WILLIAMSON
WATER & LAND ADVISORY

40 Elliot Street, Papakura

Preliminary and Detailed Site Investigation (Ground Contamination)

SOIL AND ROCK CONSULTANTS

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WWLA

40 Elliot Street, Papakura

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1	19 March 2024	Soil and Rock Consultants	Draft for client comment – second round of gas monitoring to be undertaken.
2	3 April 2024	Soil and Rock Consultants	Final draft for client comment following completion of second round of gas monitoring.

Investigation Summary

Williamson Water & Land Advisory Ltd (WWLA) has prepared this ground contamination assessment to assist Soil & Rock Consultants (S&R) and its client, Ministry of Justice, with developing an interim courthouse at 40 Elliot Street, Papakura. The objective of this investigation was to determine the potential for contamination, assess ground conditions and confirm the ground contamination-related implications for the development. The key findings of this assessment are:

History and potential for contamination [Section 3]	**An evaluation of past activities against the Ministry for the Environment's Hazardous Activities and Industries List (HAIL; those with potential to cause ground contamination) was undertaken to inform the resource consent planning assessment and proposed soil disturbance.** • Review of the site history indicates the site was located on farmland at the edge of the Pahurehure Inlet, with the western boundary partially reclaimed by 1959, likely associated with operation of the Ray Small Park closed landfill known to be located immediately west of the site. In the 1970s the entire site was earthworked, presumably for final levelling for development and the Returned Services Assocation (RSA) building was constructed in the late 1970s. • Owing to the presence of up to some 4 m of fill beneath the site, HAIL Activity G3 (landfill sites) is considered to apply.
Site investigation [Section 4]	**Site investigations involved soil sampling, instantaneous surface emission monitoring (ISM) and soil gas measurements around underground services and manholes.** • Soil samples were collected via hand auger around the building. On the western side of the building up to 3 m of fill was encountered, described as silty gravel and gravelly clay, variably brown, green and orange. • Up to 1 m of gravelly silt fill was encountered at the remaining investigation locations. • No visual or olfactory evidence of contamination, including presence of waste materials, was noted in either fill units. The results of laboratory soil analyses showed: • Topsoil and fill contain low concentrations of metals, SVOCs and asbestos, above expected background ranges but below NESCS and AUP criteria, so these material do not present an unacceptable risks to human health or the environment. • Underlying natural soils can be considered cleanfill, once scrapped clean of any overlying fill material. Landfill gas screening indicates that the existing building platform has a low landfill gas risk.
Conceptual site model (CSM) [Section 5]	The CSM, a process to identify potential risk to people and environmental receptors during and post soil disturbing activities, shows there are **no unacceptable risks posed by ground contamination to site workers and environmental receptors during site development or subsequent use as a courthouse.** All soils can be reused on site but fill requiring offsite disposal will need to go to a managed fill site.
Future development implications [Section 6]	**Consent is expected to be required to be obtained on a controlled activity basis under the NESCS. Standard earthworks controls and procedures are applicable during development works.** • Consent for soil disturbance is not required under Section E30 of the Auckland Unitary Plan. • Earthworks can be carried out in accordance with standard earthworks controls and no contaminated land-specific health and safety procedures is required. • Surplus surficial fill requires disposal to managed fill. Excluding the upper 100-200 mm underlying natural soils are expected to be suitable for disposal as cleanfill. • Landfill gas mitigation measures are not expected to be required in building design or construction. But if a precautionary approach is preferred cutoffs could be installed in new wastewater and stormwater connections to east and south of the courthouse as the existing large diameter / deep underground services are expected to be the most likely pathway by which landfill gas could migrate from the adjoining closed landfill. • An asbestos survey of the building should be undertaken before any demolition activity. If present asbestos will need to be removed from the existing building and associated infrastructure by a Licensed Asbestos Removalist.

Contents

Figures:

Tables:

Appendices:

1. Introduction

Williamson Water & Land Advisory (WWLA) has prepared this ground contamination assessment, comprising combined preliminary and detailed site investigations (PSI and DSI), to assist the Ministry of Justice (MoJ), via Soil and Rock Consultants (S&R), with development of an interim courthouse at 40 Elliot Street Papakura, Auckland (referred to herein as 'the site', see **Figure 1**).

Figure 1. Site location, outline in red (Image source: LINZ)

1.1 Background

The current Papakura courthouse is not fit for purpose, so MoJ propose to develop a new interim courthouse at the site while repairs on the original courthouse take place. The design life of the interim structure is intended to be at least 20 years. The site is currently occupied by building that was formerly used by the Returned Services Association (RSA). If possible MoJ would like to utilise off-site construction methodologies and reuse the floor slab of the existing building to support a central portal frame structure containing the courtrooms, with modular units adjacent, containing all other amenities.

The site adjoins Auckland Council's Ray Small Park closed landfill and previous investigations undertaken by S&R indicate that uncontrolled fill material extends into the western and southern parts of the site. Filling is potentially an activity included on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL). Land where HAIL activities have occurred is subject to the requirements of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (the NESCS) and it may also be subject to the contaminated land requirements of the Auckland Unitary Plan (AUP). Additionally, there is a potential for landfill gas effects associated with Council's close landfill.

This investigation has been undertaken to:

1. Confirm the site's history and assess whether any HAIL[1] activities have occurred.
2. Determine the actual contamination present (if any), and the implications for consenting and construction of the interim courthouse.

1.2 Scope of work

The scope of this investigation comprised:

1. Assessment of the site's history comprising review of:
    a) Historical aerial photographs sourced from Retrolens, Auckland Council GeoMaps and Google Earth.
    b) The Auckland Council property file.
    c) Previous investigations provided by Auckland Council's closed landfill team.
2. Site walkover inspection by a Suitably Qualified and Experienced Practitioner (SQEP)/Contaminated Land Specialist.
3. Assessment of the potential for contamination, based on the current and historical land use and evaluation of that against the HAIL.
4. Site investigations comprising:
    a) Collection and testing of soil samples to investigate potential ground contamination impacts.
    b) Instantaneous surface monitoring (ISM) for methane and installation and monitoring of temporary gas probes to screen for landfill gas conditions in ground.
5. Development of a conceptual site model (CSM) to assess contaminant risks and mitigation requirements.
6. Evaluation of the implications of the findings on design, consenting, earthworks/construction, and post-construction for the proposed redevelopment.

1.3 Legislative requirements

WWLA has undertaken the investigations and prepared this report in general accordance with requirements of a preliminary site investigation (PSI) and detailed site investigation (DSI) as set out in industry best practice guidance, including:

- Ministry for the Environment (MfE) Contaminated Land Management Guideline No. 1: Reporting on Contaminated Sites in New Zealand (Revised 2021), (CLMG1);
- MfE's Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils (Revised 2021), (CLMG5); and
- New Zealand Guidelines for Assessing and Managing Asbestos in Soil (NZAG; BRANZ, November 2017).

This report has been prepared, reviewed, and certified by SQEPs as described in the NESCS Users' Guide[2]. CVs confirming the SQEP status of our contaminated land specialists are available on request.

[1] Ministry for the Environment's Hazardous Activities and Industries List.
[2] Ministry for the Environment. 2012. Users' Guide: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.

2. Site Description

2.1 Site identification

The property comprises a single land parcel on the southern side of Elliot Street, Papakura. The property details are described in **Table 1**.

Table 1. Site details

Address	Legal description	Certificate of title	Area (m^2)	Zoning (Auckland Unitary Plan)
40 Elliot Street, Papakura 2113	Lot 3 DP 468814	629977	7,925	Residential – mixed housing urban

2.2 Site setting

The site setting is described in **Table 2**. The features of the site setting are considered in the context of their potential to affect the distribution, mobility and form of contaminants (if present).

Table 2. Environmental setting

Surrounding land use	The site is located at the edge of the Papakura town centre so surrounding use is a mixture of commercial, community, and residential properties. Immediately south of the site, and sharing the same carpark, is the Hawkins Theatre and a further 130m south of the site is Papakura Central School. To the west of the site is Ray Small Park (a closed landfill) and to the north across Elliot Street are various commercial or light industrial businesses including a dance studio, picture framer, mechanical workshop and to the northeast a Caltex service station. Land to the east is under high-density residential use (townhouses).
Topography and drainage	*The topography and drainage influences where contaminants may migrate to if present and surface water features are potential receiving environments for contaminants (if any) derived from the site.* The topography surrounding the site falls to gently the southwest, with the site having an elevation of approximately 11 m RL in its northeast corner and around 8 m RL along its southern boundaries. A single building is located on the site. The building is surrounded by asphalt car park areas to the north, south and west which controls surface runoff into stormwater drain systems. Auckland Council GeoMaps indicates that stormwater in the area is reticulated to the west, ultimately discharging to the Pahurehure Inlet of the Manukau Harbour which is located some 170 m away. Information on GeoMaps shows an overland flow path near the southern boundary, and potential for flooding across the southern quarter of the site, including impinging slightly on the existing building.
Geology	*The geology is considered in the context of describing the conceptual site model (CSM) (**Section 5**) should a potential for contamination be identified by the desk study component of this report. For example, more porous soils can enable contaminants (if present) to move more quickly and potentially further than clay-rich soils that retain or prevent penetration of contaminants.* The published geological map[3] shows the site is located on Puketoka Formation sediments, but this and other investigations (refer **Section 3.2.3**) indicate that fill was used to reclaim the site and surrounds in the 1950s-1970s Fill of up to 4 m in thickness is underlain by Puketoka Formation silty clay and clayey silt, with sandy alluvial deposits present closer to the location of the former inlet along the western boundary.
Hydrogeology	*Hydrogeological conditions affect the potential risk of a contaminant entering and being transported in groundwater*. Geotechnical investigations conducted concurrently by S&R[4], and previous investigations (refer **Section 3.2.3**), have encountered groundwater between approximately 2.5 m to 3.5 m below ground level (m BGL) at the site. Shallow groundwater is expected to follow the topography, flowing to the west towards the Papakura Inlet.

[3] Kermode, L.O., 1992. Geology of the Auckland urban area. Scale 1:50,000. Institute of Geological & Nuclear Sciences geological map 2
[4] Geotechnical Investigation for Proposed District Courthouse at 40 Elliot Street, Papakura. Report prepared for Ministry of Justice by Soil and Rock Consultants, dated 5 March 2024. Reference: 220761 - Rev A.

Sensitive receptors	*Sensitive human receptors could, for example, be children at a school or kindergarten on or adjacent to a site. Workers on industrial land (including or adjacent to a site) would be considered less sensitive.* The site surrounds are occupied by a mixture of school, recreational and residential land uses. Occupants and users of these lands could be considered sensitive receptors.
	Sensitive environmental receptors could include aquatic or terrestrial ecosystems. This is not an ecological assessment but is instead an initial review of the surrounding environment to assess where contaminants (if present) on the site could migrate to and affect. The ecosystem of the Papakura Inlet could be considered sensitive given its proximity to the site.

3. HAIL Assessment

This section details a HAIL Assessment, a review of current and historical activities to determine whether activities listed on MfE's HAIL have occurred on the site. The findings of the HAIL Assessment inform the scope of detailed investigations (sampling) and the subsequent contamination consenting assessment.

3.1 Site layout and current use

The site was visited by a SQEP from WWLA on a number of occasions during February 2024. Site observations and selected photographs are provided below:

- The site is accessed via Elliot Street and contains one building within a carpark that is shared with the neighbouring Hawkins Theatre to the south. The site has an open boundary with Ray Small park (closed landfill) and skate park to the west, a St John ambulance base to the southwest, and a fenced boundary with a high-density residential development to the east.
- The building is vacant but was most recently occupied by the Papakura RSA and a culinary school.
- Building construction material is predominantly a mixture of brick, timber and corrugated sheet metal roofs (Photograph 1 to Photograph 4). However soffits and some facia panels comprise fibre cement board, which has the potential to contain asbestos. A covered walkway, also clad with fibre cement board, is located along the northern side of the building (Photograph 3). The building appeared to be in good condition.
- The site slopes down gently to the west. The southeastern end of the building has been built into the slope creating a partial basement (**Photograph 5**).
- Landscaped borders are present along the northern boundary of the site (Elliot Street frontage) and at the western entrance to the building. All vegetation appeared healthy with no visible signs of distress (**Photograph 1, Photograph 6 and Photograph 7**).
- There are two garages / sheds in the southern corner of the site, constructed from profiled steel over the asphalt pavement. The interiors of the sheds were not inspected but were expected to be empty given that the main building was vacant (**Photograph 8**).
- No signs of surface staining or other visual indicators of potential ground contamination were observed.

Photograph 1. View looking southwest from northeast site boundary (Elliot Street) towards former RSA building.

Photograph 2. Building entrance from Elliot Street, view looking east.

Photograph 3. Western entrance to RSA building looking east, showing site sloping to the west.

Photograph 4. Western entrance to RSA building looking east, showing site sloping to the west.

Photograph 5. Southern end of building, formerly used by a culinary school associated with the RSA.

Photograph 6. Area used for carparking south and west of main building, looking south towards Hawkins Theatre.

Photograph 7. View of site from northwestern end of carpark looking north.

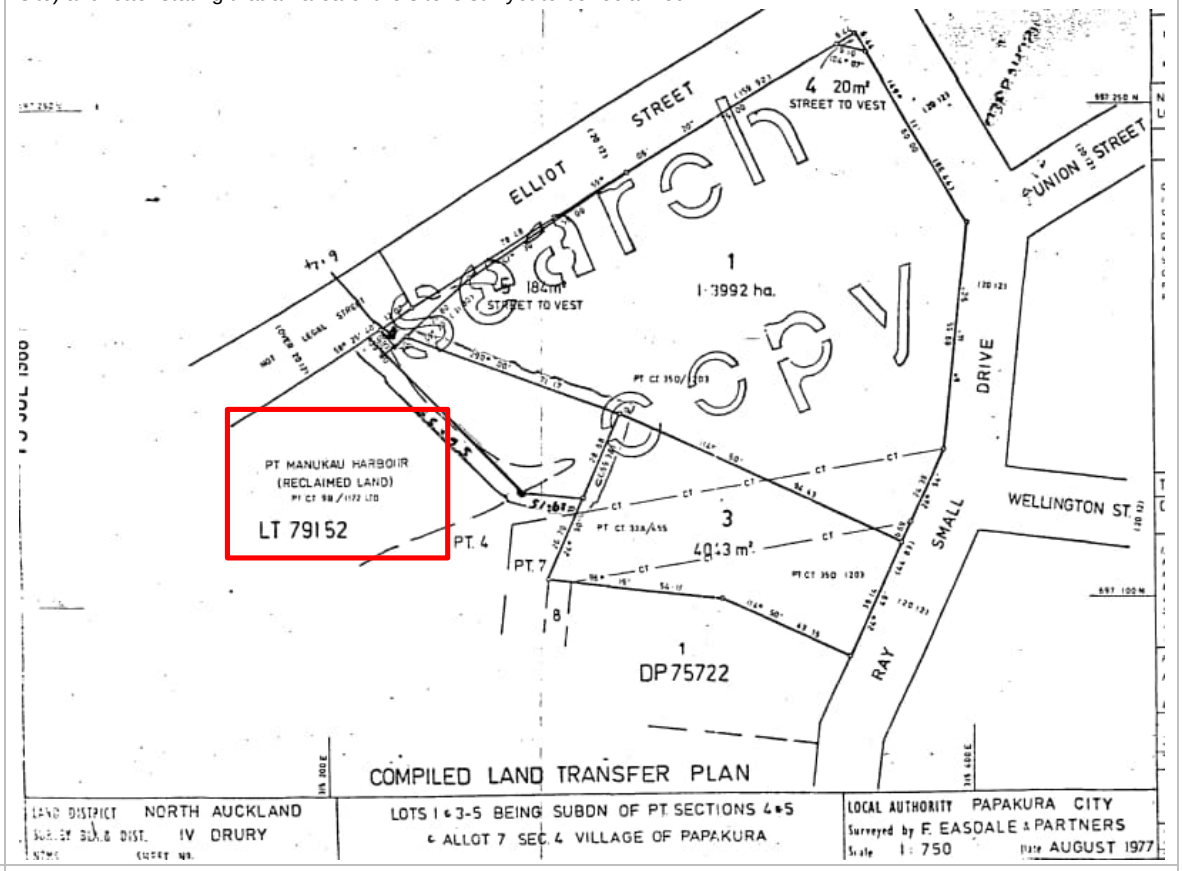
Photograph 8.Two garages in the southeastern corner of the site.

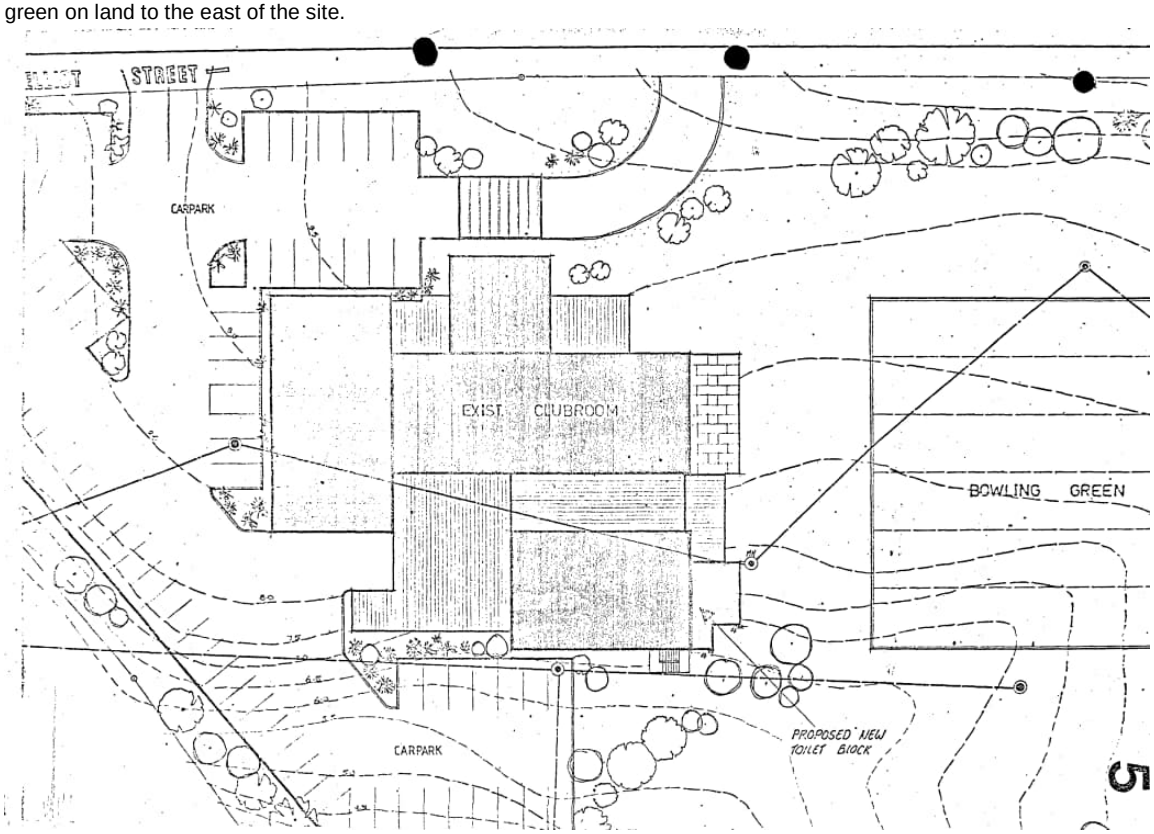
3.2 Site History review

3.2.1 Auckland Council property file

The property file for 40 Elliot Street was received from Auckland Council in March 2024. The documents in the file relevant to prior land uses or potential contamination sources are summarised in **Table 3**.

