- RD 2 NTH WORK EXTENTS
- EXISTING BOUNDARIES
- PROPOSED STAGE 2 BOUNDARIES
- STREETLIGHTS
- PROPOSED RETAINING WALL
- PROPOSED SAFETY FENCE
- PROPOSED SEMI-RIGID BARRIER

REVISION DETAILS		INT	DATE		
1	FOR 50% DETAILED DESIGN	AC	29/08/2024	DESIGNED	AC
2	FOR 85% DETAILED DESIGN	AC	09/12/2024	DRAWN	AC
3	FOR 85% DETAILED DESIGN	EW	10/02/2025	CHECKED	JLC
				APPROVED	CD

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Kiwi Property

DRURY CENTRE

ROAD 2 NORTH
ROADING PLAN

STATUS	85% DESIGN	REV
SCALE	1:500 @ A3	3
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P23-315-04-2001-RD	

REVISION DETAILS		INT	DATE	SURVEYED	
1	FOR 50% DETAILED DESIGN	AC	29/08/2024	DESIGNED	AC
2	FOR 85% DETAILED DESIGN	AC	09/12/2024	DRAWN	AC
3	FOR 85% DETAILED DESIGN	EW	10/02/2025	CHECKED	JLC
				APPROVED	CD

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8 NUGENT ST, GRAFTON,
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Kiwi Property

DRURY CENTRE

ROAD 2 NORTH
ROADING PLAN

STATUS	85% DESIGN	REV
SCALE	1:500 @ A3	3
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P23-315-04-2002-RD	

REVISION DETAILS		INT	DATE	SURVEYED	
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2	FOR 85% DETAILED DESIGN	AC	09/12/2024	DRAWN	AC
3	FOR 85% DETAILED DESIGN	EW	10/02/2025	CHECKED	JLC
				APPROVED	CD

BUILDING B, LEVEL 1
8 NUGENT ST, GRAFTON,
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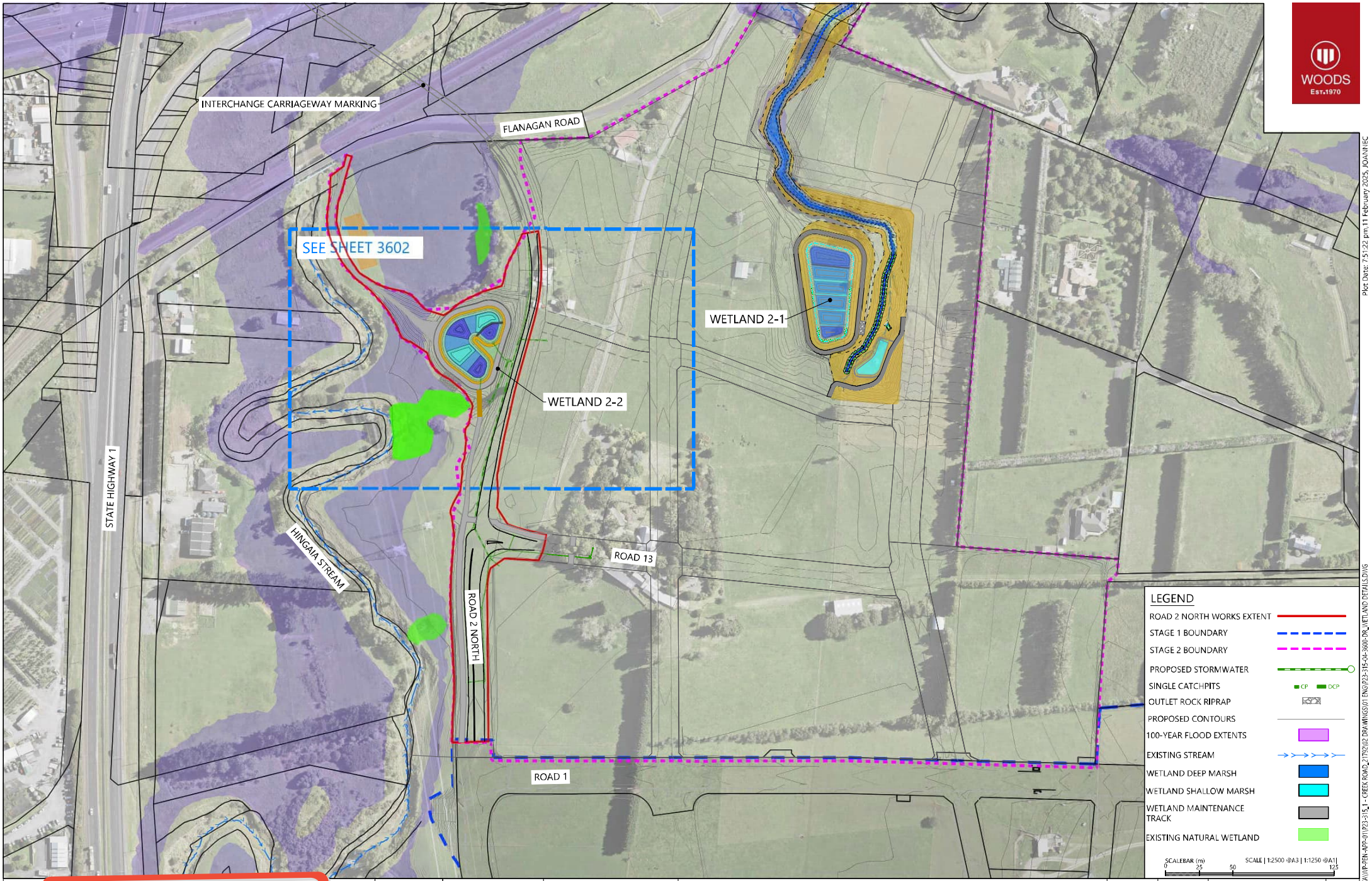
DRURY CENTRE

ROAD 2 NORTH
ROADING PLAN

STATUS	85% DESIGN	REV
SCALE	1:500 @ A3	3
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P23-315-04-2003-RD	



WOODS Est.1970

Plot Date: 7:51:22 pm, 11 February 2025, JOANNE

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REVISION	DETAILS	INT	DATE	SURVEYED	
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2	FOR 85% DESIGN	AC	19/12/2024	DRAWN	AC
3	FOR 85% DESIGN	CW	10/02/2025	CHECKED	JLC
					CD