Table 3. Summary of relevant property file documents

1977-1978	Scheme plan for subdivision showing (red outline) that reclamation of Manukau Harbour has occurred (to southwest of site) and letter stating that an area of the site is still yet to be reclaimed. 
1976	Letter from RSA to Council agreeing to purchase the site.
1978	Building permit for new club building for Papakura RSA. Building materials specified are concrete, timber and iron.
1979	Building permit for a bowling green storage shed for Papakura RSA. Building materials specified are fibrolite walls and iron roof.
1984	Plans for the galvanised iron shed on the southern boundary, plans show it in the current location.
1985	Building permit to add an office block to RSA building. Building materials specified are concrete and brick with iron roofing.
1986	Building permit for a new soil and implement shed for the RSA bowling club. Building materials specified are timber and concrete.
1990	Building permit to alter and extend the RSA building for new kitchen, dining, lounge and toilet facilities. Building materials are concrete, wood and galvanised steel roof.
1990	Geotechnical investigation report for proposed new clubroom extensions. The report states that gravelly silt fill was encountered to 1.2 m depth in both investigation locations. One borehole then encountered impenetrable gravel at 1.2 m depth and could not be advanced further; the second borehole had natural clayey silt below 1.2 m depth. Groundwater was at 3 m depth. The borehole location plan was not attached to the document and could not be located in the file.

~1990	Undated plans for a new clubroom extension including new toilet block (assumed 1990) showing position of bowling green on land to the east of the site. 
1994	Consent for a groundwater take to irrigate the two bowling greens.
1997	Building permit for new garage next to the existing shed in the south of the site.
2015	Permit for alteration to existing building to construct commercial training kitchen.

3.2.2 Aerial photograph review

Historical aerial imagery available from the Retrolens, Auckland Council GeoMaps and Google Earth Pro were reviewed and are summarised in **Table 4**.

Table 4. Historical aerial photograph review

Photograph date (source)	Activities	Aerial image (site in red outline)
1939 Retrolens (SN139/36/9)	The site is vacant and likely used as pasture. The western site boundary borders the Pahurehure Inlet. A gully runs from the inlet along the southern boundary of the site. Surrounding land is also pasture, with residential development occurring further east.	

Photograph date (source)	Activities	Aerial image (site in red outline)
1959 GeoMaps	The western part of the site bordering the inlet has been partially reclaimed. The wider site remains vacant and unchanged. The reclamation to the west shows disturbed soil so is actively being filled at this time. A partial image available from Retrolens for 1961 suggests that filling continued to extend out to the west of the site. Land to the north has been redeveloped for commercial use and additional residential development has occurred in the wider surrounding area.	
1979 Retrolens (SN5783B/T/11)	The site has been fully developed, with the RSA building and surrounding car park constructed. Reclamation of the inlet to the west/northwest is complete and development of land to the south and southwest also appears to have involved filling. The bowling green has been established immediately east of the site.	
1989 Retrolens (SN8772/U/4)	Additions to the northeast of the building have occurred and a shed has been built in the south. A second bowling green has been built to the southeast of the site, and reserve land established to the west.	

Photograph date (source)	Activities	Aerial image (site in red outline)
2001 GeoMaps	Some additions to the building have occurred since 1989, widening the building footprint. The shed in the south of the site has been replaced. The Hawkins Theatre has been constructed to the south.	
2003, 2006 (pictured), 2008, 2010 GeoMaps	No material changes evident on the site or on surrounding land relative to 2001 imagery.	
2017 GeoMaps	No material changes evident onsite. Both bowling greens to the east have been removed and this area is being redeveloped.	

3.2.3 Other information

3.2.3.1 Geotechnical investigations

S&R completed a preliminary geotechnical investigation of the site in 2022[5]. Machine- and hand-drilled boreholes advanced across the site encountered between 1.3-4.8 m of nonengineered fill. It was interpreted

[5] Geotechnical Investigation for Concept Design of Proposed Courthouse at 40 Elliot Street, Papakura, Report prepared for Ministry of Justice by Soil and Rock Consultants, dated 30 September 2022. Reference: 220761-Rev A.

that fill closer to the building was associated with its construction but the thicker deposits of fill encountered at the western and southern margins of the site were associated with reclamation undertaken in the site surrounds. The cohesive fill was described as clayey silt and silty clay with occasional inorganic materials (paper, plastic, wood, brick, rubber, glass). However, our review of the borehole logs shows that the fill did not include refuse (domestic rubbish) or significant quantities of organic material. Groundwater was encountered at between 2 and 3.4 m BGL during drilling works but was measured depths of between 2 and 2.7 m BGL in a piezometer installed for this purpose.

As noted in **Section 2.2**, S&R undertook additional geotechnical investigations concurrently with this assessment. From a ground contamination perspective the findings were broadly consistent with those described above. However, the additional investigations were focussed immediately around the existing building and encountered considerably less in organic wastes within the fill materials.

Auckland Council's closed landfill team also provided a number of geotechnical investigation reports (refer to **Section 3.2.3.2**) however, the only additions to S&R's findings were:

- The landfill materials underlying Ray Small Park are overlain by a clay cap of highly variable thickness (0.1 to 2 m, although generally >1 m) which is covered by some 200 mm of topsoil[6].
- Fill was confirmed as extending up to 4 m BGL in the vicinity of the skate park. The fill was described as refuse but review of the borehole logs indicates it principally comprised inorganic wastes such as concrete, tiles, glass, plastic, brick, wire etc. Some localised areas of paper and organic material and associated odours were identified.
- Fill materials thickened slightly (up to some 5 m BGL) to the northwest, in the vicinity of the Badminton Club, and also contained more refuse type wastes[7].

3.2.3.2 Auckland Council closed landfill records

WWLA requested information from Auckland Council's closed landfill on its monitoring records relating to Ray Small Park closed landfill. Monitoring reports for the period from 2019 through 2023[8] were provided and in summary show:

- The closed landfill is classified under the Council's own framework as having a "moderate" potential for landfill gas generation.
- ISM surveys of the Badminton Club building (north of Elliot Street) and Northern (near the skate park) and Southern toilet blocks are carried out annually.
- Methane measurements of up to 650 ppm were reported in 2021 and early 2022 but no methane was detected in November 2022. The trigger level for further investigation is 1,000 ppm.
- The reports conclude that the landfill gas monitoring does "not indicate a significant risk" to human health.
- Visual inspection of the wider park and sampling of leachate discharges into the Pahurehure Inlet are also undertaken but are not considered relevant given the separation distance from the subject site.

The information provided by Auckland Council also included an Assessment of Environmental Effects prepared in 2007[9].

- The report states that there is limited historical information about the nature and extent of filling but notes that "It is believed to have received municipal waste from the Papakura District and the landfill most likely closed during the mid 1970s…".

[6] Geotechnical Investigation for Skate Park Extensions, Ray Small Park, Papakura. Report prepared for Isthmus Group by Geotek Services Limited, dated 18 June 2014. Reference: 4802.
[7] Proposed Extension to Ray Phillips (Badminton) Hall, Elliot Street, Papakura. Geotechnical Investigation Report. Report prepared for Counties Manukau Badminton Association by Geotek Services Limited, dated 1 May 2008. Reference: 3885.
[8] Tonkin & Taylor Ltd, January 2023. *Landfill Gas Monitoring Report, Ray Small Park (Elliot Street) Closed Landfill: February 2022 to January 2023*. Prepared for Auckland Council - Closed Landfills Team. Reference: 28645.5020 v2
[9] Elliot closed landfill, Assessment of Environmental Effects. Report prepared for Papakura District Council by Environmental & Earth Sciences Ltd, dated March 2007. Reference: 305045 AEE (Rev1).

- While only eight test pits were excavated across the landfill it is reported that "*there was little evidence of household putrescible waste and no evidence of any hazardous or industrial wastes*". The fill is reported to have mainly consisted of "*building rubble (brick and timber), glass, paper, plastics and wire/fence materials…"*
- Landfill gas was not encountered during excavation of the test pits.
- Soil samples were tested for metals and semi-volatile organic compounds (SVOCs), which showed that while these analytes were locally present above background concentrations they complied with the guidelines for residential and parkland use adopted at the time.

3.2.3.3 11 Ray Small Drive

The property file for the residential development on 11 Ray Small Drive was obtained to determine if investigations, particularly a landfill gas assessment, had been undertaken on this site. A combined DSI and remediation action plan (RAP)[10] were identified in the file. However, no landfill gas investigations were conducted, and only low concentrations of metals and polycyclic aromatic hydrocarbon (PAH) contamination were reported in fill encountered at the site. The nature and extent of fill is not described in the report. Higher contaminants levels were encountered in the surface soils of the former bowling greens.

3.2.4 Summary

In summary, the site history review indicates that:

- The site originally comprised farmland at the edge of the Pahurehure Inlet.
- Its western boundary was partially reclaimed by 1959, which appears to coincide with the commencement of operation of a wider landfill, which is now occupied by Ray Small Park. While the landfill is believed to have received municipal wastes investigations have identified principally inorganic materials such as building rubble, glass, paper, plastics and wire.
- In the 1970s the entire site was earthworked, presumably for final levelling for development.
- The RSA building was constructed in the late 1970s and had several additions and internal alterations through to the 2010s. Two bowling greens associated with the RSA were located east and southeast of the site (now removed).
- Previous investigations have confirmed that up to 4 m of cohesive fill is present at the western and southern ends of the site. The fill thins rapidly to the northeast and is only present as a thin veneer in the vicinity of the former RSA building. No evidence of household putrescible waste or hazardous or industrial wastes have been identified in the fill materials investigated beneath the site.
- Landfill gas monitoring conducted in relation to the Ray Small Park closed landfill does not indicate a significant risk to human health.

3.3 Potential for contamination

Potentially contaminating activities identified for the site are described in **Table 5** along with an assessment of the likelihood and magnitude of any contamination resulting from the activity, and whether the activity constitutes a HAIL. Colour coding in the table is used to indicate:

- Red highlight indicates a confirmed HAIL activity.
- Orange highlight indicates activities that have the potential to be a HAIL but require soil testing to confirm the HAIL status.
- Green highlight indicates an activity not considered to be HAIL.

[10] Detailed Site Investigation, Remediation Action Plan & Assessment of Environmental Effects, 11 Ray Small Drive, Papakura, Auckland. Report prepared for Mex Enterprises Limited by Focus Environmental Services Limited, dated September 2015. Reference: FES 0469.001.

Table 5. Evaluation of potentially contaminating activities

Land use and associated HAIL activity	**Potential contaminants**	**Possible extent of contamination**	**HAIL Assessment**
Reclamation and filling which may have included municipal wastes. *HAIL Activity G3. Landfill sites*	Metals and polycyclic aromatic hydrocarbons (PAH) are common urban fill contaminants. Landfills may include a wide range of contaminants.	The western end of the site was reclaimed around the time that the Ray Small Park closed landfill commenced operations. The site was later levelled around the time landfill operations were ceasing. The presence of up to 4 m of fill at the western and southern ends indicates that landfilling encroached onto the site, probably as a result of filling low points in the inlet and a former gully.	HAIL Activity G3 is more likely than not to have occurred at the site.
Asbestos use on RSA building or demolition of ACM during various alterations. *HAIL Activity E1. Asbestos… including sites with buildings containing asbestos products known to be in a deteriorated condition.*	Asbestos	The building was constructed at a time when ACM was commonly used. Several alterations have been made to the building since the 1970s. The risk presented by ACM is that degradation of these materials, and certain property maintenance activities (water blasting, painting prep/sanding), have the potential to deposit asbestos fibres to surficial soils around building margins. In this instance, as the site has been largely impervious since it the 1970s and there has been limited opportunity for fibres to accumulate in soil. They are more likely to have been dispersed by wind and rain before they could accumulate in soil at concentrations that present a risk to health. For these reasons HAIL category E1 is not considered to apply in this instance.	HAIL Activity E1 not considered to apply in this instance.
Use of lead-based paint. *HAIL Activity I. Intentional or accidental release of a hazardous substance in sufficient quantity that could pose a risk to human health or the environment.*	Lead	The age of the building means use of lead-based paints at some point is likely. Maintenance or degradation of lead-based paint has the potential to deposit lead to surficial soils around building margins and/or areas of stormwater flow and collection. As with asbestos, the presence impervious surfaces around the building would limit the extent of any lead associated with building maintenance activities. For these reasons HAIL category I relating to use of lead-based paint, is not considered to apply in this instance.	Not considered to be a HAIL in this instance.

4. Site Investigations

4.1 Sampling and analysis rationale

The HAIL Assessment confirms that landfilling, and possibly later levelling with uncontrolled fill, has the potential to have caused ground contamination at the site. Sampling locations were targeted to investigate the potential for contamination, particularly in relation to the existing building, as outlined in **Table 6**. Sampling locations are presented in **Figure 2**.

Table 6. Sampling rationale

Potential contamination source	Contaminants tested	Sampling rationale	Sample locations
Landfill and/or imported fill materials	Metals, asbestos, PAHs, total petroleum hydrocarbons (TPH) with a subset of samples tested for volatile and semi-volatile organic compounds (VOC, SVOC) and per- and polyfluoroalkyl substances (PFAS)	Testing through the fill profile.	All locations but particularly AH03/AH11*, AH04 where the greatest thickness of fill was encountered.
Landfill gas	Landfill gas – methane (CH_4), carbon dioxide (CO_2), oxygen (O_2), carbon monoxide (CO) and hydrogen sulphide (H_2S)	Survey of existing building and installation of temporary gas probes around building and major underground services (refer to **Section 4.2.2** for further discussion).	Building surveys and probe locations S1 to S8.
Leaching of contaminants into underlying natural soils	Variably: metals, TPH, PAH, SVOC, VOC, PFAS	Natural soils immediately below the interface with fill and deeper in situ soils.	AH03/AH11*, AH04 and AH13
Lead based paint and ACM associated with former and/or existing structures	Metals and asbestos	Topsoil where present but selected fill samples also tested.	AH04, AH05, AH08, AH03/AH11*, AH013
Notes: * as refusal was encountered at shallow depth in AH11 this location was merged with AH03 (located only a few metres away) to provide coverage of the fill profile.			

4.2 Sampling methodology

4.2.1 Soil sampling

Soil sampling was undertaken by a SQEP from WWLA on 15 and 20 February 2024. Samples were collected using hand augering techniques as follows:

- Materials encountered were logged in general accordance with the NZ Geotechnical Society “Guidelines for the classification and field description of soils and rocks for engineering purposes”.
- Soil sampling was in general accordance with CLMG No. 5. This involved:
  - Collection of samples using gloved hands directly from the auger and placed into laboratory-supplied containers for testing.
  - Gloves were changed between samples.
  - Samples were couriered to the laboratory chilled, under chain of custody documentation, soon after they were collected.
- All samples were sent to Eurofins Laboratories in Auckland for analysis.

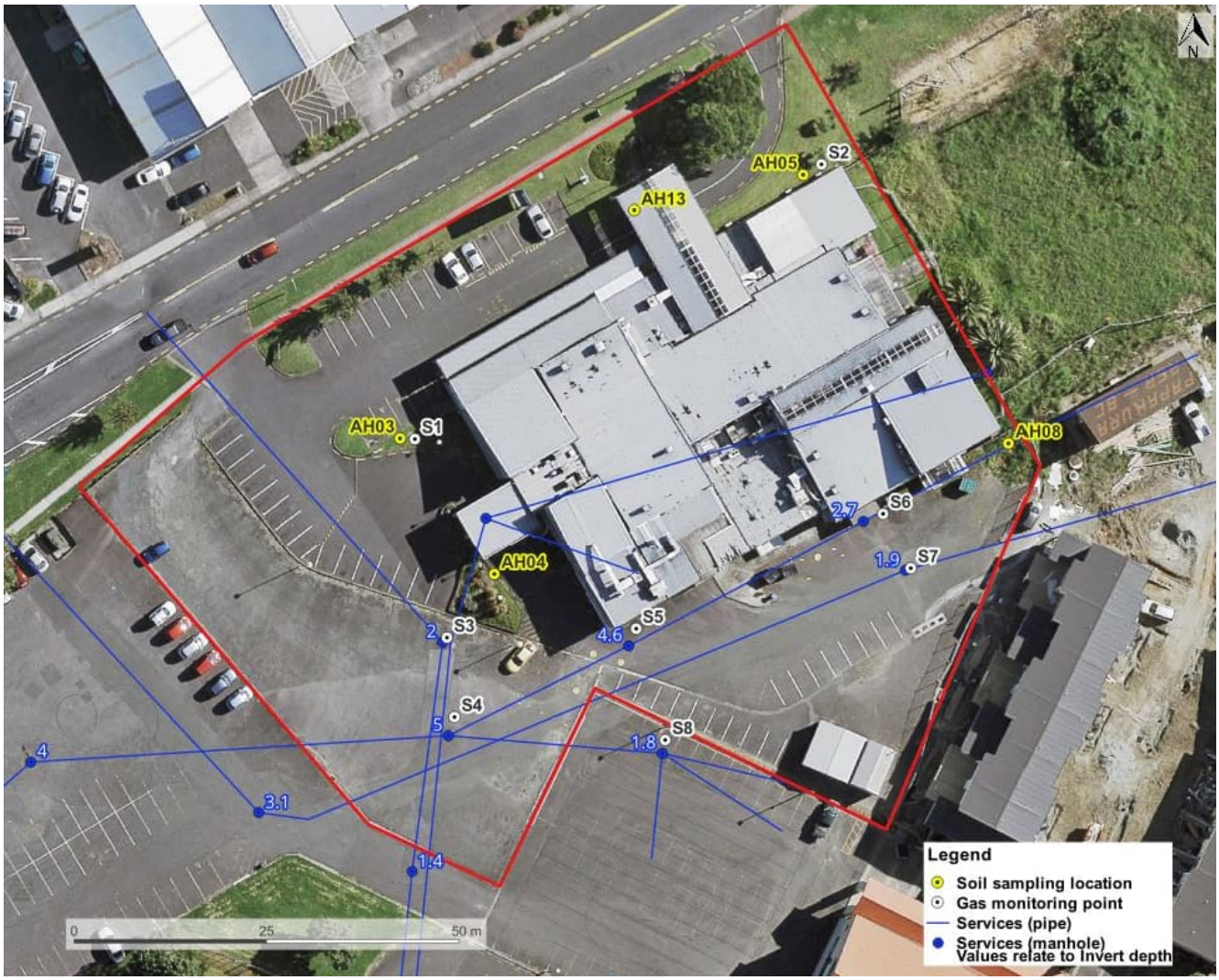


Figure 2. Investigation location plan

4.2.2 Landfill gas screening

WWLA carried out the instantaneous surface monitoring (ISM) and soil gas probe surveys on 21 and 22 February 2024 and 27 March 2024. The March 2024 monitoring event was undertaken during a period of falling barometric pressure, relative to the preceding week, however, pressures were within normal ranges for the region (i.e. neither particularly high nor low).

The ISM survey was conducted using Auckland Council Closed Landfill Teams standard survey methodology with particular attention given to monitoring locations (both interior and exterior) where services and other penetrations to the building slab were able to be accessed.

Gas measurements (both ISM and probes) were made using a combination of Eagle 2 five gas, Eagle 1 (low range) and GA5000 gas monitoring equipment hired from Envco. Envco provided a current calibration certificate at the time of hire.

The temporary soil gas probes were installed using an AMS gas vapour kit. A slide hammer and hollow drive extensions are used to insert a dedicated stainless steel gas vapor probe (GVP) and 1/4' Teflon tubing to the desired sampling depth. Once the desired sampling depth is reached the drive extensions are extracted leaving the GVP and tubing in place allowing measurement of vapours at surface. Due to refusal on granular hardfill probes were generally installed to ~1m BGL, but in some instances greater depths were achieved.

Landfill gas concentrations were measured both as the probes were advanced, on completion and then again before the field team left site. The probes were temporarily capped to allow repeat screening to be conducted (March 2024).

The temporary soil gas probes were principally installed to target backfill around the existing wastewater and stormwater lines and manhole locations. Several wastewater and stormwater lines, installed to depths of between 2 and 5 m BGL, are located to the south and west of the former RSA building (see **Figure 2**). These services range from approximately 400 to 1300 mm in diameter. The deep and wide service trenches are expected to provide the path of least resistance for migration of landfill gas from the adjoining closed landfill, therefore an absence of gas in the vicinity of these structures would indicate a low gas risk to the existing building. As illustrated in **Figure 2** and **Figure 3** the location and configuration of the deep service trenches is also expected to intercept landfill gas and direct it away from or around the existing building (former RSA).

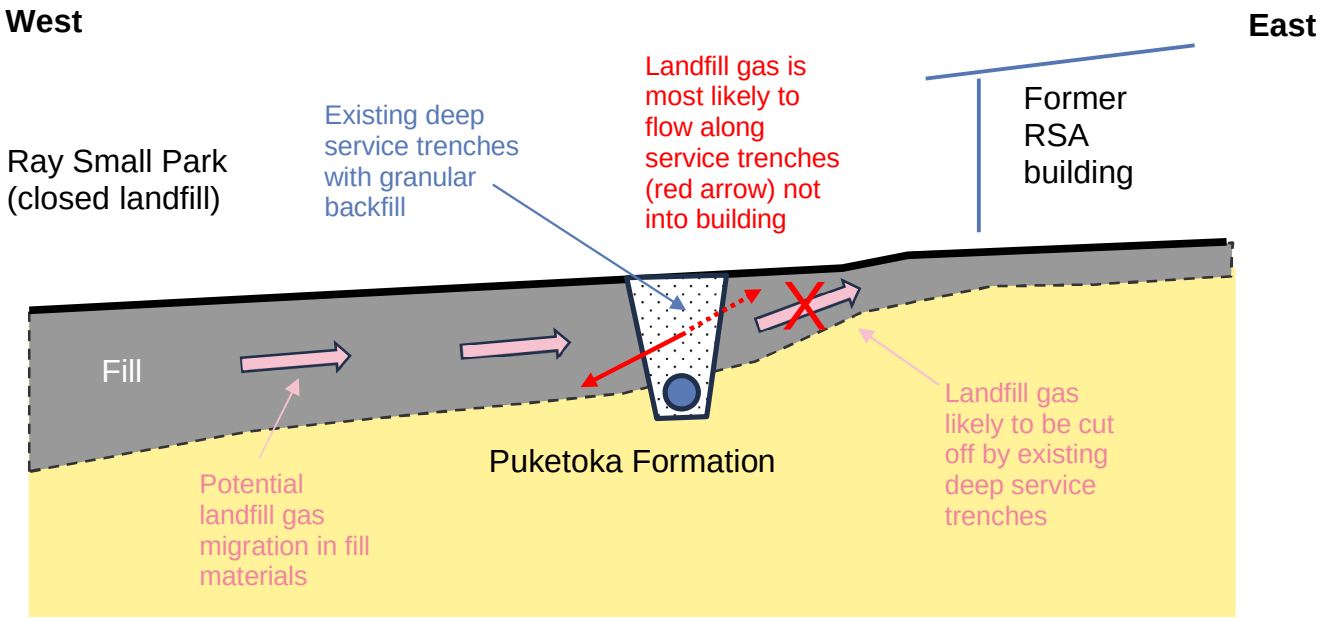


Figure 3. Illustration of the site in section showing expected influence of existing services

4.2.3 Data quality

The data quality objectives (DQOs) for this investigation were to:

- Undertake the investigation in general accordance with CLMG 5; and
- Collect and analyse soil samples and with sufficient accuracy and precision to provide evaluation against relevant human health and environmental acceptance criteria.
- Provide screening data to assess the level of landfill gas present in the vicinity of the existing building (former RSA).

The following quality assurance and quality control measures were implemented to meet the investigation DQOs:

- Appropriately experienced staff were used to undertake the field investigation work.
- Sampling equipment was decontaminated (as required).
- Soil analyses were carried out by International Accreditation New Zealand (IANZ) accredited laboratories using industry standard methods.
- Appropriate chain of custody documentation was used.
- Calibrated gas monitoring equipment was used.

4.3 Results

4.3.1 Field observations

The following observations of soil or inground conditions were made during sampling. Borehole logs are provided in **Appendix A**:

- Consistent with previous investigations, locations AH03 and AH04, on the western side of the building encountered the greatest thickness of fill, between approximately 2 and 3 m respectively. The fill was described as silty gravel and gravelly clay, variably brown, green and orange in colour. No waste materials were observed in the fill materials.
- In contrast less than 1 m of gravelly silty fill was encountered at the other investigation locations. Geotechnical logs show slightly greater depths of fill compared to some WWLA logs, we consider this to be the result of use of hydrovac excavation during the geotechnical investigations making identification of the fill / natural interface difficult in some instances.
- Silts and clays of the Puketoka Formation were encountered beneath the fill (where penetrated). These were reported as being blue-grey and including possible shell material at locations AH03 and AH04, possibly reflecting the original estuarine environment before filling occurred.
- No visual or olfactory evidence of contamination was observed.

4.3.2 Soil analytical results

The laboratory testing results are discussed in **Table 7** and presented in **Table 8** (overpage). Sample locations are shown in **Figure 4.** Full laboratory transcripts are attached in **Appendix B**.

The soil analytical data was compared against the criteria set out below:

Protection of Human Health	NESCS SCS[11,12] for commercial/industrial land use given the proposed use of the site as a courthouse; also used as a proxy for assessing potential exposures to construction workers undertaking redevelopment works.
Discharges to the Environment	Auckland Unitary Plan (AUP) Permitted Activity Criteria[13].
Soil Disposal	Published background concentrations[14] are typically used as a basis for acceptance of soil to cleanfill sites.

In summary, topsoil and fill in the vicinity of the existing building contain low concentrations of contaminants that do not present an unacceptable risk to human health or the environment. Underlying natural soils that are in direct contact with fill have been slightly affected by leaching / migration of contaminants, but deeper natural soils are not expected to be impacted.

Table 7. Evaluation of soil testing results

Topsoil and fill in the vicinity of the existing building	**Topsoil and fill contain low concentrations of contaminants but does not present an unacceptable risk to human health or the environment.** • There were no exceedances of NESCS or AUP criteria, so these materials do not present an unacceptable risk to human health or the environment. • Trace amounts (<0.001% w/w) of asbestos fibres were detected at sampling locations AH04 and AH08, although only in near surface soils (<0.5 m depth) in both cases.

[11] Soil Contaminant Standards (SCS) as set out in Ministry for the Environment, 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.
[12] Where NESCS are not provided, guidelines have been adopted in accordance with Ministry for the Environment, 2011. Contaminated Land Management Guidelines No. 2, Hierarchy and Application in New Zealand of Environmental Guideline Values (Revised 2011). Wellington: Ministry for the Environment.
[13] As defined by Standard E30.6.1.4 of the AUP.
[14] Auckland Regional Council, 2001. Background Concentrations of Inorganic Elements in Soils from the Auckland Region. Auckland Regional Council, Technical Publication No. 153, October 2001 (TP153).

	• Arsenic, copper or lead concentrations slightly exceeded published background in several samples. • Trace PAHs were detected but only in three of the 11 topsoil and fill samples tested. • At AH03 (1.6-1.7 m) the SVOCs 4-aminobiphenyl and aniline were detected. Both compounds were historically used as additives to tyres and dyes. • No TPH, VOCs, PFAS, or other SVOC were detected.
Underlying natural soils	**Following removal of overlying fill natural soils are expected to be classified as cleanfill.** • Contaminants were within expected background ranges for non-volcanic soils in the Auckland region except for slightly elevated lead at AH08 0.4-0.5 m, and a trace amount of endrin at AH13 0.4-0.5 m. • This is interpreted to reflect some minor leaching and/or carryover of contaminants from the overlying fill materials and is not expected to extend more than 100-200 mm into natural soil.

4.3.3 Landfill gas screening

As described previously, the site is located directly adjacent to the Ray Small Park closed landfill, so there is potential for migration of landfill gas onto the site via either the fill materials and/or preferential pathways such as underground service trenches. Landfill gases can accumulate inside buildings, presenting an asphyxiation risk (e.g. carbon dioxide, carbon monoxide) or explosive risk (methane).

However, methane was not detected in or around the existing building during the ISM surveys undertaken in February or March. As shown in **Appendix C**, methane was typically not detected in the temporary probes, only probe S4, installed adjacent to the deepest stormwater manhole (~5 m depth) returned a consistent detection of methane at 4% LEL in February. However, methane was not detected at this location in March, nor in the probe locations installed nearer the building (S3, S5).

Hydrogen sulphide was not detected (other than inconsistently at S3) and carbon monoxide was consistently detected at low concentrations (peak of 5.8 but steady state of <1.5 %). Carbon dioxide concentrations are within the range typical of the natural organic soils.

Where they were able to be measured gas flow rates were reported to be very low (<0.1 litres/hr).

Of note, low gas concentrations and flows were reported at the western end of the building platform (S1 and S3) closest to Ray Small Park and where the greatest thickness of fill was encountered.

Collectively the information available on waste types, Auckland Council's landfill gas monitoring and the screening conducted during this investigation, indicates that the existing building platform has a low landfill gas risk.

Table 8. Summary soil analytical results

Sample information	Sample Location	NESCS Commercial/ Industrial/ Outdoor worker [1]	AUP permitted activity discharge criteria [2]	Published background (non-volcanic) [3]	AH03 and AH11*					AH04							AH05	AH08		AH13	
	Depth (m bgl)				0-0.1	0.9-1.0	1-1.5	1.6-1.7	2.0-2.1	0-0.1	0.4-0.5	0.9-1.0	1.1-1.2	2.1-2.2	2.4-2.5	3.2-3.3	0-0.1	0-0.1	0.4-0.5	0-0.1	0.4-0.5
	Material type				Topsoil	Fill	Fill	Fill	Natural	Topsoil	Fill	Fill	Fill	Fill	Fill	Natural	Topsoil	Topsoil	Fill	Topsoil	Natural
Asbestos	ACM (bonded) % w/w [6]	0.05	-	-	ND	ND	ND	-	-	ND	ND	ND	ND	-	-	-	ND	ND	ND	ND	ND
	AF+FA* %w/w [6]	0.001	-	-				-	-	<0.001	<0.001			-	-	-		<0.001			
Metals	Arsenic	70	100	12	8.8	5	-	-	6.6	6.4	8.6	6.1	-	-	2.1	6	8.2	11	7	21	11
	Cadmium	1,300	7.5	0.65	0.22	0.01	-	-	0.03	0.21	0.15	0.15	-	-	0.08	0.04	0.17	0.29	0.24	0.34	0.09
	Chromium	6,300	400	55	25	9.7	-	-	12	39	47	47	-	-	23	8.6	23	28	21	57	22
	Copper	>10,000	325	45	29	3.7	-	-	7.1	23	21	25	-	-	48	2.3	24	37	26	33	20
	Lead	3,300	250	65	110	12	-	-	22	34	33	38	-	-	7.9	20	54	100	70	76	26
	Nickel	6,000 [4]	105	35	17	3.6	-	-	5.4	23	23	31	-	-	85	3.3	14	18	15	33	17
	Zinc	400,000 [4]	400	180	150	20	-	-	15	77	62	68	-	-	55	34	110	160	88	160	110
TPH	C_7-C_9	8,800 [5]	710 [5]	-	< 5	< 5	-	-	< 5	< 5	< 5	-	-	-	< 5	< 5	< 5	< 5	-	< 5	-
	C_{10}-C_{14}	1,900 [5]	1,500 [5]	-	< 10	< 10	-	-	< 10	< 10	< 10	-	-	-	< 10	< 10	< 10	< 10	-	< 10	-
	C_{15}-C_{36}	>20,000 [5]	>20,000 [5]	-	< 20	< 20	-	-	< 20	< 20	< 20	-	-	-	< 20	< 20	< 20	< 20	-	< 20	-
PAH	Acenaphthylene	-	-	-	< 0.3	< 0.03	-	< 0.03	< 0.03	< 0.3	< 0.03	< 0.3	-	-	< 0.3	< 0.03	< 0.03	< 0.3	< 0.3	< 0.3	< 0.03
	Acenaphthene	45,000 [7]	-	-	< 0.3	< 0.03	-	< 0.03	< 0.03	< 0.3	< 0.03	< 0.3	-	-	< 0.3	< 0.03	< 0.03	< 0.3	< 0.3	< 0.3	< 0.03
	Anthracene	230,000 [7]	-	-	< 0.3	< 0.03	-	< 0.03	< 0.03	< 0.3	< 0.03	< 0.3	-	-	< 0.3	< 0.03	< 0.03	< 0.3	< 0.3	< 0.3	< 0.03
	Benzo[a]anthracene	Refer BaP PEF	Refer BaP PEF	-	< 0.3	< 0.03	-	< 0.03	< 0.03	< 0.3	< 0.03	< 0.3	-	-	< 0.3	< 0.03	< 0.03	< 0.3	< 0.3	< 0.3	< 0.03
	Benzo[a]pyrene (BAP)	Refer BaP PEF	Refer BaP PEF	-	< 0.3	< 0.03	-	< 0.03	< 0.03	< 0.3	0.04	< 0.3	-	-	< 0.3	< 0.03	< 0.03	0.43	< 0.3	< 0.3	< 0.03
	Benzo[a]pyrene PEF	35	20	-	< 0.8	< 0.08	-	< 0.08	< 0.08	< 0.8	0.09	< 0.8	-	-	< 0.8	< 0.08	< 0.08	0.8	< 0.8	< 0.8	< 0.08
	Benzo[b]fluoranthene + Benzo[j]fluoranthene	Refer BaP PEF	Refer BaP PEF	-	< 0.3	< 0.03	-	< 0.03	< 0.03	< 0.3	0.06	< 0.3	-	-	< 0.3	< 0.03	< 0.03	0.63	< 0.3	< 0.3	< 0.03
	Benzo[g,h,i]perylene	-	-	-	< 0.3	< 0.03	-	< 0.03	< 0.03	< 0.3	< 0.03	< 0.3	-	-	< 0.3	< 0.03	< 0.03	< 0.3	< 0.3	< 0.3	< 0.03
	Benzo[k]fluoranthene	Refer BaP PEF	Refer BaP PEF	-	< 0.3	< 0.03	-	< 0.03	< 0.03	< 0.3	0.04	< 0.3	-	-	< 0.3	< 0.03	0.06	0.51	< 0.3	< 0.3	< 0.03
	Chrysene	Refer BaP PEF	Refer BaP PEF	-	< 0.3	< 0.03	-	< 0.03	< 0.03	< 0.3	< 0.03	< 0.3	-	-	< 0.3	< 0.03	< 0.03	< 0.3	< 0.3	< 0.3	< 0.03
	Dibenzo[a,h]anthracene	Refer BaP PEF	Refer BaP PEF	-	< 0.3	< 0.03	-	< 0.03	< 0.03	< 0.3	< 0.03	< 0.3	-	-	< 0.3	< 0.03	< 0.03	< 0.3	< 0.3	< 0.3	< 0.03
	Fluoranthene	Refer BaP PEF	Refer BaP PEF	-	< 0.3	< 0.03	-	< 0.03	< 0.03	< 0.3	0.05	< 0.3	-	-	< 0.3	< 0.03	0.04	0.54	< 0.3	< 0.3	< 0.03
	Indeno(1,2,3-c,d)pyrene	Refer BaP PEF	Refer BaP PEF	-	< 0.3	< 0.03	-	< 0.03	< 0.03	< 0.3	< 0.03	< 0.3	-	-	< 0.3	< 0.03	< 0.03	< 0.3	< 0.3	< 0.3	< 0.03
	Naphthalene	69 [5]	0.047 [5]	-	< 0.3	< 0.1	-	< 0.1	< 0.1	< 0.3	< 0.1	< 0.3	-	-	< 0.3	< 0.1	< 0.1	< 0.3	< 0.3	< 0.3	< 0.1
	Phenanthrene	-	-	-	< 0.3	< 0.03	-	< 0.03	< 0.03	< 0.3	< 0.03	< 0.3	-	-	< 0.3	< 0.03	< 0.03	< 0.3	< 0.3	< 0.3	< 0.03
	Pyrene	>20,000 [5]	1.3 [5]	-	< 0.3	< 0.03	-	< 0.03	< 0.03	< 0.3	0.05	< 0.3	-	-	< 0.3	< 0.03	0.06	0.54	< 0.3	< 0.3	< 0.03
SVOC	4-Aminobiphenyl	-	-	-	-	-	-	0.7	-	-	-	< 5	-	-	< 5	-	-	-	< 5	-	< 5
	Aniline	4,000 [7]	-	-	-	-	-	0.7	-	-	-	< 5	-	-	< 5	-	-	-	< 5	-	< 5
	Endrin	100 [4]	-	-	-	-	-	< 0.01	-	-	-	< 0.1	-	-	< 0.1	-	-	-	< 0.1	-	0.02
	All other SVOC				-	-	-	<LoR	-	-		<LoR	-	-	<LoR	-	-	-	<LoR	-	<LoR
VOC	All VOCs				-	-	-	<LoR	-	-	-	<LoR	-	-	<LoR	-	-	-	<LoR	-	<LoR
PFAS	All PFAS					-	<0.001	-	-	-	-	<0.001	-	<0.001	-	-	-	-	<0.001	-	<0.001

Notes:
* As refusal was encountered at shallow depth in AH11 this location was merged with AH03 to provide coverage of the fill profile.
All values are presented in mg/kg except where noted (asbestos).
FA = fibrous asbestos, AF = asbestos fines.
ND denotes no asbestos detected.
<LoR indicates concentration below the laboratory limit of reporting.
References:
1. MfE, 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health (unless otherwise stated). Soil Contamination Standard - Commercial/industrial land use.
2. Auckland Unitary Plan permitted activity discharge criteria (Standard E30.6.1.4).
3. Auckland Regional Council, Technical Publication 153, October 2001. Background Concentrations of Inorganic Elements in Soils from the Auckland Region.
4. National Environment Protection Council [Australia] - National Environment Protection Measure (Assessment of Site Contamination). Health Investigation Levels - Commercial/industrial land use (HIL D)
5. MfE, 1999. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. Tier 1 Soil acceptance criteria, silty clay, contamination <1 m depth, commercial/industrial use. 5b: Protection of Groundwater Quality, groundwater at 2 m.
6. BRANZ, 2017. New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
7. USEPA Regional Screening Levels (RSLs) - Generic Tables as of November 2023.