DRAFT

BUILDING B, LEVEL 1
8 NUGENT ST, GRAFTON,
AUCKLAND 1023
+64 9 308 9229
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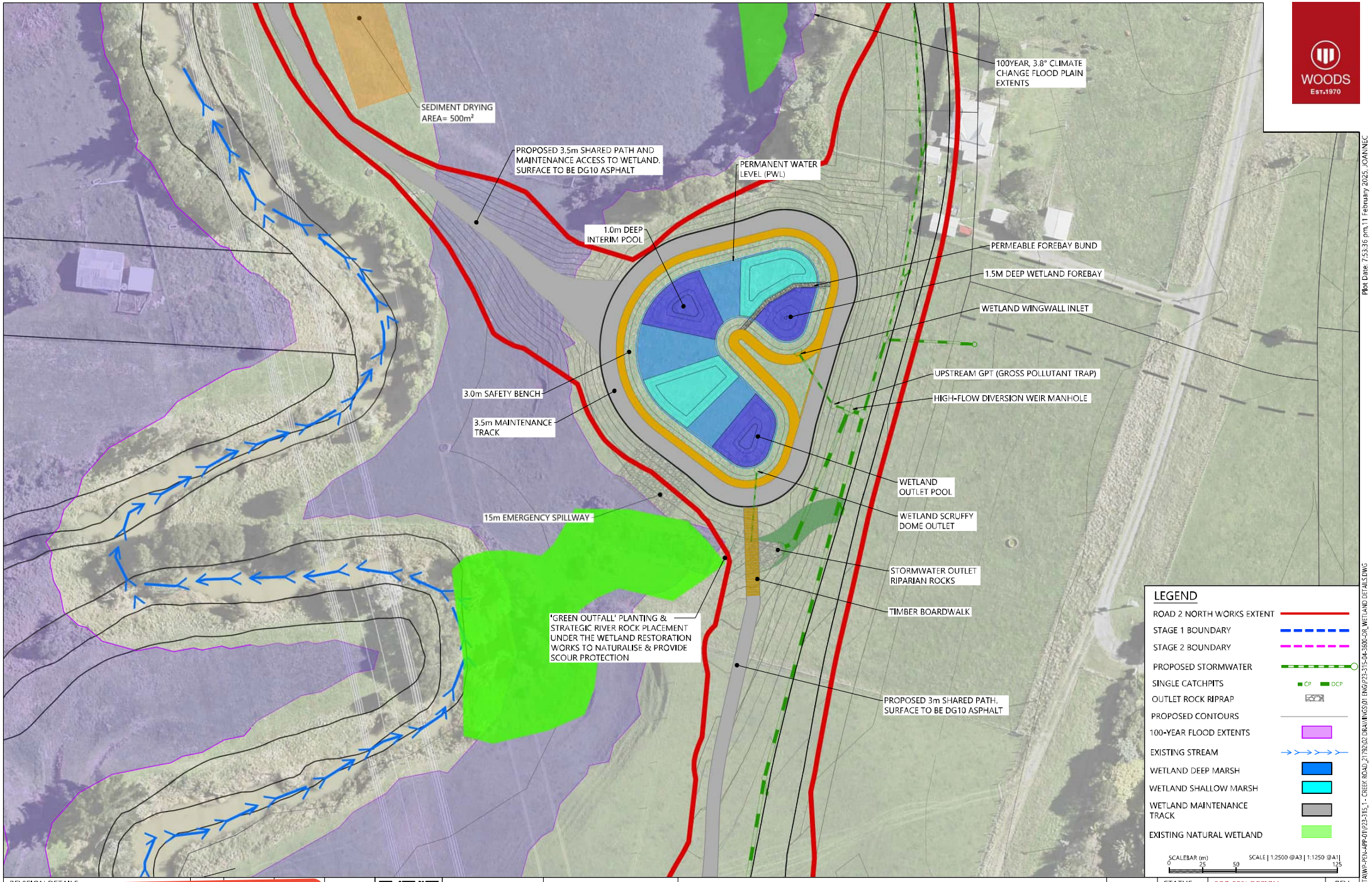
Kiwi Property

DRURY CENTRE - ROAD 2 NORTH

OVERALL WETLANDS LAYOUT PLAN

STATUS	FOR 85% DESIGN
SCALE	1:2500 @ A3
COUNCIL	AUCKLAND COUNCIL
DWG NO	P24-447-01-3600-DR
REV	3



WOODS Est.1970

Plot Date: 7:53:36 pm,11 February 2025, JOANNEC

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REVISION DETAILS						
1	FOR 85% DESIGN	AC	20/11/2024	DESIGNED	AC
2	FOR 85% DESIGN	AC	10/02/2025	DRAWN	AC
				CHECKED	JLC
				APPROVED	CD

DRAFT

BUILDING B, LEVEL 1
8 NUGENT ST, GRAFTON,
AUCKLAND 1023
+64 9 308 9229
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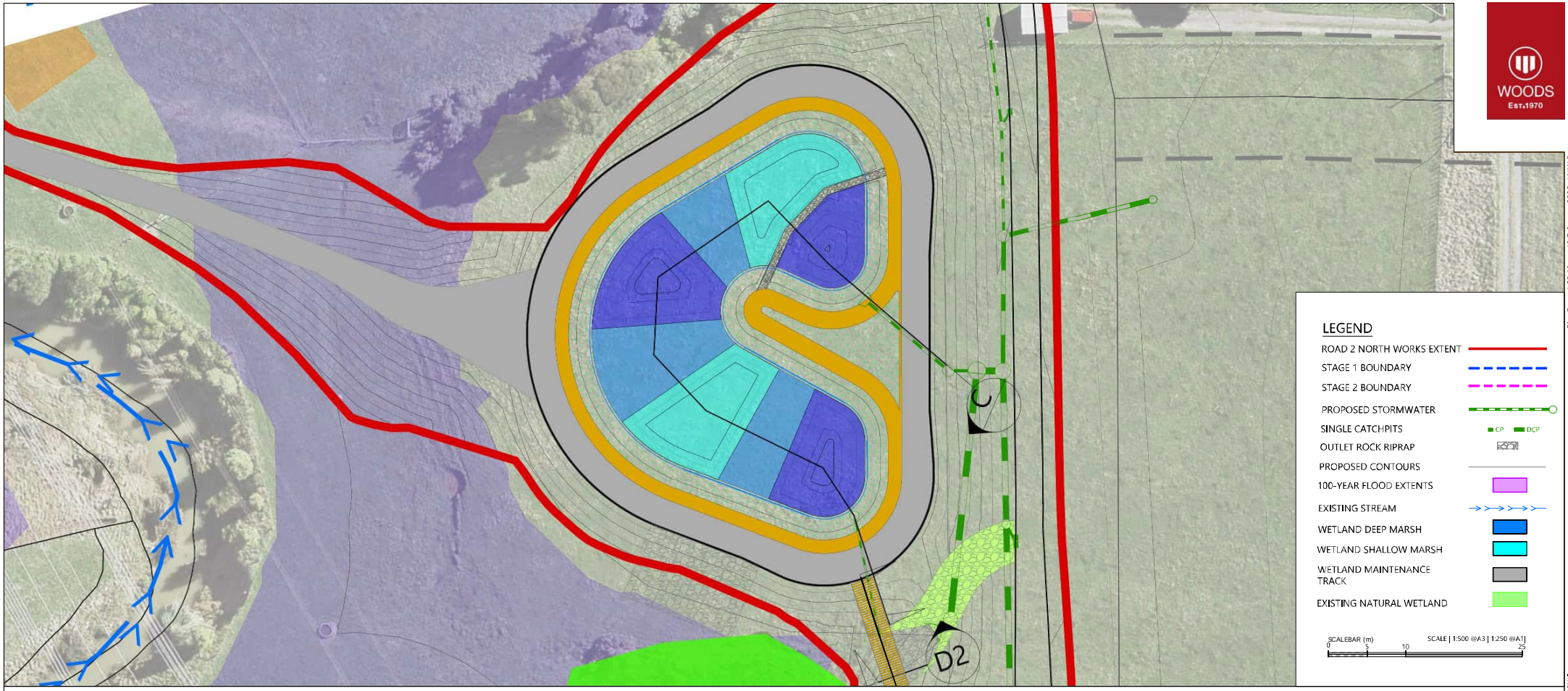
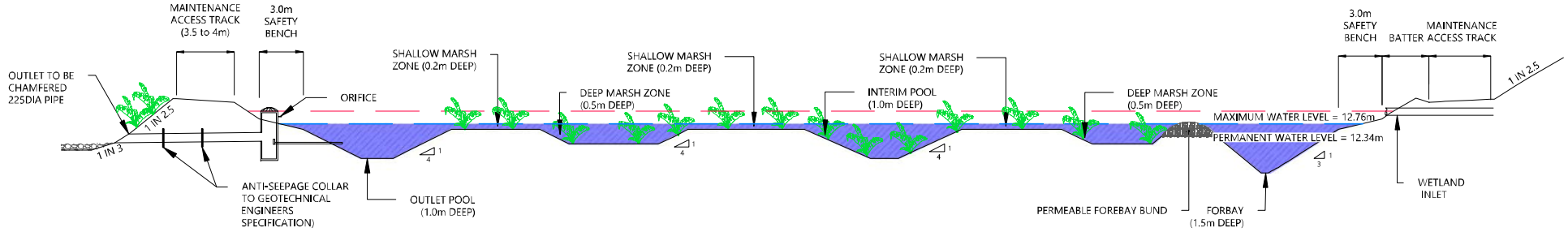
Kiwi Property