5. Conceptual Site Model

A conceptual site model (CSM) indicates known and potential sources of contamination, routes of exposure (pathways), and the receptors that are affected by contaminants moving along those pathways. This is discussed in the source – pathway – receptor analysis (CSM) in **Table 9**. Receptors may be people or the environment. *The CSM's purpose is to set out risks to people and the environment (if any) associated with any proposed activity (short or long term) on the land.*

The CSM is presented in **Table 9**. Colour coding in the table is used to indicate the:

- Potentially Complete pathways i.e. those where there may be a risk to people and/or the environment if appropriate controls are not in place; and
- Incomplete exposure pathways where there is no unacceptable risk to human or environmental receptors.

In summary, soil sampling shows that there is low-level contamination of fill and topsoil in the vicinity of the existing building but this does not present a human health or environmental risk. Offsite disposal of these materials during earthworks (if required) would need to be managed since they cannot be considered cleanfill.

Table 9. CSM for potential development of the site as an interim courthouse

Source	Receptor	Exposure pathway	Acceptable risk (Yes/No) and assessment
Topsoil and fill in the vicinity of the existing building	Construction workers and neighbouring site occupants during soil disturbance	Dermal contact, ingestion, inhalation	**Yes** Contaminant concentrations are below applicable human health criteria.
	Future site users	Dermal contact, ingestion, inhalation	
	Ecological receptors at the nearest surface water bodies	Discharges via surface and groundwater	**Yes** Contaminant concentrations are below applicable environmental criteria
	Receptors at the soil receiving site	Discharges to the receiving environment	**No** Potential risks associated with offsite disposal will need to be managed by disposing of surplus material as managed fill.
Landfill gas migration onto site and accumulation within buildings	Construction workers during earthworks and construction.	Inhalation, explosion risk.	**Yes** Gas generation from the closed landfill is shown to present a low risk to the existing building platform. The existing large diameter / deep underground services are expected to be directing landfill gas (if any) away from the existing building.
	Future site users		

6. Development Implications

6.1 Consenting

Contaminated land related consenting requirements are summarised below and discussed in detail in the following sections (**Section 6.1.1** and **6.1.2**). Colour coding is used to indicate where we consider the relevant requirements:

- Can be met or are not applicable.
- Applicable and cannot be met and therefore consent is required.

Regulatory Framework	Rule	Consent required (Y/N and type)
NESCS	5(2) – Removal of a fuel storage system	No – not applicable
	5(3) – Soil sampling	No – not applicable
	5(4) – Disturbing soil	Yes - unable to be definitively confirmed at this time but is expected that the permitted soil disturbance volumes or durations will be exceeded requiring consent as a controlled activity under Regulation 9(1)
	5(5) Subdivision	No – not applicable
	5(6) Change in land use	No – permitted activity requirements can be met
AUP	E30.6.1.2 Discharges of contaminants from soil disturbance activities	No – not applicable because contaminant concentrations comply with permitted activity criteria set out under Standard E30.6.1.4

6.1.1 NESCS

The NESCS sets out nationally consistent planning controls appropriate to district and city councils for assessing potential human health effects related to contaminants in soil. The regulations apply to specific activities on land (soil disturbance and removal, subdivision, bulk soil sampling and land use change) where an activity included on the HAIL has occurred.

Our assessment of the proposed works relative to the soil disturbance and land use change rules in the NESCS shows:

- The NESCS applies to the site because HAIL activities (landfilling) have occurred, related contaminants remain in soil above background levels, and some soil disturbance is expected to be required to facilitate the proposed development.
- It is expected that the permitted activity thresholds for earthworks volumes and/or duration will be exceeded (**Table 10**). In that case earthworks (soil disturbance) will require consent as a Controlled Activity under Part 1 of Regulation 9 of the NESCS because the contaminant are present above background ranges but the relevant standards are not exceeded.
- The proposed development is technically captured under the definition of “changing the use of a piece of land” under the NESCS. However, we consider that the permitted activity standards for land use change (**Table 11**) can be met, the proposed development can therefore be undertaken as a Permitted Activity under Part 4 of Regulation 8 of the NESCS. The same interpretation applies to subdivision of the site should this be considered in future.
- While a low contamination risk has been identified we expect that Council will require that a Site Management Plan (SMP) is submitted in support of the consent application. A simple checklist style SMP will be adequate.

Table 10: Soil disturbance as a permitted activity under NESCS Rule 8(3)

Rule 8(3)	Disturbing soil is a permitted activity while the following requirements are met:	Evaluation
(a)	Implementation of controls to minimise exposure of humans to mobilised contaminants.	Can be met as standard earthworks controls are sufficient
(b)	The soil must be reinstated to an erosion free state within one month of completing the land disturbance.	Expected to be able to be met.
(c)	The volume of the disturbance of the piece of land must be no more than 25 m^3 per 500 m^2. *[The site-specific permitted activity volume for disturbance based on the HAIL area covering the entire site is 396 m^3]*	If the adopted design can reuse the existing building slab this threshold may be able to be met.
(d)	Soil must not be taken away unless it is for laboratory testing or, for all other purposes combined, a maximum of 5 m^3 per 500 m^2 of soil may be taken away per year. *[The site-specific permitted activity volume for soil removal is ~80 m^3 per year. As a year is not defined in the NESCS, works on successive days can be considered as being undertaken over two consecutive years, i.e. 160 m^3 total]*	Even if the design can reuse the existing building slab this threshold is unlikely to be able to be met. New service connections and foundations for the portal frame are likely to generate spoil volumes in excess of 160 m^3 and there is currently no space to retain the materials onsite.
€	Soil taken away must be disposed of at an appropriately licensed facility.	Can be met.
(f)	The duration of land disturbance must be no longer than two months.	Expected to be able to be met if the adopted design can reuse the existing building slab.
(g)	The integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.	Not applicable.

Table 11: Permitted activity provisions for subdivision and change in land use under NESCS Rule 8(4)

Rule 8(4)	Changing the use of the piece of land is a permitted activity while the following requirements are met:	Evaluation
(a)	A preliminary site investigation of the land or piece of land must exist.	This report fulfils the requirements for a PSI.
(b)	The PSI must state that it is highly unlikely that there will be a risk to human health if the activity is done to the piece of land.	This combined PSI and DSI shows that soils and landfill gas in the vicinity of the existing building do not pose an unacceptable risk to human health under the proposed use.
(c)	The report must be accompanied by a relevant site plan to which the report is referenced.	The figures provided in this report fulfil this requirement.
(d)	The consent authority must have the report and the plan.	Can be met if this report is provided to Council.

6.1.2 Auckland Unitary Plan

The Auckland Unitary Plan (AUP), Section E30 contains rules that address discharges to the environment, both during works and in the long term. The contaminated land rules of the AUP apply to soils with contaminant levels that exceed the permitted discharge criteria in Standard E30.6.1.4 and earthworks volumes of more than 200 m^3 is proposed. The soil testing results comply with the permitted criteria therefore consent is not required under Section E30 of the AUP.

6.2 Site management and earthworks implications

The key requirements for the proposed redevelopment works at the site are set out in **Table 12.**

Table 12. Key redevelopment requirements

Demolition requirements	**If present asbestos will need to be removed from the existing building and associated infrastructure by a Licensed Asbestos Removalist.** • Given the age of the existing building, the Asbestos Regulations[15] require that an asbestos survey is conducted prior to any refurbishment or demolition work. Where it is being disturbed asbestos will need to be removed by a Licensed Asbestos Removalist. • Asbestos may also be associated with building foundations (e.g. shuttering or formwork) and underground services.
Landfill gas implications	The existing building platform has a low landfill gas risk. On this basis gas mitigation measures are not expected to be required in the design or construction of the interim courthouse. But if a precautionary approach is preferred cutoffs could be installed in new wastewater and stormwater connections to east and south of the courthouse as the existing large diameter / deep underground services are expected to be the most likely pathway by which landfill gas could migrate from the adjoining closed landfill.
Earthworks requirements	• Standard earthworks controls and procedures are applicable to the site as set out in Auckland Council's GD05 – *Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region* are applicable for the works, with particular focus on ensuring that there are no discharges of soil or sediment to the stormwater network or surrounding sites. • There are no specific contamination-related health and safety requirements for onsite workers during disturbance of soil. However, good hygiene practices should always be followed, such as washing hands before eating and drinking. • All fill and underlying natural soils can be reused on site if geotechnically suitable. • If surplus to site requirements: - Topsoil, fill and the upper 100-200 mm of underlying natural soil will need to be disposed of as managed fill. - Once overlying fill is removed and the surface of underlying natural soils scraped, natural soil is expected to be able to be disposed offsite as cleanfill. This report can be used to gain disposal facility acceptance of surplus spoil. • If unexpected contamination is identified, the immediate area of works should be isolated and a SQEP (e.g. WWLA) contacted for advice. • While a low contamination risk has been identified we expect that Council will require that an SMP is submitted in support of the consent application. A simple checklist style SMP will be adequate.

[15] Health and Safety at Work (Asbestos) Regulations 2016.

7. Conclusions

This ground contamination report (comprising a PSI and DSI) has been prepared to support Soil and Rock Consultants and their client, MoJ, with developing an interim courthouse at 40 Elliot Street, Papakura. The key findings of this assessment are:

- Review of the site history indicates the site was located on farmland at the edge of the Pahurehure Inlet, with the western boundary partially reclaimed by 1959, likely associated with operation of the Ray Small Park closed landfill known to be located immediately west of the site. In the 1970s the entire site was earthworked, presumably for final levelling for development and the RSA was constructed in the late 1970s.
- Soil investigations show:
  - Topsoil and fill contain low concentrations of metals, SVOCs and asbestos, above expected background ranges but below NESCS and AUP criteria, so these materials do not present unacceptable risks to human health or the environment.
  - Underlying natural soils can be considered cleanfill, once scrapped clean of any overlying fill material.
- Landfill gas screening indicates that the existing building platform has a low landfill gas risk. Landfill gas mitigation measures are therefore not expected to be required to be implemented for the proposed interim courthouse. But if a precautionary approach is preferred cutoffs could be installed in new wastewater and stormwater connections to east and south of the courthouse as the existing large diameter / deep underground services are expected to be the most likely pathway by which landfill gas could migrate from the adjoining closed landfill.
- It is unable to be definitively confirmed at this time but is expected that the permitted soil disturbance volumes or durations will be exceeded requiring consent as a controlled activity under Regulation 9(1) of the NESCS.
- Consent is not required under Section E30 of the AUP.
- Earthworks can be carried out in accordance with standard earthworks controls and no contaminated land-specific health and safety procedures are required.
- Surplus topsoil and fill requires disposal to managed fill. Excluding the upper 100-200 mm underlying natural soils are expected to be suitable for disposal as cleanfill.
- An asbestos survey of the building should be undertaken before any demolition activity. If present asbestos will need to be removed from the existing building and associated infrastructure by a Licensed Asbestos Removalist.

Appendix A. Borelogs

Hand Auger Log

AH03

Project Name: Papakura Courthouse
Project Number: WWLA1078

Location: 40 Elliot Street, Papakura

EXCAVATION DETAILS
Excavation Company: WWLA
Exavation Date: 20 February 2024
Excavation Method: Hand auger

Diameter (mm): 50mm

Depth (m): 2.6

Depth (m)	Lithology	Unit	Lithological Description
0.0 – 0.2		TOPSOIL	TOPSOIL, Silt with trace gravels, medium brown. FILL
0.2 – 0.8		Clayey SILT	Clayey SILT medium brown with dark brown mottles. FILL
0.8 – 2.0		Clayey SILT	Clayey SILT, green brown with orange mottles/mixed. FILL. @1.2 m medium brown with trace orange brown. @1.5 m dark brown/black, no odour. @1.6 m medium brown with orange brown. @1.7 m green blue brown.
2.0 – 2.6		Clayey SILT	Clayey sandy SILT, bluish with white inclusions (~1 mm) shells? INSITU

Grainsize Classification (mm):

Boulders	Cobbles	Gravel			Sand			Silt			Clay
		Coarse	Medium	Fine	Coarse	Medium	Fine	Coarse	Medium	Fine	
200	60	20	6		2	0.6	0.2	0.06	0.02	0.006	0.002

Hand Auger Log

AH03

Project Name: Papakura Courthouse
Project Number: WWLA1078

Location: 40 Elliot Street, Papakura

EXCAVATION DETAILS
Excavation Company: WWLA
Exavation Date: 20 February 2024
Excavation Method: Hand auger

Diameter (mm): 50mm

Depth (m): 3.3

Depth (m)	Lithology	Unit	Lithological Description
0.0 – 0.2		GRAVEL	GRAVELLY SILT, medium brown. FILL
0.2 – 0.8		GRAVEL	Silty GRAVEL, Angular GRAVELS ~ 2-10 mm. FILL
0.8 – 2.0		Silty CLAY	Silty Gravelly CLAY, mixed medium to dark brown, and orange brown. FILL
2.0 – 2.6		GRAVEL	Silty GRAVEL, medium brown to red brown - scoria. Gravels (~2-4 mm) @2.6 m some CLAY and silt. FILL
2.6 – 3.0		Clayey SILT	Clayey SILT, blue with trace gravels. FILL
3.0 – 3.2		Sandy SILT	Sandy SILT, blue with white inclusions. EOH @3.3 m. INSITU

Grainsize Classification (mm):

Boulders	Cobbles	Gravel			Sand			Silt			Clay
		Coarse	Medium	Fine	Coarse	Medium	Fine	Coarse	Medium	Fine	
200	60	20	6		2	0.6	0.2	0.06	0.02	0.006	0.002

Soil&Rock Consultants
Your responsive & cost-effective engineers

CLIENT: Ministry of Justice

PROJECT: Geotechnical Investigation, 40 Elliot Street, Papakura

Auger Hole No: AH08

Sheet 1 of 1

Drill Type:	50mmØ Hand Auger	Project No:	220761	Logged By:	DEG
Drilled By:	DEG	Coordinates:		Shear Vane No - Calibration Date:	GEO3564 - 2/05/2023
Date Started:	9/2/24	Ground Elevation:		Surface Conditions:	Slightly Sloping, Soil
Date Finished:	9/2/24	Water Level:	Groundwater Not Encountered		

STRATIGRAPHY	DEPTH (m)	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	NATURAL WATER CONTENT △ LIQUID LIMIT ✕ PLASTIC LIMIT □ 50 100 150 (%) SHEAR STRENGTH ○ v REMOULDED SHEAR ◉ r POCKET PENETROMETER ○ p 50 100 150 (kPa)	LABORATORY TESTS
FILL	0.0		SILT, some fine to coarse sand, minor clay, minor fine to coarse angular gravel, brown, very stiff, dry, slightly plastic (FILL) trace brick fragments, trace asphalt fragments		0.0		
	0.5		some fine to coarse angular gravel, minor angular cobblestones to 150mmØ a 100mmØ orange PVC pipe		0.5	16 r, 70 V	
	1.0				1.0	32 r, 105 V	
TG			SILT, minor clay, minor fine sand, grey, orange and orange yellow streaks, very stiff, moist, slightly plastic (PUKETOKA FORMATION)				
	1.5		fine to medium SAND, some silt, some fine to coarse angular gravel, brown, dense, moist		1.5		
			END OF BORE. 1.30 METRES. GRAVEL OBSTRUCTION				
	2.0				2.0		
	2.5				2.5		
	3.0				3.0		
	3.5				3.5		
	4.0				4.0		
	4.5				4.5		
	5.0				5.0		

HAND AUGER LOG 220761 - AH08-13 - 40 ELLIOT STREET - 16FEB24.GPJ S+R_2013.GDT 29/2/24

Soil&Rock Consultants
Your responsive & cost-effective engineers

CLIENT: Ministry of Justice

PROJECT: Geotechnical Investigation, 40 Elliot Street, Papakura

Auger Hole No: AH11

Sheet 1 of 1

Drill Type:	50mmØ Hand Auger	Project No:	220761	Logged By:	DEG
Drilled By:	DEG	Coordinates:		Shear Vane No - Calibration Date:	GEO3564 - 2/05/2023
Date Started:	9/2/24	Ground Elevation:		Surface Conditions:	Slightly Sloping, Grass
Date Finished:	9/2/24	Water Level:	0.90m		

STRATIGRAPHY	DEPTH (m)	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	NATURAL WATER CONTENT △ LIQUID LIMIT ✕ PLASTIC LIMIT □ 50 100 150 (%) SHEAR STRENGTH ○ v REMOULDED SHEAR ◉ r POCKET PENETROMETER ○ p 50 100 150 (kPa)	LABORATORY TESTS
FILL	0.0		SILT, some fine sand, red brown, stiff, moist, non plastic (FILL)		0.0		
	0.5		fine to coarse angular GRAVEL, some angular cobble to 20mmØ, some silt, brown, grey, medium dense, moist (GRANULAR FILL) very dense 25mmØ orange PVC pipe		0.5		200+ UTP V
	1.0		saturated base of vacuum pit - SILT, some clay, minor fine to coarse sand, minor fine to coarse angular gravel, yellow, orange, yellow brown, stiff, saturated, slightly plastic (FILL)	▽	1.0		223 V
	1.5		END OF BORE. 1.20 METRES. SOLID OBSTRUCTION		1.5		
	2.0				2.0		
	2.5				2.5		
	3.0				3.0		
	3.5				3.5		
	4.0				4.0		
	4.5				4.5		
	5.0				5.0		

HAND AUGER LOG 220761 - AH08-13 - 40 ELLIOT STREET - 16FEB24.GPJ S+R_2013.GDT 29/2/24

Soil&Rock Consultants
Your responsive & cost-effective engineers

CLIENT: Ministry of Justice

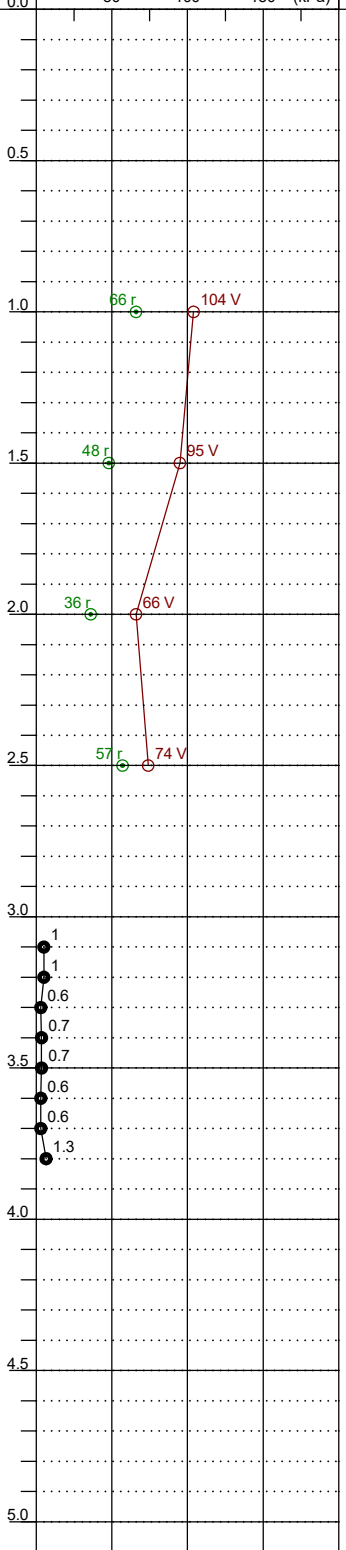
PROJECT: Geotechnical Investigation, 40 Elliot Street, Papakura

Auger Hole No: AH13

Sheet 1 of 1

Drill Type:	50mmØ Hand Auger	Project No:	220761	Logged By:	DM
Drilled By:	DM	Coordinates:		Shear Vane No - Calibration Date:	GEO3562 - 2/05/2023
Date Started:	9/2/24	Ground Elevation:		Surface Conditions:	Slightly Sloping, Grass
Date Finished:	9/2/24	Water Level:	3.00m		

STRATIGRAPHY	DEPTH (m)	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)
	0.0		TOPSOIL	
FILL	0.5		SILT, some fine to coarse sand, some fine to coarse angular gravel, orange brown, brown, very stiff, moist, non plastic (FILL)	
			concrete on building side of pit down to 0.65m deep	
	1.0		base of vacuum pit - silty CLAY, trace fine sand, light grey orange and yellow, stiff, moist, highly plastic (PUKETOKA FORMATION)	
TAURANGA GROUP	1.5			
	2.0		SILT, some clay, some fine to medium sand, dark orange, orange, stiff, moist, slightly plastic	
			yellow, wet	
	2.5		light yellow	
	3.0		fine to medium sandy SILT, minor clay, blue, light grey, yellow, firm, wet, slightly plastic	▽
			fine to medium SAND, minor silt, blue and grey, very loose, saturated, 50% sample recovery	
	3.5		SILT, trace clay, some fine to medium sand, light grey, light orange, very soft, saturated, non plastic, 20% sample recovery	
	4.0		no sample recovery	
	4.5		END OF BORE. 4.20 METRES. NO RECOVERY	
	5.0			



LABORATORY TESTS

HAND AUGER LOG WITH SCALA 220761 - AH08-13 - 40 ELLIOT STREET - 16FEB24.GPJ S+R_2013.GDT 29/2/24

Appendix B. Laboratory Transcripts

Semi Quantitative Analysis of Soil

Client: Williamson Water and Land Advisory
Contact: Wendi Williamson
Tel: +64 21 65 4422
Email: wendi.williamson@wwla.kiwi
Address: 10/1 Putaki Drive, Kumeu, Auckland

Eurofins | Focus
Unit C1, 4 Pacific Rise
Mount Wellington
Auckland 1060
Tel: +64 (0) 9 525 0568

Site: : WWLA1078

Date sample(s) received: 15/02/2024

Date sample(s) analysed: 21/02/2024

Samples taken by: Alistair

Certificate / Job Number: Q-00614/WWLA1078

Qualitative Analysis of Asbestos

Lab ID	Sample ID	Sample Details	Sample Weight (g) (as received)	Fibres Identified
1	AH11 0-0.1		614	**ORF, NAD**
2	AH11 0.9-1.0		623	**ORF, NAD**
3	AH04 0-0.1		514	**AMO, ORF**
4	AH04 0.4-0.5		583	**CHR, ORF**
5	AH04 0.9-1.0		592	**ORF, NAD**
6	AH08 0-0.1		519	**CHR, ORF**
7	AH08 0.4-0.5		548	**ORF, NAD**
8	AH13 0-0.1		413	**ORF, NAD**
9	AH13 0.4-0.5		479	**ORF, NAD**
10	AH05 0-0.1		357	**ORF, NAD**

Fibre Identification Key:

CHR – Chrysotile (White Asbestos)
AMO – Amosite (Brown / Grey Asbestos)
CRO – Crocidolite – (Blue Asbestos)
UMF – Unknown Mineral Fibre
ORF – Organic Fibre
SMF – Synthetic Mineral Fibre
NFD – No Fibres Detected
NAD – No Asbestos Detected

Scope of Accreditation:

1. The analytical comments marked (*) stated in the semi-quantitative analysis and the calculations in the semi-quantitative analysis of asbestos in soil are beyond Eurofins | Focus scope of accreditation.
2. The laboratory is not responsible for sampling errors when we have not taken the sample.
3. This certificate should be read in its entirety and shall not be reproduced except in full, without written approval of the laboratory.

*Semi Quantitative Analysis of Soil

*Semi Quantitative Analysis of Asbestos in Soil

Date sample(s) received: 15/02/2024
Date sample(s) analysed: 21/02/2024

Lab ID	Sample ID	As received weight (g)	Dry weight (g)	Moisture (%)	Fraction size (mm)	Dry fraction weight (g)	Asbestos product weight (g)	Asbestos product type	Percentage of asbestos in product [a]	Total mass of Asbestos in sample [b]	Bonded Asbestos containing material in sample (% w/w) [c]	Asbestos as FA (% w/w) [d]	Asbestos as AF (% w/w) [e]	Total Fibrous Asbestos + Asbestos Fines (Friable) (% w/w) [f]
1	AH11 0-0.1	614.0	511.0	16.8	(>10mm) Fraction	43.6	-	NAD	-	-	-	<0.001	<0.001	<0.001
					(10-2mm) Fraction	244.3	-	NAD	-					
					(<2mm) Fraction	223.1	-	NAD	-					
2	AH11 0.9-1.0	622.8	525.0	15.6	(>10mm) Fraction	81.2	-	NAD	-	-	-	<0.001	<0.001	<0.001
					(10-2mm) Fraction	270.3	-	NAD	-					
					(<2mm) Fraction	173.5	-	NAD	-					
3	AH04 0-0.1	513.5	429.8	16.2	(>10mm) Fraction	26.7	-	NAD	-	0.0001	-	<0.001	<0.001	<0.001
					(10-2mm) Fraction	213.4	-	NAD	-					
					(<2mm) Fraction	189.7	0.0001	FFF	100					
4	AH04 0.4-0.5	583.3	490.8	15.8	(>10mm) Fraction	43.6	-	NAD	-	0.0022	-	<0.001	<0.001	<0.001
					(10-2mm) Fraction	227.9	0.0116	CMP	15					
					(<2mm) Fraction	219.3	0.0005	FFF	100					
5	AH04 0.9-1.0	591.6	498.6	15.6	(>10mm) Fraction	23.5	-	NAD	-	-	-	<0.001	<0.001	<0.001
					(10-2mm) Fraction	278.0	-	NAD	-					
					(<2mm) Fraction	197.1	-	NAD	-					

*Semi Quantitative Analysis of Soil

*Semi Quantitative Analysis of Asbestos in Soil

Date sample(s) received: 15/02/2024
Date sample(s) analysed: 21/02/2024

Lab ID	Sample ID	As received weight (g)	Dry weight (g)	Moisture (%)	Fraction size (mm)	Dry fraction weight (g)	Asbestos product weight (g)	Asbestos product type	Percentage of asbestos in product [a]	Total mass of Asbestos in sample [b]	Bonded Asbestos containing material in sample (% w/w) [c]	Asbestos as FA (% w/w) [d]	Asbestos as AF (% w/w) [e]	Total Fibrous Asbestos + Asbestos Fines (Friable) (% w/w) [f]
6	AH08 0-0.1	519.3	409.5	21.1	(>10mm) Fraction	25.9	-	NAD	-	0.0003	-	<0.001	<0.001	<0.001
					(10-2mm) Fraction	188.0	-	NAD	-					
					(<2mm) Fraction	195.6	0.0003	FFF	100					
7	AH08 0.4-0.5	548.4	421.0	23.2	(>10mm) Fraction	23.8	-	NAD	-	-	-	<0.001	<0.001	<0.001
					(10-2mm) Fraction	225.9	-	NAD	-					
					(<2mm) Fraction	171.3	-	NAD	-					
8	AH13 0-0.1	413.4	338.7	18.0	(>10mm) Fraction	18.4	-	NAD	-	-	-	<0.001	<0.001	<0.001
					(10-2mm) Fraction	131.0	-	NAD	-					
					(<2mm) Fraction	189.3	-	NAD	-					
9	AH13 0.4-0.5	479.2	343.7	28.2	(>10mm) Fraction	0.0	-	NAD	-	-	-	<0.001	<0.001	<0.001
					(10-2mm) Fraction	180.8	-	NAD	-					
					(<2mm) Fraction	162.9	-	NAD	-					
10	AH05 0-0.1	357.4	259.9	27.2	(>10mm) Fraction	0.0	-	NAD	-	-	-	<0.001	<0.001	<0.001
					(10-2mm) Fraction	123.7	-	NAD	-					
					(<2mm) Fraction	136.2	-	NAD	-					

Analysis Method:

Samples submitted have been analysed to determine the mass fraction of asbestos in soil using low powered stereo microscopy followed by polarised light microscopy (PLM) including dispersion staining techniques as documented in (AS 4964-2004), Method for the qualitative identification of asbestos in bulk samples, BRANZ, New Zealand Guidelines for Assessing and Managing Asbestos in Soils:2017 and (TP 04) our internal method Technical Procedure for Qualitative and Semi Qualitative analysis of asbestos in soil.

Product Identification Key:

BTP	Bituminous Product	LSE	Loose Fill Insulation
CMP	Cement Product	NAD	No Asbestos Detected
COM	Composite	PPR	Paper Product
FFF	Free Fibres	RPL	Reinforced Plastics
FIB	Fibre Board	TXC	Textured Coating
GCP	Gaskets (compressed)	VNP	Vinyl Products
GRW	Gaskets (rope/woven)	VPP	Vinyl with paper backing
INB	Insulating Board	WVP	Woven Product

Interpretation of Key:

[a] Percentage of Asbestos in product is adopted from HSG 264 - 2012, Asbestos the survey guide, Appendix 2, ACMS in buildings and categorized in our internal Technical Procedure (TP04) for Qualitative and Semi-Quantitative analysis of asbestos in soil. A dash (-) denotes that there was no asbestos found in that fraction.

[b] Total Mass of Asbestos is the sum mass of asbestos-by-asbestos type in product type([a]) plus the mass of free fibre asbestos. A dash (-) denotes that there was no total mass of asbestos calculated asbestos found in that fraction.

[c] Bonded Asbestos Containing Material in the greater than 10mm fraction as percentage of the total sample (% w/w). A dash (-) denotes that there was no bonded asbestos containing materials found in that fraction.

[d] Asbestos as Fibrous Asbestos (FA) in greater than 10mm fraction as percentage of total sample (% w/w).

[e] Asbestos as Asbestos Fines (AF) in less than 10mm fraction as a percentage of total sample (% w/w).

[f] Total Friable Asbestos combining Fibrous Asbestos and Asbestos Fines as the percentage weight for weight of the total sample (% w/w).

Sample Retention: Hold soil samples will only be stored for one month from date of receipt.

Analyst Name: Colin Wang **Analyst Signature:** Colin Wang

Reviewed By KTP: Colin Wang **Reviewer Signature:** Colin Wang

Semi Quantitative Analysis of Soil

Client: Williamson Water and Land Advisory
Contact: Wendi Williamson
Tel: +64 21 65 4422
Email: wendi.williamson@wwla.kiwi
Address: 10/1 Putaki Drive, Kumeu, Auckland

Eurofins | Focus
Unit C1, 4 Pacific Rise
Mount Wellington
Auckland 1060
Tel: +64 (0) 9 525 0568

Site: : WWLA1078

Date sample(s) received:	22/02/2024	Date sample(s) analysed:	5/03/2024
Samples taken by:	Cherise	Certificate / Job Number:	Q-00633/WWLA1078

Qualitative Analysis of Asbestos

Lab ID	Sample ID	Sample Details	Sample Weight (g) (as received)	Fibres Identified
1	AH03 1-1.5		552	**ORF, NAD**
2	AH04 1.1-2.1		674	**ORF, NAD**

Fibre Identification Key:

CHR – Chrysotile (White Asbestos)
AMO – Amosite (Brown / Grey Asbestos)
CRO – Crocidolite – (Blue Asbestos)
UMF – Unknown Mineral Fibre
ORF – Organic Fibre
SMF – Synthetic Mineral Fibre
NFD – No Fibres Detected
NAD – No Asbestos Detected

Scope of Accreditation:

1. The analytical comments marked (*) stated in the semi-quantitative analysis and the calculations in the semi-quantitative analysis of asbestos in soil are beyond Eurofins | Focus scope of accreditation.
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3. This certificate should be read in its entirety and shall not be reproduced except in full, without written approval of the laboratory.

*Semi Quantitative Analysis of Soil

*Semi Quantitative Analysis of Asbestos in Soil

Date sample(s) received: 22/02/2024
Date sample(s) analysed: 5/03/2024

Lab ID	Sample ID	As received weight (g)	Dry weight (g)	Moisture (%)	Fraction size (mm)	Dry fraction weight (g)	Asbestos product weight (g)	Asbestos product type	Percentage of asbestos in product [a]	Total mass of Asbestos in sample [b]	Bonded Asbestos containing material in sample (% w/w) [c]	Asbestos as FA (% w/w) [d]	Asbestos as AF (% w/w) [e]	Total Fibrous Asbestos + Asbestos Fines (Friable) (% w/w) [f]
1	AH03 1-1.5	552.2	397.6	28.0	(>10mm) Fraction	8.8	-	NAD	-	-	-	<0.001	<0.001	<0.001
					(10-2mm) Fraction	233.7	-	NAD	-					
					(<2mm) Fraction	155.1	-	NAD	-					
2	AH04 1.1-2.1	674.3	520.1	22.8	(>10mm) Fraction	56.1	-	NAD	-	-	-	<0.001	<0.001	<0.001
					(10-2mm) Fraction	308.7	-	NAD	-					
					(<2mm) Fraction	155.3	-	NAD	-					

Analysis Method:

Samples submitted have been analysed to determine the mass fraction of asbestos in soil using low powered stereo microscopy followed by polarised light microscopy (PLM) including dispersion staining techniques as documented in (AS 4964-2004), Method for the qualitative identification of asbestos in bulk samples, BRANZ, New Zealand Guidelines for Assessing and Managing Asbestos in Soils:2017 and (TP 04) our internal method Technical Procedure for Qualitative and Semi Qualitative analysis of asbestos in soil.

Product Identification Key:

BTP	Bituminous Product	LSE	Loose Fill Insulation
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GCP	Gaskets (compressed)	VNP	Vinyl Products
GRW	Gaskets (rope/woven)	VPP	Vinyl with paper backing
INB	Insulating Board	WVP	Woven Product

Interpretation of Key:

[a] Percentage of Asbestos in product is adopted from HSG 264 - 2012, Asbestos the survey guide, Appendix 2, ACMS in buildings and categorized in our internal Technical Procedure (TP04) for Qualitative and Semi-Quantitative analysis of asbestos in soil. A dash (-) denotes that there was no asbestos found in that fraction.

[b] Total Mass of Asbestos is the sum mass of asbestos-by-asbestos type in product type([a]) plus the mass of free fibre asbestos. A dash (-) denotes that there was no total mass of asbestos calculated asbestos found in that fraction.

[c] Bonded Asbestos Containing Material in the greater than 10mm fraction as percentage of the total sample (% w/w). A dash (-) denotes that there was no bonded asbestos containing materials found in that fraction.

[d] Asbestos as Fibrous Asbestos (FA) in greater than 10mm fraction as percentage of total sample (% w/w).

[e] Asbestos as Asbestos Fines (AF) in less than 10mm fraction as a percentage of total sample (% w/w).

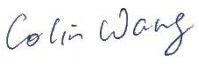
[f] Total Friable Asbestos combining Fibrous Asbestos and Asbestos Fines as the percentage weight for weight of the total sample (% w/w).

Sample Retention: Hold soil samples will only be stored for one month from date of receipt.

Analyst Name: Elsie Xu

Analyst Signature: 

Reviewed By KTP: Colin Wang

Reviewer Signature: 

Williamson Water and Land Advisory Limited
Unit 10 | 1 Putaki Drive
Kumeu
Auckland 0810

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

Attention: **SHANE MOORE**

Report **1069726-S**
Project name CH
Project ID WWLA 1078
Received Date Feb 16, 2024

Client Sample ID			**AH11 0-0.1**	**AH11 0.9-1.0**	**AH04 0-0.1**	**AH04 0.4-0.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**K24-Fe0043972**	**K24-Fe0043973**	**K24-Fe0043974**	**K24-Fe0043975**
Date Sampled			**Feb 15, 2024**	**Feb 15, 2024**	**Feb 15, 2024**	**Feb 15, 2024**
Test/Reference	LOR	Unit				
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	< 5	< 5	< 5	< 5
TPH-SG C10-C14	10	mg/kg	< 10	< 10	< 10	< 10
TPH-SG C15-C36	20	mg/kg	< 20	< 20	< 20	< 20
TPH-SG C7-C36 (Total)	35	mg/kg	< 35	< 35	< 35	< 35
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Comments			G01		G01	
Acenaphthene	0.03	mg/kg	< 0.3	< 0.03	< 0.3	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.3	< 0.03	< 0.3	< 0.03
Anthracene	0.03	mg/kg	< 0.3	< 0.03	< 0.3	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.3	< 0.03	< 0.3	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.3	< 0.03	< 0.3	0.04
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.3	< 0.03	< 0.3	0.05
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.4	0.04	0.4	0.07
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.8	0.08	0.8	0.09
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.3	< 0.03	< 0.3	0.06
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.3	< 0.03	< 0.3	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.3	< 0.03	< 0.3	0.04
Chrysene	0.03	mg/kg	< 0.3	< 0.03	< 0.3	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.3	< 0.03	< 0.3	< 0.03
Fluoranthene	0.03	mg/kg	< 0.3	< 0.03	< 0.3	0.05
Fluorene	0.03	mg/kg	< 0.3	< 0.03	< 0.3	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.3	< 0.03	< 0.3	< 0.03
Naphthalene	0.1	mg/kg	< 0.3	< 0.1	< 0.3	< 0.1
Phenanthrene	0.03	mg/kg	< 0.3	< 0.03	< 0.3	< 0.03
Pyrene	0.03	mg/kg	< 0.3	< 0.03	< 0.3	0.05
Total PAH*	0.1	mg/kg	< 0.3	< 0.1	< 0.3	0.2
p-Terphenyl-d14 (surr.)	1	%	94	124	INT	119
2-Fluorobiphenyl (surr.)	1	%	117	119	147	133
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	8.8	5.0	6.4	8.6
Cadmium	0.01	mg/kg	0.22	0.01	0.21	0.15
Chromium	0.1	mg/kg	25	9.7	39	47
Copper	0.1	mg/kg	29	3.7	23	21
Lead	0.1	mg/kg	110	12	34	33
Nickel	0.1	mg/kg	17	3.6	23	23
Zinc	5	mg/kg	150	20	77	62

Client Sample ID			AH11 0-0.1	AH11 0.9-1.0	AH04 0-0.1	AH04 0.4-0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K24-Fe0043972	K24-Fe0043973	K24-Fe0043974	K24-Fe0043975
Date Sampled			Feb 15, 2024	Feb 15, 2024	Feb 15, 2024	Feb 15, 2024
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	15	21	15	15