DRURY CENTRE - ROAD 2 NORTH

WETLAND 2-2 LAYOUT PLAN

STATUS	FOR 85% DESIGN
SCALE	1:750 @ A3
COUNCIL	AUCKLAND COUNCIL
DWG NO	P23-315-04-3602-DR
REV	2





WETLAND 2-2 CROSS-SECTION -C

SCALEBAR (m) 0 3 6 15 SCALE | 1:300 @A3 | 1:150 @A1

REVISION DETAILS		INT	DATE	SURVEYED	
1	FOR 50% DESIGN	AC	29/11/2024	DESIGNED	AC
2	FOR 85% DETAILED DESIGN	EW	10/02/2025	DRAWN	AC
				CHECKED	JLC
				APPROVED	CD

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8 NUGENT ST, GRAFTON,
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+64 9 308 9229
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Kiwi Property

DRURY CENTRE - ROAD 2 NORTH

WETLAND 2-2 CROSS-SECTION-C PLAN

N

STATUS	FOR 85% DESIGN	REV
SCALE	AS SHOWN	2
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P24-447-01-3604-DR	

Plot Date: 1:59:48 pm,13 February 2025, ANUIC

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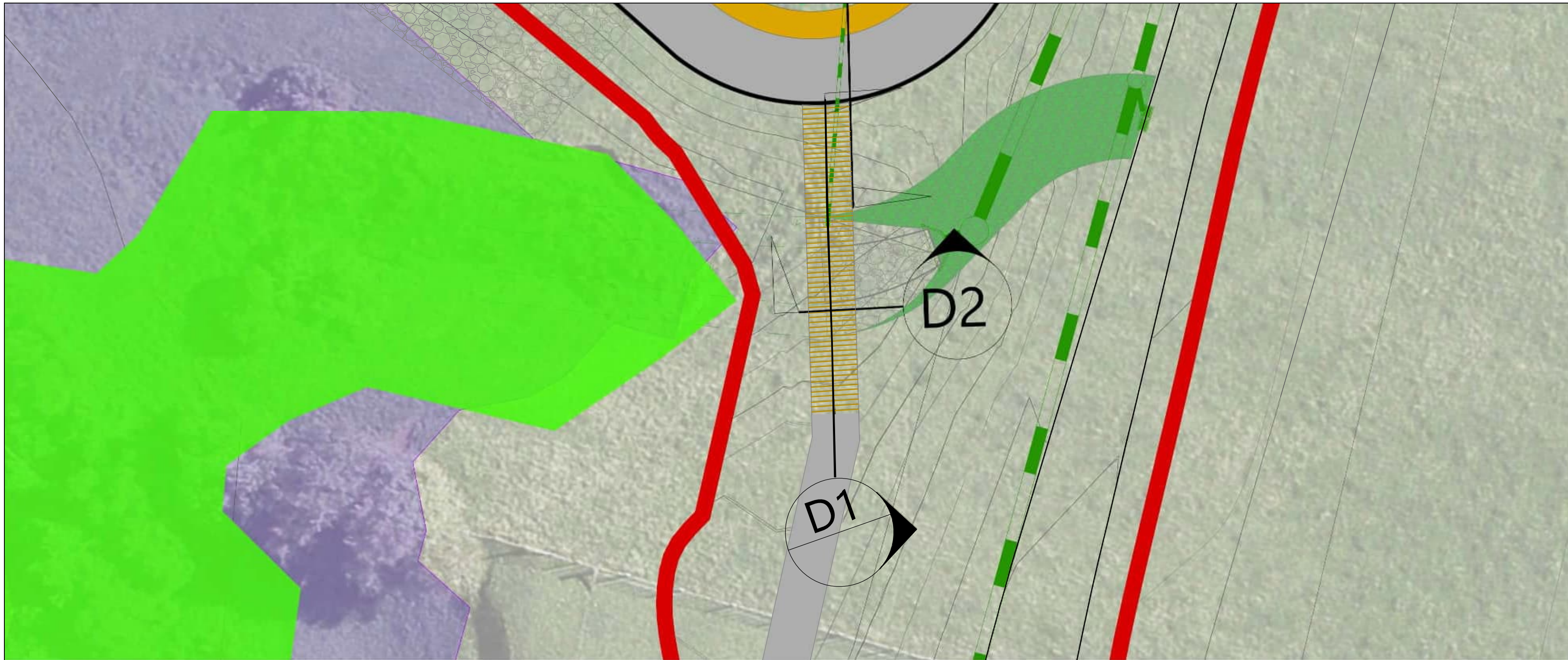


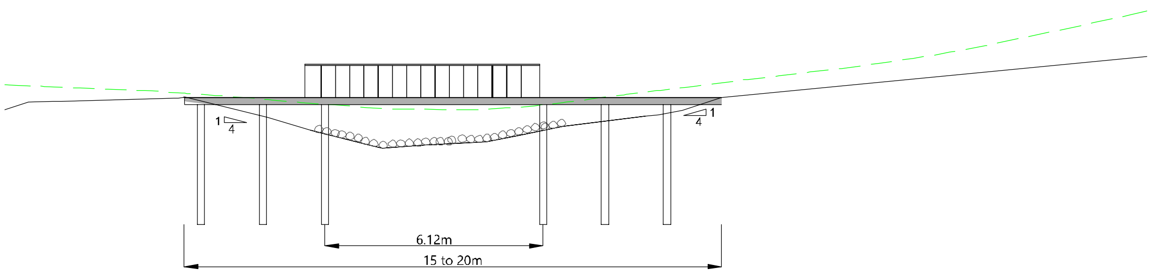
LEGEND

ROAD 2 NORTH WORKS EXTENT	
STAGE 1 BOUNDARY	
STAGE 2 BOUNDARY	
PROPOSED STORMWATER	
SINGLE CATCHPITS	CP DCP
OUTLET ROCK RIPRAP	
PROPOSED CONTOURS	
100-YEAR FLOOD EXTENTS	
EXISTING STREAM	
WETLAND DEEP MARSH	
WETLAND SHALLOW MARSH	
WETLAND MAINTENANCE TRACK	
EXISTING NATURAL WETLAND	

SCALEBAR (m) 0 3 6 15 SCALE | 1:300 @A3 | 1:150 @A1|

NOTE

1. TIMBER BOARDWALK IS TO BE DESIGNED IN ACCORDANCE WITH THE LOCAL PATH DESIGN GUIDE AND NZS:3604

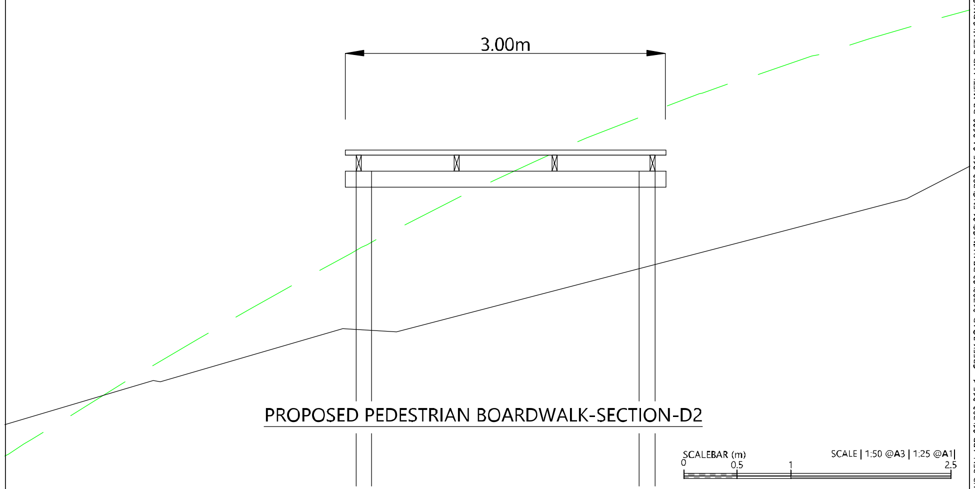


PROPOSED PEDESTRIAN BOARDWALK-SECTION-D1

SCALEBAR (m) 0 1.5 3.0 7.5 SCALE | 1:150 @A3 | 1:75 @A1|

LEGEND

EXISTING SURFACE	
FINISHED SURFACE	



PROPOSED PEDESTRIAN BOARDWALK-SECTION-D2

SCALEBAR (m) 0 0.5 1 2.5 SCALE | 1:50 @A3 | 1:25 @A1|

REVISION DETAILS	INT	DATE	SURVEYED	
			DESIGNED	A
			DRAWN	A
			CHECKED	JI
			APPROVED	C

DRAFT

BUILDING B, LEVEL 1
8 NUGENT ST, GRAFTON,
AUCKLAND 1023
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WOODS Est.1970

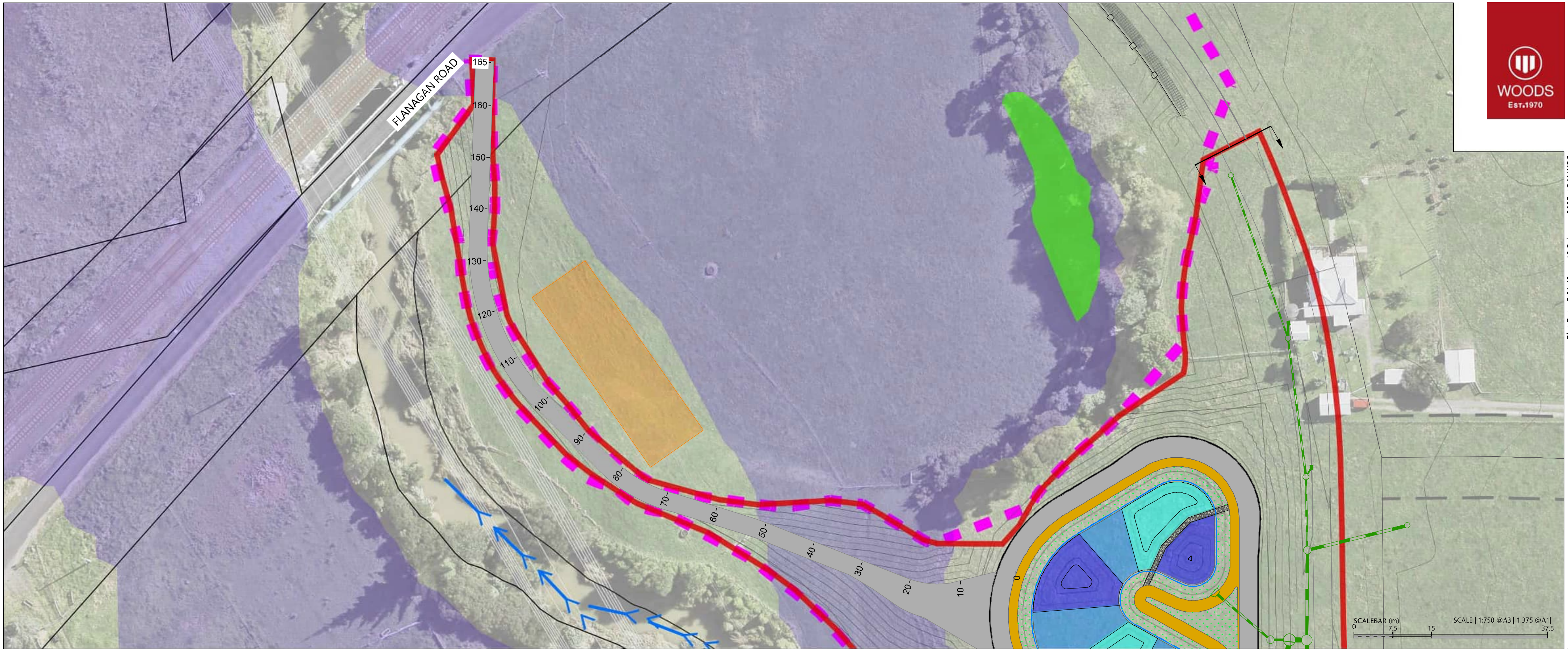
Kiwi Property

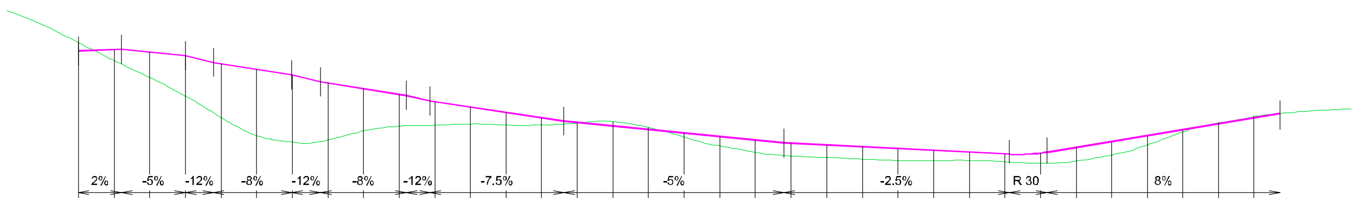
DRURY CENTRE - ROAD 2 NORTH

WETLAND PROPOSED PEDESTRIAN BOARDWALK SECTION D

STATUS	FOR 85% DESIGN	REV
SCALE	AS SHOWN	-
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P23-315-04-3605-DR	