Client Sample ID			AH04 0.9-1.0	AH08 0-0.1	AH08 0.4-0.5	AH13 0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K24-Fe0043976	K24-Fe0043977	K24-Fe0043978	K24-Fe0043979
Date Sampled			Feb 15, 2024	Feb 15, 2024	Feb 15, 2024	Feb 15, 2024
Test/Reference	LOR	Unit				
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	-	< 5	-	< 5
TPH-SG C10-C14	10	mg/kg	-	< 10	-	< 10
TPH-SG C15-C36	20	mg/kg	-	< 20	-	< 20
TPH-SG C7-C36 (Total)	35	mg/kg	-	< 35	-	< 35
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Comments				G01		G01
Acenaphthene	0.03	mg/kg	-	< 0.3	-	< 0.3
Acenaphthylene	0.03	mg/kg	-	< 0.3	-	< 0.3
Anthracene	0.03	mg/kg	-	< 0.3	-	< 0.3
Benz(a)anthracene	0.03	mg/kg	-	< 0.3	-	< 0.3
Benzo(a)pyrene	0.03	mg/kg	-	0.43	-	< 0.3
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	-	0.6	-	< 0.3
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	-	0.7	-	0.4
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	-	0.9	-	0.8
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	-	0.63	-	< 0.3
Benzo(g.h.i)perylene	0.03	mg/kg	-	< 0.3	-	< 0.3
Benzo(k)fluoranthene	0.03	mg/kg	-	0.51	-	< 0.3
Chrysene	0.03	mg/kg	-	< 0.3	-	< 0.3
Dibenz(a.h)anthracene	0.03	mg/kg	-	< 0.3	-	< 0.3
Fluoranthene	0.03	mg/kg	-	0.54	-	< 0.3
Fluorene	0.03	mg/kg	-	< 0.3	-	< 0.3
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	-	< 0.3	-	< 0.3
Naphthalene	0.1	mg/kg	-	< 0.3	-	< 0.3
Phenanthrene	0.03	mg/kg	-	< 0.3	-	< 0.3
Pyrene	0.03	mg/kg	-	0.54	-	< 0.3
Total PAH*	0.1	mg/kg	-	2.7	-	< 0.3
p-Terphenyl-d14 (surr.)	1	%	-	97	-	82
2-Fluorobiphenyl (surr.)	1	%	-	132	-	133
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	6.1	11	7.0	21
Cadmium	0.01	mg/kg	0.15	0.29	0.24	0.34
Chromium	0.1	mg/kg	47	28	21	57
Copper	0.1	mg/kg	25	37	26	33
Lead	0.1	mg/kg	38	100	70	76
Nickel	0.1	mg/kg	31	18	15	33
Zinc	5	mg/kg	68	160	88	160
Sample Properties						
% Moisture	1	%	15	19	24	15

Client Sample ID			AH04 0.9-1.0	AH08 0-0.1	AH08 0.4-0.5	AH13 0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K24-Fe0043976	K24-Fe0043977	K24-Fe0043978	K24-Fe0043979
Date Sampled			Feb 15, 2024	Feb 15, 2024	Feb 15, 2024	Feb 15, 2024
Test/Reference	LOR	Unit				
Volatile Organics (NZ MfE)						
1.1-Dichloroethane	0.5	mg/kg	< 0.5	-	< 0.5	-
1.1-Dichloroethene	0.5	mg/kg	< 0.5	-	< 0.5	-
1.1.1-Trichloroethane	0.5	mg/kg	< 0.5	-	< 0.5	-
1.1.1.2-Tetrachloroethane	0.5	mg/kg	< 0.5	-	< 0.5	-
1.1.2-Trichloroethane	0.5	mg/kg	< 0.5	-	< 0.5	-
1.1.2.2-Tetrachloroethane	0.5	mg/kg	< 0.5	-	< 0.5	-
1.2-Dibromoethane	0.5	mg/kg	< 0.5	-	< 0.5	-
1.2-Dichlorobenzene	0.5	mg/kg	< 0.5	-	< 0.5	-
1.2-Dichloroethane	0.5	mg/kg	< 0.5	-	< 0.5	-
1.2-Dichloropropane	0.5	mg/kg	< 0.5	-	< 0.5	-
1.2.3-Trichloropropane	0.5	mg/kg	< 0.5	-	< 0.5	-
1.2.4-Trimethylbenzene	0.5	mg/kg	< 0.5	-	< 0.5	-
1.3-Dichlorobenzene	0.5	mg/kg	< 0.5	-	< 0.5	-
1.3-Dichloropropane	0.5	mg/kg	< 0.5	-	< 0.5	-
1.3.5-Trimethylbenzene	0.5	mg/kg	< 0.5	-	< 0.5	-
1.4-Dichlorobenzene	0.5	mg/kg	< 0.5	-	< 0.5	-
2-Butanone (MEK)	0.5	mg/kg	< 0.5	-	< 0.5	-
2-Propanone (Acetone)	0.5	mg/kg	< 10	-	< 10	-
4-Chlorotoluene	0.5	mg/kg	< 0.5	-	< 0.5	-
4-Methyl-2-pentanone (MIBK)	0.5	mg/kg	< 0.5	-	< 0.5	-
Allyl chloride	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzene	0.1	mg/kg	< 0.1	-	< 0.1	-
Bromobenzene	0.5	mg/kg	< 0.5	-	< 0.5	-
Bromochloromethane	0.5	mg/kg	< 0.5	-	< 0.5	-
Bromodichloromethane	0.5	mg/kg	< 0.5	-	< 0.5	-
Bromoform	0.5	mg/kg	< 0.5	-	< 0.5	-
Bromomethane	0.5	mg/kg	< 0.5	-	< 0.5	-
Carbon disulfide	0.5	mg/kg	< 0.5	-	< 0.5	-
Carbon Tetrachloride	0.5	mg/kg	< 0.5	-	< 0.5	-
Chlorobenzene	0.5	mg/kg	< 0.5	-	< 0.5	-
Chloroethane	0.5	mg/kg	< 0.5	-	< 0.5	-
Chloroform	0.5	mg/kg	< 0.5	-	< 0.5	-
Chloromethane	0.5	mg/kg	< 0.5	-	< 0.5	-
cis-1.2-Dichloroethene	0.5	mg/kg	< 0.5	-	< 0.5	-
cis-1.3-Dichloropropene	0.5	mg/kg	< 0.5	-	< 0.5	-
Dibromochloromethane	0.5	mg/kg	< 0.5	-	< 0.5	-
Dibromomethane	0.5	mg/kg	< 0.5	-	< 0.5	-
Dichlorodifluoromethane	0.5	mg/kg	< 0.5	-	< 0.5	-
Ethylbenzene	0.1	mg/kg	< 0.1	-	< 0.1	-
Iodomethane	0.5	mg/kg	< 0.5	-	< 0.5	-
Isopropyl benzene (Cumene)	0.5	mg/kg	< 0.5	-	< 0.5	-
Methylene Chloride	0.5	mg/kg	< 0.5	-	< 0.5	-
m&p-Xylenes	0.2	mg/kg	< 0.2	-	< 0.2	-
o-Xylene	0.1	mg/kg	< 0.1	-	< 0.1	-
Xylenes - Total	0.3	mg/kg	< 0.3	-	< 0.3	-
Styrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Tetrachloroethene	0.5	mg/kg	< 0.5	-	< 0.5	-
Toluene	0.1	mg/kg	< 0.1	-	< 0.1	-
trans-1.2-Dichloroethene	0.5	mg/kg	< 0.5	-	< 0.5	-

Client Sample ID			AH04 0.9-1.0	AH08 0-0.1	AH08 0.4-0.5	AH13 0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K24-Fe0043976	K24-Fe0043977	K24-Fe0043978	K24-Fe0043979
Date Sampled			Feb 15, 2024	Feb 15, 2024	Feb 15, 2024	Feb 15, 2024
Test/Reference	LOR	Unit				
Volatile Organics (NZ MfE)						
trans-1.3-Dichloropropene	0.5	mg/kg	< 0.5	-	< 0.5	-
Trichloroethene	0.5	mg/kg	< 0.5	-	< 0.5	-
Trichlorofluoromethane	0.5	mg/kg	< 0.5	-	< 0.5	-
Vinyl chloride	0.5	mg/kg	< 0.5	-	< 0.5	-
Total MAH*	0.5	mg/kg	< 0.5	-	< 0.5	-
4-Bromofluorobenzene (surr.)	1	%	111	-	131	-
Toluene-d8 (surr.)	1	%	84	-	108	-
Semivolatile Organics						
Comments			G01		G01	
1-Chloronaphthalene	0.5	mg/kg	< 0.5	-	< 0.5	-
Total PAH*	0.1	mg/kg	< 0.3	-	< 0.3	-
1-Naphthylamine	0.5	mg/kg	< 5	-	< 5	-
1.2-Dichlorobenzene	0.5	mg/kg	< 5	-	< 5	-
1.2.3-Trichlorobenzene	0.5	mg/kg	< 5	-	< 5	-
1.2.3.4-Tetrachlorobenzene	0.5	mg/kg	< 5	-	< 5	-
1.2.3.5-Tetrachlorobenzene	0.5	mg/kg	< 5	-	< 5	-
1.2.4-Trichlorobenzene	0.5	mg/kg	< 5	-	< 5	-
1.2.4.5-Tetrachlorobenzene	0.5	mg/kg	< 5	-	< 5	-
1.3-Dichlorobenzene	0.5	mg/kg	< 5	-	< 5	-
1.3.5-Trichlorobenzene	0.5	mg/kg	< 5	-	< 5	-
1.4-Dichlorobenzene	0.5	mg/kg	< 5	-	< 5	-
2-Chloronaphthalene	0.5	mg/kg	< 0.5	-	< 0.5	-
2-Chlorophenol	0.5	mg/kg	< 5	-	< 5	-
2-Fluorobiphenyl (surr.)	1	%	87	-	INT	-
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 50	-	< 50	-
2-Methylnaphthalene	0.5	mg/kg	< 0.5	-	< 0.5	-
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 5	-	< 5	-
2-Naphthylamine	0.5	mg/kg	< 5	-	< 5	-
2-Nitroaniline	0.5	mg/kg	< 5	-	< 5	-
2-Nitrophenol	1	mg/kg	< 10	-	< 10	-
2-Picoline	0.5	mg/kg	< 5	-	< 5	-
2.3.4.6-Tetrachlorophenol	5	mg/kg	< 5	-	< 5	-
2.4-Dichlorophenol	0.5	mg/kg	< 5	-	< 5	-
2.4-Dimethylphenol	0.5	mg/kg	< 5	-	< 5	-
2.4-Dinitrophenol	5	mg/kg	< 50	-	< 50	-
2.4-Dinitrotoluene	0.5	mg/kg	< 5	-	< 5	-
2.4.5-Trichlorophenol	1	mg/kg	< 10	-	< 10	-
2.4.6-Tribromophenol (surr.)	1	%	134	-	INT	-
2.4.6-Trichlorophenol	1	mg/kg	< 10	-	< 10	-
2.6-Dichlorophenol	0.5	mg/kg	< 5	-	< 5	-
2.6-Dinitrotoluene	0.5	mg/kg	< 5	-	< 5	-
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 10	-	< 10	-
3-Methylcholanthrene	0.5	mg/kg	< 0.5	-	< 0.5	-
3.3'-Dichlorobenzidine	0.5	mg/kg	< 5	-	< 5	-
4-Aminobiphenyl	0.5	mg/kg	< 5	-	< 5	-
4-Bromophenyl phenyl ether	0.5	mg/kg	< 5	-	< 5	-
4-Chloro-3-methylphenol	1	mg/kg	< 5	-	< 5	-
4-Chlorophenyl phenyl ether	0.5	mg/kg	< 5	-	< 5	-
4-Nitrophenol	5	mg/kg	< 50	-	< 50	-

Client Sample ID			AH04 0.9-1.0	AH08 0-0.1	AH08 0.4-0.5	AH13 0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K24-Fe0043976	K24-Fe0043977	K24-Fe0043978	K24-Fe0043979
Date Sampled			Feb 15, 2024	Feb 15, 2024	Feb 15, 2024	Feb 15, 2024
Test/Reference	LOR	Unit				
Semivolatile Organics						
4.4'-DDD	0.01	mg/kg	< 0.1	-	< 0.1	-
4.4'-DDE	0.01	mg/kg	< 0.1	-	< 0.1	-
4.4'-DDT	0.01	mg/kg	< 0.1	-	< 0.1	-
7.12-Dimethylbenz(a)anthracene	0.5	mg/kg	< 0.5	-	< 0.5	-
a-HCH	0.01	mg/kg	< 0.1	-	< 0.1	-
Acenaphthene	0.03	mg/kg	< 0.3	-	< 0.3	-
Acenaphthylene	0.03	mg/kg	< 0.3	-	< 0.3	-
Acetophenone	0.5	mg/kg	< 5	-	< 5	-
Aldrin	0.01	mg/kg	< 0.1	-	< 0.1	-
Aniline	0.5	mg/kg	< 5	-	< 5	-
Anthracene	0.03	mg/kg	< 0.3	-	< 0.3	-
b-HCH	0.01	mg/kg	< 0.1	-	< 0.1	-
Benz(a)anthracene	0.03	mg/kg	< 0.3	-	< 0.3	-
Benzo(a)pyrene	0.03	mg/kg	< 0.3	-	< 0.3	-
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.3	-	< 0.3	-
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.4	-	0.4	-
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.8	-	0.8	-
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.3	-	< 0.3	-
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.3	-	< 0.3	-
Benzo(k)fluoranthene	0.03	mg/kg	< 0.3	-	< 0.3	-
Benzyl chloride	0.5	mg/kg	< 5	-	< 5	-
Bis(2-chloroethoxy)methane	0.5	mg/kg	< 5	-	< 5	-
Bis(2-chloroisopropyl)ether	0.5	mg/kg	< 5	-	< 5	-
Bis(2-ethylhexyl)phthalate	0.5	mg/kg	< 5	-	< 5	-
Butyl benzyl phthalate	0.5	mg/kg	< 5	-	< 5	-
Chrysene	0.03	mg/kg	< 0.3	-	< 0.3	-
d-HCH	0.01	mg/kg	< 0.1	-	< 0.1	-
Di-n-butyl phthalate	0.5	mg/kg	< 5	-	< 5	-
Di-n-octyl phthalate	0.5	mg/kg	< 5	-	< 5	-
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.3	-	< 0.3	-
Dibenz(a.j)acridine	0.5	mg/kg	< 0.5	-	< 0.5	-
Dibenzofuran	0.5	mg/kg	< 5	-	< 5	-
Dieldrin	0.01	mg/kg	< 0.1	-	< 0.1	-
Diethyl phthalate	0.5	mg/kg	< 5	-	< 5	-
Dimethyl phthalate	0.5	mg/kg	< 5	-	< 5	-
Dimethylaminoazobenzene	0.5	mg/kg	< 5	-	< 5	-
Diphenylamine	0.5	mg/kg	< 5	-	< 5	-
Endosulfan I	0.01	mg/kg	< 0.1	-	< 0.1	-
Endosulfan II	0.01	mg/kg	< 0.1	-	< 0.1	-
Endosulfan sulphate	0.01	mg/kg	< 0.1	-	< 0.1	-
Endrin	0.01	mg/kg	< 0.1	-	< 0.1	-
Endrin aldehyde	0.01	mg/kg	< 0.1	-	< 0.1	-
Endrin ketone	0.01	mg/kg	< 0.1	-	< 0.1	-
Fluoranthene	0.03	mg/kg	< 0.3	-	< 0.3	-
Fluorene	0.03	mg/kg	< 0.3	-	< 0.3	-
g-HCH (Lindane)	0.01	mg/kg	< 0.1	-	< 0.1	-
Heptachlor	0.01	mg/kg	< 0.1	-	< 0.1	-
Heptachlor epoxide	0.01	mg/kg	< 0.1	-	< 0.1	-
Hexachlorobenzene	0.01	mg/kg	< 5	-	< 5	-

Client Sample ID			AH04 0.9-1.0	AH08 0-0.1	AH08 0.4-0.5	AH13 0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K24-Fe0043976	K24-Fe0043977	K24-Fe0043978	K24-Fe0043979
Date Sampled			Feb 15, 2024	Feb 15, 2024	Feb 15, 2024	Feb 15, 2024
Test/Reference	LOR	Unit				
Semivolatile Organics						
Hexachlorobutadiene	0.5	mg/kg	< 5	-	< 5	-
Hexachlorocyclopentadiene	0.5	mg/kg	< 5	-	< 5	-
Hexachloroethane	0.5	mg/kg	< 5	-	< 5	-
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.3	-	< 0.3	-
Methoxychlor	0.01	mg/kg	< 0.1	-	< 0.1	-
N-Nitrosodibutylamine	0.5	mg/kg	< 5	-	< 5	-
N-Nitrosodipropylamine	0.5	mg/kg	< 5	-	< 5	-
N-Nitrosopiperidine	0.5	mg/kg	< 5	-	< 5	-
Naphthalene	0.1	mg/kg	< 0.3	-	< 0.3	-
Nitrobenzene	0.5	mg/kg	< 5	-	< 5	-
Nitrobenzene-d5 (surr.)	1	%	92	-	INT	-
Pentachlorobenzene	0.5	mg/kg	< 5	-	< 5	-
Pentachloronitrobenzene	0.5	mg/kg	< 5	-	< 5	-
Pentachlorophenol	1	mg/kg	< 10	-	< 10	-
Phenanthrene	0.03	mg/kg	< 0.3	-	< 0.3	-
Phenol	0.5	mg/kg	< 5	-	< 5	-
Phenol-d6 (surr.)	1	%	94	-	INT	-
Pronamide	0.5	mg/kg	< 5	-	< 5	-
Pyrene	0.03	mg/kg	< 0.3	-	< 0.3	-
Trifluralin	0.5	mg/kg	< 5	-	< 5	-
PFASs Summations						
Sum (PFHxS + PFOS)*[N16]	1	ug/kg	< 1	-	< 1	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*[N16]	1	ug/kg	< 1	-	< 1	-
Sum of PFASs (n=30)*[N16]	1	ug/kg	< 1	-	< 1	-
Sum of US EPA PFAS (PFOS + PFOA)*[N16]	1	ug/kg	< 1	-	< 1	-
Sum of WA DWER PFAS (n=10)*[N16]	1	ug/kg	< 1	-	< 1	-
Perfluoroalkyl sulfonamido substances- Trace						
Perfluorooctane sulfonamide (FOSA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11, N16]	1	ug/kg	< 1	-	< 1	-
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11, N16]	1	ug/kg	< 1	-	< 1	-
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
13C8-FOSA (surr.)[N16]	1	%	67	-	58	-
D3-N-MeFOSA (surr.)[N16]	1	%	81	-	77	-
D5-N-EtFOSA (surr.)[N16]	1	%	108	-	101	-
D7-N-MeFOSE (surr.)[N16]	1	%	135	-	152	-
D9-N-EtFOSE (surr.)[N16]	1	%	88	-	81	-
D5-N-EtFOSAA (surr.)[N16]	1	%	105	-	90	-
D3-N-MeFOSAA (surr.)[N16]	1	%	93	-	79	-