Plot Date: 7:57:03 pm,11 February 2025, JOANNEC





DATUM R.L. = 2.00

FINISHED SURFACE	13.20	13.30	13.12	12.87	12.32	11.92	11.51	10.95	10.55	10.15	9.62	9.25
CUT/FILL DEPTH	-0.59	0.77	1.79	2.85	3.80	4.66	4.74	4.02	2.97	2.24	1.63	1.20
EXISTING SURFACE	13.79	12.53	11.33	10.03	8.52	7.25	6.77	6.94	7.59	7.91	7.99	8.05
CHAINAGE	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00

FINISHED SURFACE	8.87	8.50	8.17	7.92	7.67	7.42	7.17	6.92	6.70	6.57	6.45	6.32
CUT/FILL DEPTH	0.88	0.50	0.03	-0.32	-0.14	0.29	0.65	0.86	0.87	0.87	0.85	0.81
EXISTING SURFACE	8.00	8.00	8.14	8.24	7.81	7.13	6.52	6.06	5.82	5.70	5.59	5.51
CHAINAGE	60.00	65.00	70.00	75.00	80.00	85.00	90.00	95.00	100.00	105.00	110.00	115.00

FINISHED SURFACE	6.20	6.07	5.95	6.01	6.41	6.81	7.21	7.61	8.01	8.41
CUT/FILL DEPTH	0.70	0.57	0.53	0.72	0.96	0.94	0.62	0.10	-0.12	-0.17
EXISTING SURFACE	5.49	5.50	5.41	5.30	5.45	5.87	6.58	7.51	8.13	8.58
CHAINAGE	120.00	125.00	130.00	135.00	140.00	145.00	150.00	155.00	160.00	165.00

Plot Date: 5:01:42 pm,10 February 2025, JOANNEC

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REVISION DETAILS

DRAFT

DESIGNED	AC
DRAWN	AC
CHECKED	JLC
APPROVED	CD

BUILDING B, LEVEL 1
8 NUGENT ST, GRAFTON,
AUCKLAND 1023
+64 9 308 9229
WOODS.CO.NZ

WOODS Est.1970

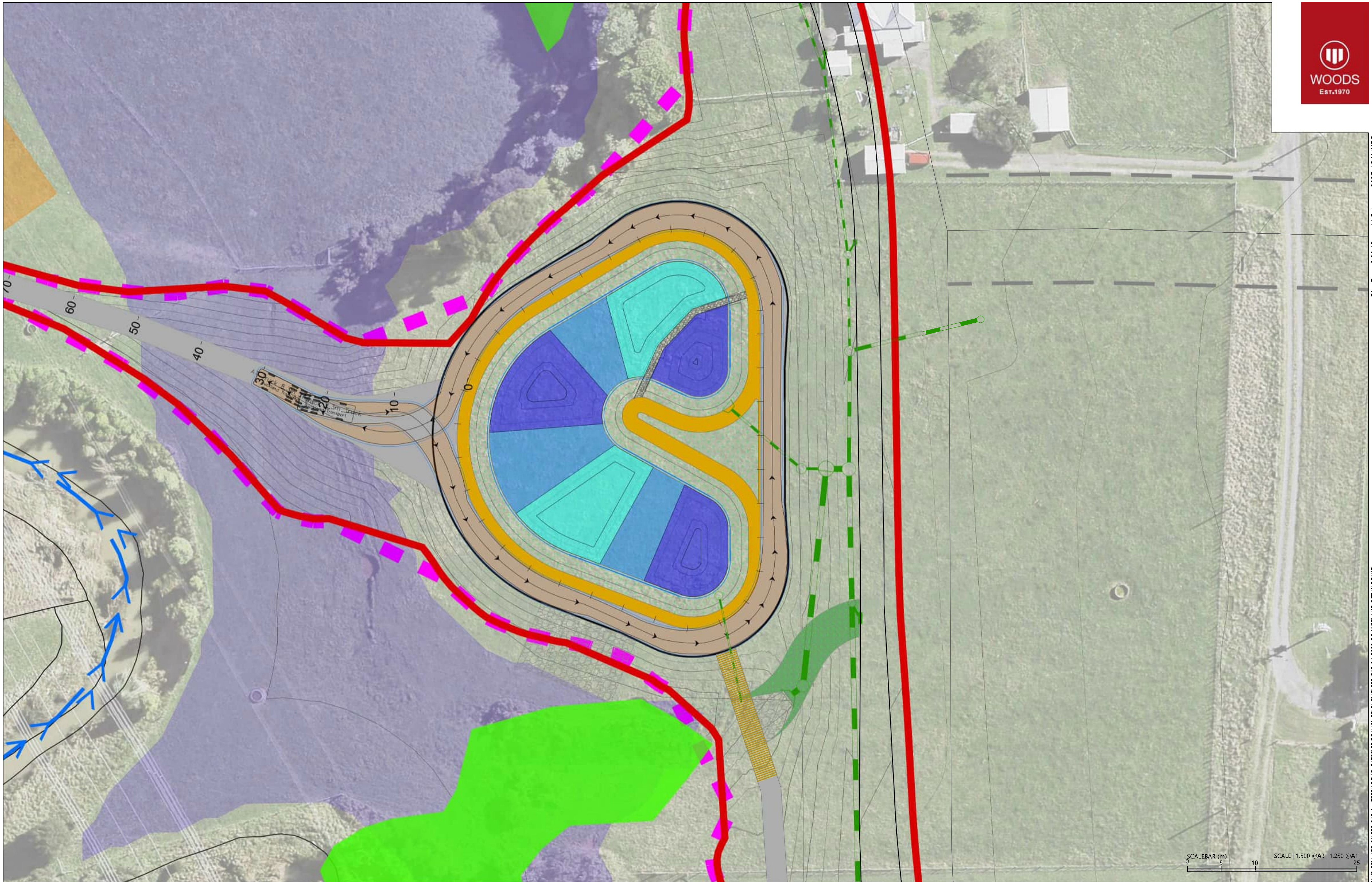
Kiwi Property

DRURY CENTRE - ROAD 2 NORTH

WETLAND MAINTENANCE ACCESS LONG-SECTION DETAIL

N

STATUS	FOR 85% DESIGN	REV
SCALE	AS SHOWN	-
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P23-315-04-3606-DR	



REVISION DETAILS					
1	FOR 50% D[illegible]GN	AC	20/11/2024	DESIGNED	
2	FOR 85% DESI[illegible]	A[illegible]	[illegible]/25	DRAWN	
				CHECKED	
				APPROVED	

DRAFT

WOODS
EST.1970

BUILDING B, LEVEL 1
8 NUGENT ST, GRAFTON,
AUCKLAND 1023
+64 9 308 9229

WOODS.CO.NZ

Kiwi Property

DRURY CENTRE - ROAD 2 NORTH

WETLAND 2-2 MAINTENANCE VEHICLE TRACKING PLAN

N

STATUS	FOR 85% DESIGN	REV
SCALE	AS SHOWN	2
COUNCIL	AUCKLAND COUNCIL	
DWG NO	P23-315-04-3607-DR	

Plot Date: 8:00:10 pm,11 February 2025, JOANNEC

File: C:\12DSYNERGY\DATA\WP-PEN-APP-01\P23-315_1 - CREEK ROAD_21792\02 DRAWINGS\01 ENG\P23-315-04-3600-DR_WETLAND DETAILS.DWG

APPENDIX 5:

Remedial Extent and Site Controls

Site Controls Relating to Contamination – Drury Stage 2

SITE SUMMARY

Proposed Works	Soil disturbance works associated with development of commercial buildings and associated carparking, roads and infrastructure
Contaminants Identified On-Site	Metals in site soil exceed environmental protection criteria. Low concentrations of asbestos fibres in soil.
Potential Risks to Site Workers	Incidental skin contact, ingestion of soil, or inhalation of dust should be avoided / mitigated through use of PPE and welfare measures.

KEY CONTACTS

Auckland Council Pollution Hotline	09 377 3107
WorkSafe	0800 030 040
Contaminated Land Specialist (ENGEO)	(09) 972 2205

HEALTH & SAFETY

All contractors and visitor shall be **inducted** before entering or commencing work to ensure they are **aware of the potential hazards** relating to contaminated soil at the site. As a minimum, facilities to wash and dry hands prior to eating, drinking or vaping / smoking should be provided.

PPE / RPE *to minimise the effects of potential contamination exposure.* Along with standard PPE requirements for construction sites (e.g., safety boots) the following should be considered:

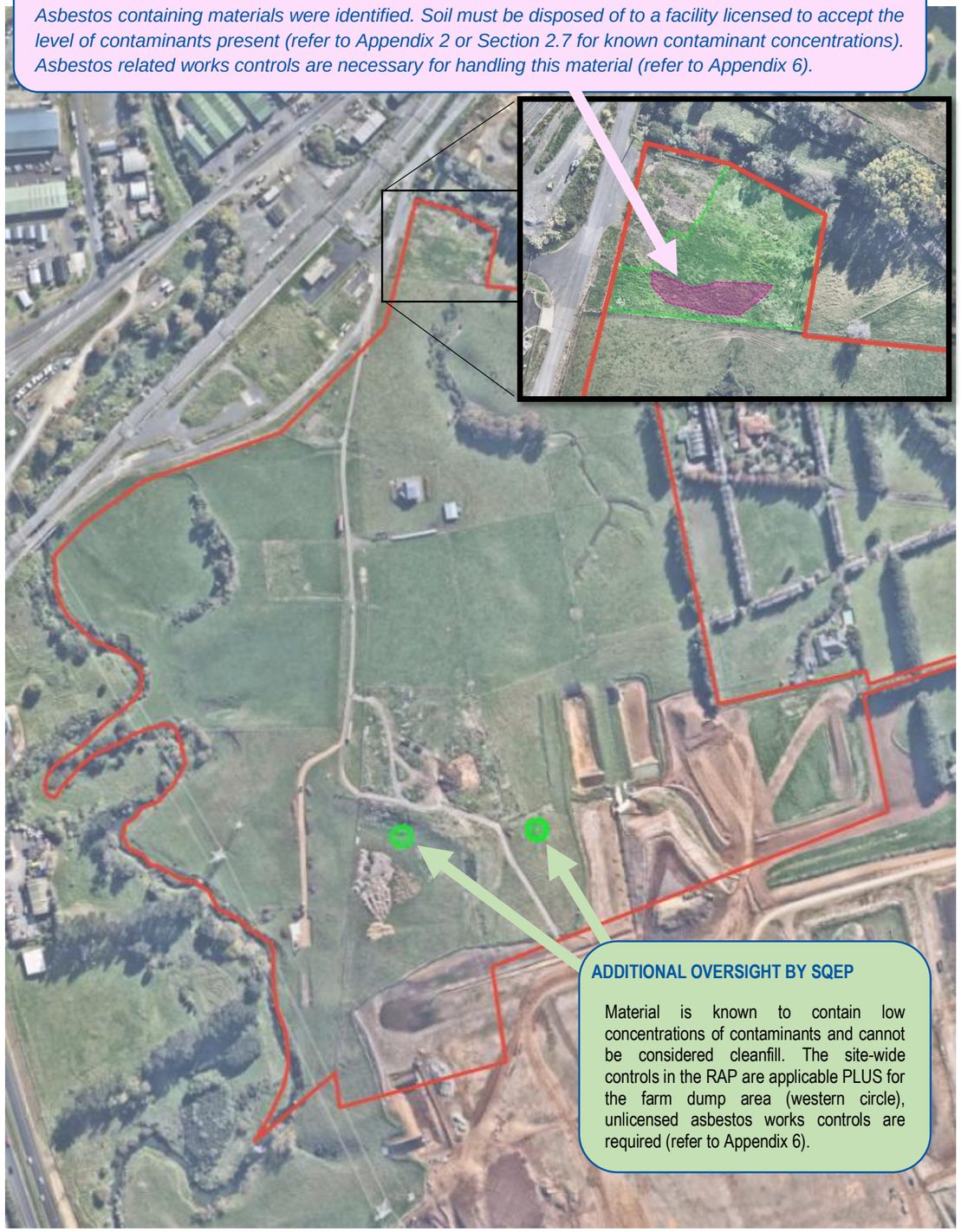
- P2 Dust Mask (if visible dust is present)
- Goggles / safety glasses (if visible dust is present)

UNEXPECTED DISCOVERY

Works shall temporarily stop and the Contaminated Land Specialist contacted should any areas of potential contamination be discovered during works. Typical indicators of contamination are asbestos containing material, staining, odorous material, visible sheen on water.

UNDOCUMENTED FILL SOIL

Asbestos containing materials were identified. Soil must be disposed of to a facility licensed to accept the level of contaminants present (refer to Appendix 2 or Section 2.7 for known contaminant concentrations). Asbestos related works controls are necessary for handling this material (refer to Appendix 6).



ADDITIONAL OVERSIGHT BY SQEP

Material is known to contain low concentrations of contaminants and cannot be considered cleanfill. The site-wide controls in the RAP are applicable PLUS for the farm dump area (western circle), unlicensed asbestos works controls are required (refer to Appendix 6).

DAILY SITE CHECK *(take photographs to record check)*

- **Security fencing** and appropriate **warning signs** are in place.
- **Sediment control measures** in good condition and working as designed.
- Check site entrance and adjacent public road for silt / sediment deposition.
- Check integrity of stockpile controls (if applicable).
- Check excavations to see if **perched groundwater or surface water** requires removal. Approval from local authority is required to discharge to local network – refer to RAP

GENERAL SITE CONTROLS

- Dust shall be managed in accordance with consent requirements and relevant regulations.
- If excavated material is **odorous**, odour control measures shall be put in place.
- If **perched groundwater or surface water** is encountered the controls in the RAP shall be implemented.
- If **temporary stockpiling of non-cleanfill material** is necessary, dust shall be controlled through wetting during the workday. If left overnight, the material shall be covered (e.g., with plastic) and protected by erosion / sediment controls (e.g., bunded).
- Stockpiles of non-cleanfill material shall be located either on an impermeable surface, or the underlying material should be considered potentially contaminated, and shall be managed in accordance with the RAP.
- Clean and dirty areas should be managed to prevent tracking potentially impacted soils around the site and off-site.
- Any wastewater generated, or rock / soil utilised in a truck loading area should be disposed of as contaminated material, unless tested.