Client Sample ID			AH04 0.9-1.0	AH08 0-0.1	AH08 0.4-0.5	AH13 0-0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K24-Fe0043976	K24-Fe0043977	K24-Fe0043978	K24-Fe0043979
Date Sampled			Feb 15, 2024	Feb 15, 2024	Feb 15, 2024	Feb 15, 2024
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs) - Trace						
Perfluorobutanoic acid (PFBA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
Perfluoropentanoic acid (PFPeA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
Perfluorohexanoic acid (PFHxA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
Perfluoroheptanoic acid (PFHpA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
Perfluorooctanoic acid (PFOA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
Perfluorononanoic acid (PFNA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
Perfluorodecanoic acid (PFDA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
Perfluorotridecanoic acid (PFTrDA)[N15, N16]	1	ug/kg	< 1	-	< 1	-
Perfluoroundecanoic acid (PFUnDA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
Perfluorododecanoic acid (PFDoDA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
Perfluorotetradecanoic acid (PFTeDA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
13C4-PFBA (surr.)[N16]	1	%	90	-	86	-
13C5-PFPeA (surr.)[N16]	1	%	148	-	122	-
13C5-PFHxA (surr.)[N16]	1	%	130	-	112	-
13C4-PFHpA (surr.)[N16]	1	%	99	-	78	-
13C8-PFOA (surr.)[N16]	1	%	96	-	91	-
13C5-PFNA (surr.)[N16]	1	%	94	-	84	-
13C6-PFDA (surr.)[N16]	1	%	134	-	120	-
13C2-PFUnDA (surr.)[N16]	1	%	102	-	93	-
13C2-PFDoDA (surr.)[N16]	1	%	93	-	98	-
13C2-PFTeDA (surr.)[N16]	1	%	80	-	85	-
Perfluoroalkyl sulfonic acids (PFSAs)- Trace						
Perfluorobutanesulfonic acid (PFBS)[N11, N16]	1	ug/kg	< 1	-	< 1	-
Perfluorononanesulfonic acid (PFNS)[N15, N16]	1	ug/kg	< 1	-	< 1	-
Perfluoropropanesulfonic acid (PFPrS)[N15, N16]	1	ug/kg	< 1	-	< 1	-
Perfluoropentanesulfonic acid (PFPeS)[N15, N16]	1	ug/kg	< 1	-	< 1	-
Perfluorohexanesulfonic acid (PFHxS)[N11, N16]	1	ug/kg	< 1	-	< 1	-
Perfluoroheptanesulfonic acid (PFHpS)[N15, N16]	1	ug/kg	< 1	-	< 1	-
Perfluorooctanesulfonic acid (PFOS)[N11, N16]	1	ug/kg	< 1	-	< 1	-
Perfluorodecanesulfonic acid (PFDS)[N15, N16]	1	ug/kg	< 1	-	< 1	-
13C3-PFBS (surr.)[N16]	1	%	137	-	133	-
18O2-PFHxS (surr.)[N16]	1	%	113	-	101	-
13C8-PFOS (surr.)[N16]	1	%	111	-	113	-
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11, N16]	1	ug/kg	< 1	-	< 1	-
13C2-4:2 FTSA (surr.)[N16]	1	%	146	-	86	-
13C2-6:2 FTSA (surr.)[N16]	1	%	177	-	84	-
13C2-8:2 FTSA (surr.)[N16]	1	%	187	-	132	-
13C2-10:2 FTSA (surr.)[N16]	1	%	99	-	110	-

Client Sample ID			AH13 0.4-0.5	AH05 0-0.1
Sample Matrix			Soil	Soil
Eurofins Sample No.			K24-Fe0043980	K24-Fe0043981
Date Sampled			Feb 15, 2024	Feb 15, 2024
Test/Reference	LOR	Unit		
Total Petroleum Hydrocarbons (NZ MfE 1999)				
TPH-SG C7-C9	5	mg/kg	-	< 5
TPH-SG C10-C14	10	mg/kg	-	< 10
TPH-SG C15-C36	20	mg/kg	-	< 20
TPH-SG C7-C36 (Total)	35	mg/kg	-	< 35
Polycyclic Aromatic Hydrocarbons (NZ MfE)				
Acenaphthene	0.03	mg/kg	-	< 0.03
Acenaphthylene	0.03	mg/kg	-	< 0.03
Anthracene	0.03	mg/kg	-	< 0.03
Benz(a)anthracene	0.03	mg/kg	-	< 0.03
Benzo(a)pyrene	0.03	mg/kg	-	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	-	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	-	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	-	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	-	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	-	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	-	0.06
Chrysene	0.03	mg/kg	-	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	-	< 0.03
Fluoranthene	0.03	mg/kg	-	0.04
Fluorene	0.03	mg/kg	-	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	-	< 0.03
Naphthalene	0.1	mg/kg	-	< 0.1
Phenanthrene	0.03	mg/kg	-	< 0.03
Pyrene	0.03	mg/kg	-	0.06
Total PAH*	0.1	mg/kg	-	0.2
p-Terphenyl-d14 (surr.)	1	%	-	INT
2-Fluorobiphenyl (surr.)	1	%	-	INT
Metals M7 (NZ MfE)				
Arsenic	0.1	mg/kg	11	8.2
Cadmium	0.01	mg/kg	0.09	0.17
Chromium	0.1	mg/kg	22	23
Copper	0.1	mg/kg	20	24
Lead	0.1	mg/kg	26	54
Nickel	0.1	mg/kg	17	14
Zinc	5	mg/kg	110	110
Sample Properties				
% Moisture	1	%	27	28
Volatile Organics (NZ MfE)				
1.1-Dichloroethane	0.5	mg/kg	< 0.5	-
1.1-Dichloroethene	0.5	mg/kg	< 0.5	-
1.1.1-Trichloroethane	0.5	mg/kg	< 0.5	-
1.1.1.2-Tetrachloroethane	0.5	mg/kg	< 0.5	-
1.1.2-Trichloroethane	0.5	mg/kg	< 0.5	-
1.1.2.2-Tetrachloroethane	0.5	mg/kg	< 0.5	-
1.2-Dibromoethane	0.5	mg/kg	< 0.5	-
1.2-Dichlorobenzene	0.5	mg/kg	< 0.5	-
1.2-Dichloroethane	0.5	mg/kg	< 0.5	-
1.2-Dichloropropane	0.5	mg/kg	< 0.5	-
1.2.3-Trichloropropane	0.5	mg/kg	< 0.5	-

Client Sample ID			AH13 0.4-0.5	AH05 0-0.1
Sample Matrix			Soil	Soil
Eurofins Sample No.			K24-Fe0043980	K24-Fe0043981
Date Sampled			Feb 15, 2024	Feb 15, 2024
Test/Reference	LOR	Unit		
Volatile Organics (NZ MfE)				
1.2.4-Trimethylbenzene	0.5	mg/kg	< 0.5	-
1.3-Dichlorobenzene	0.5	mg/kg	< 0.5	-
1.3-Dichloropropane	0.5	mg/kg	< 0.5	-
1.3.5-Trimethylbenzene	0.5	mg/kg	< 0.5	-
1.4-Dichlorobenzene	0.5	mg/kg	< 0.5	-
2-Butanone (MEK)	0.5	mg/kg	< 0.5	-
2-Propanone (Acetone)	0.5	mg/kg	< 10	-
4-Chlorotoluene	0.5	mg/kg	< 0.5	-
4-Methyl-2-pentanone (MIBK)	0.5	mg/kg	< 0.5	-
Allyl chloride	0.5	mg/kg	< 0.5	-
Benzene	0.1	mg/kg	< 0.1	-
Bromobenzene	0.5	mg/kg	< 0.5	-
Bromochloromethane	0.5	mg/kg	< 0.5	-
Bromodichloromethane	0.5	mg/kg	< 0.5	-
Bromoform	0.5	mg/kg	< 0.5	-
Bromomethane	0.5	mg/kg	< 0.5	-
Carbon disulfide	0.5	mg/kg	< 0.5	-
Carbon Tetrachloride	0.5	mg/kg	< 0.5	-
Chlorobenzene	0.5	mg/kg	< 0.5	-
Chloroethane	0.5	mg/kg	< 0.5	-
Chloroform	0.5	mg/kg	< 0.5	-
Chloromethane	0.5	mg/kg	< 0.5	-
cis-1.2-Dichloroethene	0.5	mg/kg	< 0.5	-
cis-1.3-Dichloropropene	0.5	mg/kg	< 0.5	-
Dibromochloromethane	0.5	mg/kg	< 0.5	-
Dibromomethane	0.5	mg/kg	< 0.5	-
Dichlorodifluoromethane	0.5	mg/kg	< 0.5	-
Ethylbenzene	0.1	mg/kg	< 0.1	-
Iodomethane	0.5	mg/kg	< 0.5	-
Isopropyl benzene (Cumene)	0.5	mg/kg	< 0.5	-
Methylene Chloride	0.5	mg/kg	< 0.5	-
m&p-Xylenes	0.2	mg/kg	< 0.2	-
o-Xylene	0.1	mg/kg	< 0.1	-
Xylenes - Total	0.3	mg/kg	< 0.3	-
Styrene	0.5	mg/kg	< 0.5	-
Tetrachloroethene	0.5	mg/kg	< 0.5	-
Toluene	0.1	mg/kg	< 0.1	-
trans-1.2-Dichloroethene	0.5	mg/kg	< 0.5	-
trans-1.3-Dichloropropene	0.5	mg/kg	< 0.5	-
Trichloroethene	0.5	mg/kg	< 0.5	-
Trichlorofluoromethane	0.5	mg/kg	< 0.5	-
Vinyl chloride	0.5	mg/kg	< 0.5	-
Total MAH*	0.5	mg/kg	< 0.5	-
4-Bromofluorobenzene (surr.)	1	%	142	-
Toluene-d8 (surr.)	1	%	106	-

Client Sample ID			AH13 0.4-0.5	AH05 0-0.1
Sample Matrix			Soil	Soil
Eurofins Sample No.			K24-Fe0043980	K24-Fe0043981
Date Sampled			Feb 15, 2024	Feb 15, 2024
Test/Reference	LOR	Unit		
Semivolatile Organics				
1-Chloronaphthalene	0.5	mg/kg	< 0.5	-
Total PAH*	0.1	mg/kg	< 0.1	-
1-Naphthylamine	0.5	mg/kg	< 0.5	-
1.2-Dichlorobenzene	0.5	mg/kg	< 0.5	-
1.2.3-Trichlorobenzene	0.5	mg/kg	< 0.5	-
1.2.3.4-Tetrachlorobenzene	0.5	mg/kg	< 0.5	-
1.2.3.5-Tetrachlorobenzene	0.5	mg/kg	< 0.5	-
1.2.4-Trichlorobenzene	0.5	mg/kg	< 0.5	-
1.2.4.5-Tetrachlorobenzene	0.5	mg/kg	< 0.5	-
1.3-Dichlorobenzene	0.5	mg/kg	< 0.5	-
1.3.5-Trichlorobenzene	0.5	mg/kg	< 0.5	-
1.4-Dichlorobenzene	0.5	mg/kg	< 0.5	-
2-Chloronaphthalene	0.5	mg/kg	< 0.5	-
2-Chlorophenol	0.5	mg/kg	< 0.5	-
2-Fluorobiphenyl (surr.)	1	%	139	-
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5	-
2-Methylnaphthalene	0.5	mg/kg	< 0.5	-
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.2	-
2-Naphthylamine	0.5	mg/kg	< 0.5	-
2-Nitroaniline	0.5	mg/kg	< 0.5	-
2-Nitrophenol	1	mg/kg	< 1	-
2-Picoline	0.5	mg/kg	< 0.5	-
2.3.4.6-Tetrachlorophenol	5	mg/kg	< 5	-
2.4-Dichlorophenol	0.5	mg/kg	< 0.5	-
2.4-Dimethylphenol	0.5	mg/kg	< 0.5	-
2.4-Dinitrophenol	5	mg/kg	< 5	-
2.4-Dinitrotoluene	0.5	mg/kg	< 0.5	-
2.4.5-Trichlorophenol	1	mg/kg	< 1	-
2.4.6-Tribromophenol (surr.)	1	%	111	-
2.4.6-Trichlorophenol	1	mg/kg	< 1	-
2.6-Dichlorophenol	0.5	mg/kg	< 0.5	-
2.6-Dinitrotoluene	0.5	mg/kg	< 0.5	-
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 0.4	-
3-Methylcholanthrene	0.5	mg/kg	< 0.5	-
3.3'-Dichlorobenzidine	0.5	mg/kg	< 0.5	-
4-Aminobiphenyl	0.5	mg/kg	< 0.5	-
4-Bromophenyl phenyl ether	0.5	mg/kg	< 0.5	-
4-Chloro-3-methylphenol	1	mg/kg	< 1	-
4-Chlorophenyl phenyl ether	0.5	mg/kg	< 0.5	-
4-Nitrophenol	5	mg/kg	< 5	-
4.4'-DDD	0.01	mg/kg	< 0.01	-
4.4'-DDE	0.01	mg/kg	< 0.01	-
4.4'-DDT	0.01	mg/kg	< 0.01	-
7.12-Dimethylbenz(a)anthracene	0.5	mg/kg	< 0.5	-
a-HCH	0.01	mg/kg	< 0.01	-
Acenaphthene	0.03	mg/kg	< 0.03	-
Acenaphthylene	0.03	mg/kg	< 0.03	-
Acetophenone	0.5	mg/kg	< 0.5	-
Aldrin	0.01	mg/kg	< 0.01	-

Client Sample ID			AH13 0.4-0.5	AH05 0-0.1
Sample Matrix			Soil	Soil
Eurofins Sample No.			K24-Fe0043980	K24-Fe0043981
Date Sampled			Feb 15, 2024	Feb 15, 2024
Test/Reference	LOR	Unit		
Semivolatile Organics				
Aniline	0.5	mg/kg	< 0.5	-
Anthracene	0.03	mg/kg	< 0.03	-
b-HCH	0.01	mg/kg	< 0.01	-
Benz(a)anthracene	0.03	mg/kg	< 0.03	-
Benzo(a)pyrene	0.03	mg/kg	< 0.03	-
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.03	-
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.04	-
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.08	-
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.03	-
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.03	-
Benzo(k)fluoranthene	0.03	mg/kg	< 0.03	-
Benzyl chloride	0.5	mg/kg	< 0.5	-
Bis(2-chloroethoxy)methane	0.5	mg/kg	< 0.5	-
Bis(2-chloroisopropyl)ether	0.5	mg/kg	< 0.5	-
Bis(2-ethylhexyl)phthalate	0.5	mg/kg	< 0.5	-
Butyl benzyl phthalate	0.5	mg/kg	< 0.5	-
Chrysene	0.03	mg/kg	< 0.03	-
d-HCH	0.01	mg/kg	< 0.01	-
Di-n-butyl phthalate	0.5	mg/kg	< 0.5	-
Di-n-octyl phthalate	0.5	mg/kg	< 0.5	-
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.03	-
Dibenz(a.j)acridine	0.5	mg/kg	< 0.5	-
Dibenzofuran	0.5	mg/kg	< 0.5	-
Dieldrin	0.01	mg/kg	< 0.01	-
Diethyl phthalate	0.5	mg/kg	< 0.5	-
Dimethyl phthalate	0.5	mg/kg	< 0.5	-
Dimethylaminoazobenzene	0.5	mg/kg	< 0.5	-
Diphenylamine	0.5	mg/kg	< 0.5	-
Endosulfan I	0.01	mg/kg	< 0.01	-
Endosulfan II	0.01	mg/kg	< 0.01	-
Endosulfan sulphate	0.01	mg/kg	< 0.01	-
Endrin	0.01	mg/kg	0.02	-
Endrin aldehyde	0.01	mg/kg	< 0.01	-
Endrin ketone	0.01	mg/kg	< 0.01	-
Fluoranthene	0.03	mg/kg	< 0.03	-
Fluorene	0.03	mg/kg	< 0.03	-
g-HCH (Lindane)	0.01	mg/kg	< 0.01	-
Heptachlor	0.01	mg/kg	< 0.01	-
Heptachlor epoxide	0.01	mg/kg	< 0.01	-
Hexachlorobenzene	0.01	mg/kg	< 0.01	-
Hexachlorobutadiene	0.5	mg/kg	< 0.5	-
Hexachlorocyclopentadiene	0.5	mg/kg	< 0.5	-
Hexachloroethane	0.5	mg/kg	< 0.5	-
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.03	-
Methoxychlor	0.01	mg/kg	< 0.01	-
N-Nitrosodibutylamine	0.5	mg/kg	< 0.5	-
N-Nitrosodipropylamine	0.5	mg/kg	< 0.5	-
N-Nitrosopiperidine	0.5	mg/kg	< 0.5	-
Naphthalene	0.1	mg/kg	< 0.1	-

Client Sample ID			AH13 0.4-0.5	AH05 0-0.1
Sample Matrix			Soil	Soil
Eurofins Sample No.			K24-Fe0043980	K24-Fe0043981
Date Sampled			Feb 15, 2024	Feb 15, 2024
Test/Reference	LOR	Unit		
Semivolatile Organics				
Nitrobenzene	0.5	mg/kg	< 0.5	-
Nitrobenzene-d5 (surr.)	1	%	132	-
Pentachlorobenzene	0.5	mg/kg	< 0.5	-
Pentachloronitrobenzene	0.5	mg/kg	< 0.5	-
Pentachlorophenol	1	mg/kg	< 1	-
Phenanthrene	0.03	mg/kg	< 0.03	-
Phenol	0.5	mg/kg	< 0.5	-
Phenol-d6 (surr.)	1	%	110	-
Pronamide	0.5	mg/kg	< 0.5	-
Pyrene	0.03	mg/kg	< 0.03	-
Trifluralin	0.5	mg/kg	< 0.5	-
PFASs Summations				
Sum (PFHxS + PFOS)*[N16]	1	ug/kg	< 1	-
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*[N16]	1	ug/kg	< 1	-
Sum of PFASs (n=30)*[N16]	1	ug/kg	< 1	-
Sum of US EPA PFAS (PFOS + PFOA)*[N16]	1	ug/kg	< 1	-
Sum of WA DWER PFAS (n=10)*[N16]	1	ug/kg	< 1	-
Perfluoroalkyl sulfonamido substances- Trace				
Perfluorooctane sulfonamide (FOSA)[N11, N16]	1	ug/kg	< 1	-
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11, N16]	1	ug/kg	< 1	-
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11, N16]	1	ug/kg	< 1	-
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11, N16]	1	ug/kg	< 1	-
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11, N16]	1	ug/kg	< 1	-
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11, N16]	1	ug/kg	< 1	-
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11, N16]	1	ug/kg	< 1	-
13C8-FOSA (surr.)[N16]	1	%	51	-
D3-N-MeFOSA (surr.)[N16]	1	%	76	-
D5-N-EtFOSA (surr.)[N16]	1	%	96	-
D7-N-MeFOSE (surr.)[N16]	1	%	114	-
D9-N-EtFOSE (surr.)[N16]	1	%	76	-
D5-N-EtFOSAA (surr.)[N16]	1	%	59	-
D3-N-MeFOSAA (surr.)[N16]	1	%	52	-
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				
Perfluorobutanoic acid (PFBA)[N11, N16]	1	ug/kg	< 1	-
Perfluoropentanoic acid (PFPeA)[N11, N16]	1	ug/kg	< 1	-
Perfluorohexanoic acid (PFHxA)[N11, N16]	1	ug/kg	< 1	-
Perfluoroheptanoic acid (PFHpA)[N11, N16]	1	ug/kg	< 1	-
Perfluorooctanoic acid (PFOA)[N11, N16]	1	ug/kg	< 1	-
Perfluorononanoic acid (PFNA)[N11, N16]	1	ug/kg	< 1	-
Perfluorodecanoic acid (PFDA)[N11, N16]	1	ug/kg	< 1	-
Perfluorotridecanoic acid (PFTrDA)[N15, N16]	1	ug/kg	< 1	-
Perfluoroundecanoic acid (PFUnDA)[N11, N16]	1	ug/kg	< 1	-
Perfluorododecanoic acid (PFDoDA)[N11, N16]	1	ug/kg	< 1	-
Perfluorotetradecanoic acid (PFTeDA)[N11, N16]	1	ug/kg	< 1	-
13C4-PFBA (surr.)[N16]	1	%	68	-