RECORD KEEPING

- Daily photographs to be made available on request.
- Disposal dockets for all material should be forwarded to the Contaminated Land Specialist.
- Fill imported to site shall meet the Auckland Council definition of cleanfill.
- The location of any contaminated soils retained on-site shall be recorded on as built drawings.

OFF-SITE DISPOSAL OF CONTAMINATED SOIL

- Trucks shall be loaded in a location within the site where runoff and possible spills during loading will be controlled and contained. Loads must be securely covered during off-site transport. Soil must be taken to an appropriate soil disposal facility authorised to accept the contaminants identified.
- Prior to acceptance the results of the soil testing may be requested by the receiving facility.
- Requirements for additional testing and truck lining / soil wrapping should be confirmed with the receiving landfill.
- Further testing may be required to assess whether deeper material is cleanfill / managed fill.

For details of the controls refer to the current site-specific RAP prepared by ENGEO. All site staff and subcontractors are aware of and comply with the procedures and health and safety requirements contained within this document.

APPENDIX 6:

Asbestos Controls

Drury Stage 2
Asbestos Controls

Scenario (NZ GAMAS 2017 definitions)	Control Measure Objectives	Unlicensed Asbestos Work	Asbestos-related Work	Class B: non-friable	Class A: friable	*Source Guideline Reference*
FA/AF % w/w in soil		≤ 0.001	> 0.001	> 0.01	> 1	
ACM % w/w		≤ 0.01%	> 0.01	> 1	-	
Scale, soil volume		≤ NESCS	> NESCS	-	-	
Asbestos in air		< 0.01 f/mL in air	< 0.01 f/mL in air	≥ 0.01 f/mL in air	≥ 0.01 f/mL in air	
REMOVAL WORKS RESPONSIBILITIES						
Remedial Works Supervision / Oversight	OBJECTIVE: *Undertake work by persons who have adequate knowledge and experience to assess the risks and implement appropriate control measures*	A Suitably Qualified and Experienced Practitioner (Contaminated Land – refer to NESCS)		Class B Supervisor	Class A Supervisor	*ACOP*
WorkSafe Notification		Not required		Notification five days before earthworks are to be undertaken		*ACOP*
Contractor License Requirements		Not required		Class B License	Class A License	*ACOP*
Training/Certification Requirements		Non-certified training in asbestos identification, safe handling and suitable controls. A copy of the training shall be kept on record.		Certified training for workers. Certified, competent supervisors.	Certified training for workers. Certified, competent supervisors. Certified safety management system.	*Figure 17 ACOP*
SITE SET-UP						
Boundary Controls	OBJECTIVE: *Prevent unauthorised access into works areas and accidental transport of contaminated soils on boots, clothing, equipment, skin, or in air / dust.*	Physical barriers must be in place to prevent unauthorised access.	Physical barriers must be in place to prevent unauthorised access. Warning signs must be present that clearly show that asbestos related works are underway.	Physical barriers must be in place to prevent unauthorised access. Polythene sheeting may be necessary to prevent spread of airborne fibres outside of works area. Warning signs must be present that clearly show that asbestos removal works are underway.	Physical barriers must be in place to prevent unauthorised access. Consider use of solid hoarding placed at a suitable distance beyond the works area, or full enclosure. Warning signs must be present that clearly show that asbestos removal works are underway.	*ACOP*
Personal Decontamination Facilities		Educate site workers to minimise contact with soil. Provide a boot wash and lidded and plastic lined bin for secure disposal of used PPE.	Basic disposable decontamination tent and boot wash.		Basic disposable wet decontamination tent or trailer.	*NZ GAMAS Table 6*
Dust / Asbestos Fibre Suppression	OBJECTIVE:	Minimise the size of the earthworks areas and time exposed to the elements. Stabilise exposed earth surfaces as soon as possible following works.				

Drury Stage 2
Asbestos Controls

Scenario (NZ GAMAS 2017 definitions)	Control Measure Objectives	Unlicensed Asbestos Work	Asbestos-related Work	Class B: non-friable	Class A: friable	*Source Guideline Reference*
FA/AF % w/w in soil		≤ 0.001	> 0.001	> 0.01	> 1	
ACM % w/w		≤ 0.01%	> 0.01	> 1	-	
Scale, soil volume		≤ NESCS	> NESCS	-	-	
Asbestos in air		< 0.01 f/mL in air	< 0.01 f/mL in air	≥ 0.01 f/mL in air	≥ 0.01 f/mL in air	
	Minimise the release of asbestos fibres from soils.	Spray mist water via localised points. Consider use of surfactants or polymers where a reliable source of water is not available. Consider implementing additional controls (as per Class B works) if sensitive receptors nearby (such as adjacent to busy centres, schools).		Spray mist water via localised points. Addition of surfactants and polymers where the location is sensitive (such as adjacent to busy centres, schools) or if a source of water is not readily available. Consider temporary cover of contaminated areas awaiting remediation.		*NZ GAMAS Table 6*

Scenario (NZ GAMAS 2017 definitions)	Control Measure Objectives	Unlicensed Asbestos Work	Asbestos-related Work	Class B: non-friable	Class A: friable	*Source Guideline Reference*
FA/AF % w/w in soil		≤ 0.001	> 0.001	> 0.01	> 1	
ACM % w/w		≤ 0.01%	> 0.01	> 1	-	
Scale, soil volume		≤ NESCS	> NESCS	-	-	
Asbestos in air		< 0.01 f/mL in air	< 0.01 f/mL in air	≥ 0.01 f/mL in air	≥ 0.01 f/mL in air	
OCCUPATIONAL HEALTH AND SAFETY						
Personal Protective Equipment & Respiratory Protective Equipment	OBJECTIVE: *Minimise workers exposure to asbestos fibres.* *Reduce accidental transport of asbestos contaminated soils off site on workers clothing, boots.*	Educate site workers to minimise contact with soil; to clean equipment and to undertake activities in a manner that reduces dust. Disposable P2 dust mask recommended.	Disposable coveralls rated type 5, category 3, nitrile gloves Steel toe capped gumboots are preferred as these can be readily washed down. Disposable overshoes can be used to prevent contamination of laces.	Half-face P3 respirator with particulate filter. Consider increasing to full-face if friable ACM present.	Full-face P3 respirator with particulate filter. Consider increasing to power-assisted if required.	*NZ GAMAS Table 6* *NZ GAMAS Table 6* *Refer to Part C section 14 of the ACOP and AS/NZS 1715:2009 for more information*
Contractor Health Monitoring	OBJECTIVE: *Mitigate risks to workers from the potentially harmful effects of asbestos through the workplace.*	The contractor must ensure that worker health monitoring is undertaken in accordance with the Asbestos Regulations Clause 15 and 16.		In accordance with the Asbestos Regulations Clause 15 and 16, a PCBU must ensure that health monitoring is provided to workers involved in more than four weeks of Class B work in any twelve-month period. Refer ACOP Section 16	In accordance with the Asbestos Regulations Clause 15 and 16, a PCBU must ensure that health monitoring is provided to workers involved in Class A work. Refer ACOP Section 16	*ACOP* *Section 16*
MONITORING PROCEDURES						
Air Monitoring	**Responsibility**	OBJECTIVE: *Provide a clear expectation of who is responsible for undertaking monitoring, and that the person has the*	SQEP / Competent Person	Independent Licensed Asbestos Assessor OR Independent Competent Person as defined within Section 30.4 of the ACOP	Independent Licensed Asbestos Assessor	*Section 30.4 of the ACOP*

Scenario (NZ GAMAS 2017 definitions)		Control Measure Objectives	Unlicensed Asbestos Work	Asbestos-related Work	Class B: non-friable	Class A: friable	*Source Guideline Reference*
FA/AF % w/w in soil			≤ 0.001	> 0.001	> 0.01	> 1	
ACM % w/w			≤ 0.01%	> 0.01	> 1	-	
Scale, soil volume			≤ NESCS	> NESCS	-	-	
Asbestos in air			< 0.01 f/mL in air	< 0.01 f/mL in air	≥ 0.01 f/mL in air	≥ 0.01 f/mL in air	
	Requirement	*appropriate skills and knowledge to do so.* *To provide verification that works have been safely undertaken.* *To provide early warning of potentially harmful levels of exposure.* *To identify when asbestos is present in air at a concentration that presents an unacceptable risk to site workers and surrounding receptors.* *Undertake works by persons who have been trained to manage the risks associated with asbestos.*	Air monitoring is not required for Unlicensed Asbestos works, or Asbestos Related works (as defined under the NZ GAMAS) however it is recommended where possible to provide assurances regarding cross contamination and protection of workers.		If the SQEP or competent person considers that the trace level of 0.01 f/ml may be exceeded, then air monitoring must be undertaken.	Air monitoring must be conducted before and during Class A asbestos removal work.	*NZ GAMAS Section 5.5*
	Compliance	*Implement additional control measures when necessary.*	If the concentration exceeds 0.01 f/ml then works are Class B or Class A works under the NZ GAMAS definition.		All results shall be below 0.01 fibres / ml. < 0.01 f/ml – continue with works > 0.01 f/ml – investigate the cause and implement additional controls > 0.02 f/ml – stop works and investigate, notify WorkSafe >0.1 f/ml – Remedial works required. PCBUs with management or control of workplace are to ensure that exposure of a person at the workplace to airborne asbestos is eliminated so far as is reasonably practicable.		*Section 30 of the ACOP*
SITE CONTROLS							
Vehicle Decontamination	**Vehicle assessment before demobilisation from site**	OBJECTIVE: *Minimise the potential for accidental transport of contaminated soils or asbestos fibres out of the works areas on, or in vehicles.*	Minimise vehicle transport onto site areas containing asbestos soils, or in locations where asbestos fibres may be present in air. Visual assessment.		Visual (plus swab samples if friable ACM is elsewhere on-site – lagging, insulation, etc).	Visual plus swab samples, air sampling should be undertaken inside the cab.	*NZ GAMAS Table 7*
	Vehicle assessment completed by		Competent person or SQEP.		Independent licensed assessor or independent competent person (meeting the requirements of regulation 41(3) under the Asbestos Regulations).	Independent licensed assessor.	*NZ GAMAS Table 7*
	Truck/excavator air conditioning	OBJECTIVE: *To prevent the contamination of internal spaces of equipment where people work.* *To avoid worker exposure to asbestos fibres.*	Standard air conditioning.		HEPA filter system fitted for all occupied vehicles where friable ACM on-site.	HEPA filter system fitted for all occupied vehicles, filter replaced or clean down with HEPA vacuum cleaner post work.	*NZ GAMAS Table 7*
MANAGEMENT OF CONTAMINATED MATERIAL							

Drury Stage 2
Asbestos Controls

Scenario (NZ GAMAS 2017 definitions)	Control Measure Objectives	Unlicensed Asbestos Work	Asbestos-related Work	Class B: non-friable	Class A: friable	*Source Guideline Reference*
FA/AF % w/w in soil		≤ 0.001	> 0.001	> 0.01	> 1	
ACM % w/w		≤ 0.01%	> 0.01	> 1	-	
Scale, soil volume		≤ NESCS	> NESCS	-	-	
Asbestos in air		< 0.01 f/mL in air	< 0.01 f/mL in air	≥ 0.01 f/mL in air	≥ 0.01 f/mL in air	
Stockpiles of impacted soils	OBJECTIVE: *To minimise the release of asbestos fibres into air.* *Asbestos contaminated material is to be appropriately transported and disposed in a location where the material presents no unacceptable human health risk.* *To track the movement of contaminated materials.*	Stockpiles should be avoided where possible to ensure that exposed areas of soil are minimised. All temporary stockpiled asbestos contaminated material which is created and not proposed to be immediately moved should be covered. Stockpiles shall be located on an impermeable surface within an area protected by erosion and sediment controls. Consider covering stockpiles with polythene.				*NZ GAMAS Section 6.6*
Used PPE		All disposable PPE used during remediation of asbestos impacted soil should be placed in a 200 micron HDPE plastic bag within the decontamination area. The bag should be taped closed (in a goose neck fashion) after each item is added and kept damp via the addition of water. Once full, the bag should be double bagged (200 micron HDPE) and labelled “Asbestos hazard – wear respirator and protective clothing while handling contents”.				*NZ GAMAS Section 6.6*
Contaminated Soil		The location of any soils retained on-site shall be recorded on as built drawings. The receiving facility should be contacted in advance of the soil disposal to verify the requirements for receiving the wastes. Trucks shall have their loads securely covered during off-site transport of material. Waste manifests should be completed and retained for all off-site disposal of soils. Site records shall be cross checked against receipts of soil disposal from the receiving facility. The bins / skips or trucks shall be loaded within the site where runoff and possible spills during loading will be controlled and contained.				*NZ GAMAS Section 6.6*
		Special waste bins / skips or trucks, approved for the transport of ACM to the appointed licensed landfill facility shall be placed on-site. The bins / skips or trucks will be lined / wrapped in accordance with requirements of receiving facility. It is recommended that any soil which contains asbestos in concentrations >0.001% w/w is considered hazardous and the controls stated in the Land Transport Rules adopted. For asbestos soil waste in significant quantities, hazard label signage should be displayed on the vehicles transporting the soil for disposal.	Special waste bins / skips or trucks, approved for the transport of ACM to the appointed licensed landfill facility shall be placed on-site. The bins / skips or trucks will be lined with 200 micron sealed plastic. It is recommended that any soil which contains asbestos in concentrations >0.001% w/w is considered hazardous and the controls stated in the Land Transport Rules adopted. For asbestos soil waste in significant quantities, hazard label signage should be displayed on the vehicles transporting the soil for disposal.		
Contaminated Water		Water used for cleaning asbestos-contaminated equipment (including vehicles) shall be placed into a drum or skip and disposed of at an appropriately licensed facility. If excessive water is applied, ponding or runoff may occur which could permit the transport and accumulation of asbestos fines outside of the site. Water from the work area should be retained inside the boundary of the site and wash water directed back into excavations and the site.				*NZ GAMAS Section 6.6*