Client Sample ID			AH13 0.4-0.5	AH05 0-0.1
Sample Matrix			Soil	Soil
Eurofins Sample No.			K24-Fe0043980	K24-Fe0043981
Date Sampled			Feb 15, 2024	Feb 15, 2024
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				
13C5-PFPeA (surr.)[N16]	1	%	85	-
13C5-PFHxA (surr.)[N16]	1	%	88	-
13C4-PFHpA (surr.)[N16]	1	%	65	-
13C8-PFOA (surr.)[N16]	1	%	72	-
13C5-PFNA (surr.)[N16]	1	%	73	-
13C6-PFDA (surr.)[N16]	1	%	100	-
13C2-PFUnDA (surr.)[N16]	1	%	76	-
13C2-PFDoDA (surr.)[N16]	1	%	78	-
13C2-PFTeDA (surr.)[N16]	1	%	62	-
Perfluoroalkyl sulfonic acids (PFSAs)- Trace				
Perfluorobutanesulfonic acid (PFBS)[N11, N16]	1	ug/kg	< 1	-
Perfluorononanesulfonic acid (PFNS)[N15, N16]	1	ug/kg	< 1	-
Perfluoropropanesulfonic acid (PFPrS)[N15, N16]	1	ug/kg	< 1	-
Perfluoropentanesulfonic acid (PFPeS)[N15, N16]	1	ug/kg	< 1	-
Perfluorohexanesulfonic acid (PFHxS)[N11, N16]	1	ug/kg	< 1	-
Perfluoroheptanesulfonic acid (PFHpS)[N15, N16]	1	ug/kg	< 1	-
Perfluorooctanesulfonic acid (PFOS)[N11, N16]	1	ug/kg	< 1	-
Perfluorodecanesulfonic acid (PFDS)[N15, N16]	1	ug/kg	< 1	-
13C3-PFBS (surr.)[N16]	1	%	87	-
18O2-PFHxS (surr.)[N16]	1	%	87	-
13C8-PFOS (surr.)[N16]	1	%	85	-
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11, N16]	1	ug/kg	< 1	-
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11, N16]	1	ug/kg	< 1	-
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11, N16]	1	ug/kg	< 1	-
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11, N16]	1	ug/kg	< 1	-
13C2-4:2 FTSA (surr.)[N16]	1	%	53	-
13C2-6:2 FTSA (surr.)[N16]	1	%	55	-
13C2-8:2 FTSA (surr.)[N16]	1	%	64	-
13C2-10:2 FTSA (surr.)[N16]	1	%	71	-

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Total Petroleum Hydrocarbons (NZ MfE 1999)	Auckland	Mar 01, 2024	14 Days
- Method: LTM-ORG-2010 TRH and BTEX in Soil and Water by GC FID and PT GCMS			
Polycyclic Aromatic Hydrocarbons (NZ MfE)	Auckland	Mar 01, 2024	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water by GC MSMS			
Metals M7 (NZ MfE)	Auckland	Feb 19, 2024	6 Months
- Method: LTM-MET-3040 Metals in Waters Soils Sediments by ICP-MS			
% Moisture	Auckland	Feb 19, 2024	14 Days
- Method: LTM-GEN-7080 Moisture Content in Soil by Gravimetry			
Volatile Organics (NZ MfE)	Auckland	Mar 01, 2024	14 Days
- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices			
Semivolatile Organics	Auckland	Mar 01, 2024	14 Days
- Method: LTM-ORG-2190 SVOC in Water & Soil by GC-MS			
Per- and Polyfluoroalkyl Substances (PFASs) - Trace			
Perfluoroalkyl sulfonamido substances- Trace	Brisbane	Feb 21, 2024	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Perfluoroalkyl carboxylic acids (PFCAs) - Trace	Brisbane	Feb 21, 2024	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Perfluoroalkyl sulfonic acids (PFSAs)- Trace	Brisbane	Feb 21, 2024	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace	Brisbane	Feb 21, 2024	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			

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Site# 2370

Company Name: Williamson Water and Land Advisory Ltd
Address: Unit 10 | 1 Putaki Drive
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Auckland 0810

Project Name: CH
Project ID: WWLA 1078

Order No.:
Report #: 1069726
Phone: s 9(2)(a)
Fax:

Received: Feb 16, 2024 3:52 PM
Due: Feb 27, 2024
Priority: 7 Day
Contact Name: SHANE MOORE

Eurofins Analytical Services Manager : Katyana Gausel

Sample Detail						HOLD	Moisture Set	Metals M7 (NZ MfE)	Eurofins Suite B4B-NZ: TPH, PAH (NZ MfE)	Per- and Polyfluoroalkyl Substances (PFASs) - Trace	SVV: SVOC/VOC (NZ MfE)
Auckland Laboratory - IANZ# 1327						X	X	X	X		X
Auckland (asbestos) Laboratory - IANZ# 1308											
Christchurch Laboratory - IANZ# 1290											
Tauranga Laboratory - IANZ# 1402											
Brisbane Laboratory - NATA # 1261 Site # 20794										X	
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	AH11 0-0.1	Feb 15, 2024		Soil	K24-Fe0043972		X	X	X		
2	AH11 0.9-1.0	Feb 15, 2024		Soil	K24-Fe0043973		X	X	X		
3	AH04 0-0.1	Feb 15, 2024		Soil	K24-Fe0043974		X	X	X		
4	AH04 0.4-0.5	Feb 15, 2024		Soil	K24-Fe0043975		X	X	X		
5	AH04 0.9-1.0	Feb 15, 2024		Soil	K24-Fe0043976		X	X		X	X
6	AH08 0-0.1	Feb 15, 2024		Soil	K24-Fe0043977		X	X	X		
7	AH08 0.4-0.5	Feb 15, 2024		Soil	K24-Fe0043978		X	X		X	X
8	AH13 0-0.1	Feb 15, 2024		Soil	K24-Fe0043979		X	X	X		
9	AH13 0.4-0.5	Feb 15, 2024		Soil	K24-Fe0043980		X	X		X	X

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Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

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Sample Detail						HOLD	Moisture Set	Metals M7 (NZ MfE)	Eurofins Suite B4B-NZ: TPH, PAH (NZ MfE)	Per- and Polyfluoroalkyl Substances (PFASs) - Trace	SVV: SVOC/VOC (NZ MfE)
Auckland Laboratory - IANZ# 1327						X	X	X	X		X
Auckland (asbestos) Laboratory - IANZ# 1308											
Christchurch Laboratory - IANZ# 1290											
Tauranga Laboratory - IANZ# 1402											
10	AH05 0-0.1	Feb 15, 2024		Soil	K24-Fe0043981		X	X	X		
11	AH11 0.4-0.5	Feb 15, 2024		Soil	K24-Fe0043982	X					
12	AH08 0.8-0.9	Feb 15, 2024		Soil	K24-Fe0043983	X					
13	AH03 0-0.1	Feb 15, 2024		Soil	K24-Fe0043984	X					
14	AH03 0.4-0.5	Feb 15, 2024		Soil	K24-Fe0043985	X					
15	AH03 0.9-1.0	Feb 15, 2024		Soil	K24-Fe0043986	X					
16	AH13 0.9-1.0	Feb 15, 2024		Soil	K24-Fe0043987	X					
17	AH05 0.4-0.5	Feb 15, 2024		Soil	K24-Fe0043988	X					
18	AH05 0.9-1.0	Feb 15, 2024		Soil	K24-Fe0043989	X					
Test Counts						8	10	10	7	3	3

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry weight basis unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion unless otherwise stated.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with blue colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit	**Colour:** Pt-Co Units	

Terms

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

QC - Acceptance Criteria

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

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

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

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

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 70 – 130%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 5.4, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Petroleum Hydrocarbons (NZ MfE 1999)							
TPH-SG C7-C9	mg/kg	< 5			5	Pass	
TPH-SG C10-C14	mg/kg	< 10			10	Pass	
TPH-SG C15-C36	mg/kg	< 20			20	Pass	
TPH-SG C7-C36 (Total)	mg/kg	< 35			35	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons (NZ MfE)							
Acenaphthene	mg/kg	< 0.03			0.03	Pass	
Acenaphthylene	mg/kg	< 0.03			0.03	Pass	
Anthracene	mg/kg	< 0.03			0.03	Pass	
Benz(a)anthracene	mg/kg	< 0.03			0.03	Pass	
Benzo(a)pyrene	mg/kg	< 0.03			0.03	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.03			0.03	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.03			0.03	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.03			0.03	Pass	
Chrysene	mg/kg	< 0.03			0.03	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.03			0.03	Pass	
Fluoranthene	mg/kg	< 0.03			0.03	Pass	
Fluorene	mg/kg	< 0.03			0.03	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.03			0.03	Pass	
Naphthalene	mg/kg	< 0.1			0.1	Pass	
Phenanthrene	mg/kg	< 0.03			0.03	Pass	
Pyrene	mg/kg	< 0.03			0.03	Pass	
Method Blank							
Metals M7 (NZ MfE)							
Arsenic	mg/kg	< 0.1			0.1	Pass	
Cadmium	mg/kg	< 0.01			0.01	Pass	
Chromium	mg/kg	< 0.1			0.1	Pass	
Copper	mg/kg	< 0.1			0.1	Pass	
Lead	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 0.1			0.1	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Volatile Organics (NZ MfE)							
1.1-Dichloroethane	mg/kg	< 0.5			0.5	Pass	
1.1-Dichloroethene	mg/kg	< 0.5			0.5	Pass	
1.1.1-Trichloroethane	mg/kg	< 0.5			0.5	Pass	
1.1.1.2-Tetrachloroethane	mg/kg	< 0.5			0.5	Pass	
1.1.2-Trichloroethane	mg/kg	< 0.5			0.5	Pass	
1.1.2.2-Tetrachloroethane	mg/kg	< 0.5			0.5	Pass	
1.2-Dibromoethane	mg/kg	< 0.5			0.5	Pass	
1.2-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.2-Dichloroethane	mg/kg	< 0.5			0.5	Pass	
1.2-Dichloropropane	mg/kg	< 0.5			0.5	Pass	
1.2.3-Trichloropropane	mg/kg	< 0.5			0.5	Pass	
1.2.4-Trimethylbenzene	mg/kg	< 0.5			0.5	Pass	
1.3-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.3-Dichloropropane	mg/kg	< 0.5			0.5	Pass	
1.3.5-Trimethylbenzene	mg/kg	< 0.5			0.5	Pass	
1.4-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
2-Butanone (MEK)	mg/kg	< 0.5			0.5	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
2-Propanone (Acetone)	mg/kg	< 0.5			0.5	Pass	
4-Chlorotoluene	mg/kg	< 0.5			0.5	Pass	
4-Methyl-2-pentanone (MIBK)	mg/kg	< 0.5			0.5	Pass	
Allyl chloride	mg/kg	< 0.5			0.5	Pass	
Benzene	mg/kg	< 0.1			0.1	Pass	
Bromobenzene	mg/kg	< 0.5			0.5	Pass	
Bromochloromethane	mg/kg	< 0.5			0.5	Pass	
Bromodichloromethane	mg/kg	< 0.5			0.5	Pass	
Bromoform	mg/kg	< 0.5			0.5	Pass	
Bromomethane	mg/kg	< 0.5			0.5	Pass	
Carbon disulfide	mg/kg	< 0.5			0.5	Pass	
Carbon Tetrachloride	mg/kg	< 0.5			0.5	Pass	
Chlorobenzene	mg/kg	< 0.5			0.5	Pass	
Chloroethane	mg/kg	< 0.5			0.5	Pass	
Chloroform	mg/kg	< 0.5			0.5	Pass	
Chloromethane	mg/kg	< 0.5			0.5	Pass	
cis-1.2-Dichloroethene	mg/kg	< 0.5			0.5	Pass	
cis-1.3-Dichloropropene	mg/kg	< 0.5			0.5	Pass	
Dibromochloromethane	mg/kg	< 0.5			0.5	Pass	
Dibromomethane	mg/kg	< 0.5			0.5	Pass	
Dichlorodifluoromethane	mg/kg	< 0.5			0.5	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
Iodomethane	mg/kg	< 0.5			0.5	Pass	
Isopropyl benzene (Cumene)	mg/kg	< 0.5			0.5	Pass	
Methylene Chloride	mg/kg	< 0.5			0.5	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Styrene	mg/kg	< 0.5			0.5	Pass	
Tetrachloroethene	mg/kg	< 0.5			0.5	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
trans-1.2-Dichloroethene	mg/kg	< 0.5			0.5	Pass	
trans-1.3-Dichloropropene	mg/kg	< 0.5			0.5	Pass	
Trichloroethene	mg/kg	< 0.5			0.5	Pass	
Trichlorofluoromethane	mg/kg	< 0.5			0.5	Pass	
Vinyl chloride	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Semivolatile Organics							
1-Chloronaphthalene	mg/kg	< 0.5			0.5	Pass	
1-Naphthylamine	mg/kg	< 0.5			0.5	Pass	
1.2-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.2.3-Trichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.2.3.4-Tetrachlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.2.3.5-Tetrachlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.2.4-Trichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.2.4.5-Tetrachlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.3-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.3.5-Trichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.4-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
2-Chloronaphthalene	mg/kg	< 0.5			0.5	Pass	
2-Chlorophenol	mg/kg	< 0.5			0.5	Pass	
2-Methyl-4.6-dinitrophenol	mg/kg	< 5			5	Pass	
2-Methylnaphthalene	mg/kg	< 0.5			0.5	Pass	
2-Methylphenol (o-Cresol)	mg/kg	< 0.2			0.2	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
2-Naphthylamine	mg/kg	< 0.5			0.5	Pass	
2-Nitroaniline	mg/kg	< 0.5			0.5	Pass	
2-Nitrophenol	mg/kg	< 1			1	Pass	
2-Picoline	mg/kg	< 0.5			0.5	Pass	
2.3.4.6-Tetrachlorophenol	mg/kg	< 5			5	Pass	
2.4-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dimethylphenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dinitrophenol	mg/kg	< 5			5	Pass	
2.4-Dinitrotoluene	mg/kg	< 0.5			0.5	Pass	
2.4.5-Trichlorophenol	mg/kg	< 1			1	Pass	
2.4.6-Trichlorophenol	mg/kg	< 1			1	Pass	
2.6-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
2.6-Dinitrotoluene	mg/kg	< 0.5			0.5	Pass	
3&4-Methylphenol (m&p-Cresol)	mg/kg	< 0.4			0.4	Pass	
3-Methylcholanthrene	mg/kg	< 0.5			0.5	Pass	
3.3'-Dichlorobenzidine	mg/kg	< 0.5			0.5	Pass	
4-Aminobiphenyl	mg/kg	< 0.5			0.5	Pass	
4-Bromophenyl phenyl ether	mg/kg	< 0.5			0.5	Pass	
4-Chloro-3-methylphenol	mg/kg	< 1			1	Pass	
4-Chlorophenyl phenyl ether	mg/kg	< 0.5			0.5	Pass	
4-Nitrophenol	mg/kg	< 5			5	Pass	
4.4'-DDD	mg/kg	< 0.01			0.01	Pass	
4.4'-DDE	mg/kg	< 0.01			0.01	Pass	
4.4'-DDT	mg/kg	< 0.01			0.01	Pass	
7.12-Dimethylbenz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
a-HCH	mg/kg	< 0.01			0.01	Pass	
Acetophenone	mg/kg	< 0.5			0.5	Pass	
Aldrin	mg/kg	< 0.01			0.01	Pass	
Aniline	mg/kg	< 0.5			0.5	Pass	
b-HCH	mg/kg	< 0.01			0.01	Pass	
Benzyl chloride	mg/kg	< 0.5			0.5	Pass	
Bis(2-chloroethoxy)methane	mg/kg	< 0.5			0.5	Pass	
Bis(2-chloroisopropyl)ether	mg/kg	< 0.5			0.5	Pass	
Bis(2-ethylhexyl)phthalate	mg/kg	< 0.5			0.5	Pass	
Butyl benzyl phthalate	mg/kg	< 0.5			0.5	Pass	
d-HCH	mg/kg	< 0.01			0.01	Pass	
Di-n-butyl phthalate	mg/kg	< 0.5			0.5	Pass	
Di-n-octyl phthalate	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.j)acridine	mg/kg	< 0.5			0.5	Pass	
Dibenzofuran	mg/kg	< 0.5			0.5	Pass	
Dieldrin	mg/kg	< 0.01			0.01	Pass	
Diethyl phthalate	mg/kg	< 0.5			0.5	Pass	
Dimethyl phthalate	mg/kg	< 0.5			0.5	Pass	
Dimethylaminoazobenzene	mg/kg	< 0.5			0.5	Pass	
Diphenylamine	mg/kg	< 0.5			0.5	Pass	
Endosulfan I	mg/kg	< 0.01			0.01	Pass	
Endosulfan II	mg/kg	< 0.01			0.01	Pass	
Endosulfan sulphate	mg/kg	< 0.01			0.01	Pass	
Endrin	mg/kg	< 0.01			0.01	Pass	
Endrin aldehyde	mg/kg	< 0.01			0.01	Pass	
Endrin ketone	mg/kg	< 0.01			0.01	Pass	
g-HCH (Lindane)	mg/kg	< 0.01			0.01	Pass	
Heptachlor	mg/kg	< 0.01			0.01	Pass	
Heptachlor epoxide	mg/kg	< 0.01			0.01	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Hexachlorobenzene	mg/kg	< 0.01			0.01	Pass	
Hexachlorobutadiene	mg/kg	< 0.5			0.5	Pass	
Hexachlorocyclopentadiene	mg/kg	< 0.5			0.5	Pass	
Hexachloroethane	mg/kg	< 0.5			0.5	Pass	
Methoxychlor	mg/kg	< 0.01			0.01	Pass	
N-Nitrosodibutylamine	mg/kg	< 0.5			0.5	Pass	
N-Nitrosodipropylamine	mg/kg	< 0.5			0.5	Pass	
N-Nitrosopiperidine	mg/kg	< 0.5			0.5	Pass	
Nitrobenzene	mg/kg	< 0.5			0.5	Pass	
Pentachlorobenzene	mg/kg	< 0.5			0.5	Pass	
Pentachloronitrobenzene	mg/kg	< 0.5			0.5	Pass	
Pentachlorophenol	mg/kg	< 1			1	Pass	
Phenol	mg/kg	< 0.5			0.5	Pass	
Pronamide	mg/kg	< 0.5			0.5	Pass	
Trifluralin	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances- Trace							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 1			1	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 1			1	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 1			1	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/kg	< 1			1	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/kg	< 1			1	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 1			1	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 1			1	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs) - Trace							
Perfluorobutanoic acid (PFBA)	ug/kg	< 1			1	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 1			1	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 1			1	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 1			1	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 1			1	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 1			1	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 1			1	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 1			1	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 1			1	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 1			1	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 1			1	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)- Trace							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 1			1	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 1			1	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 1			1	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 1			1	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 1			1	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 1			1	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 1			1	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 1			1	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 1			1	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/kg	< 1			1	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 1			1	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 1			1	Pass	
LCS - % Recovery							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total Petroleum Hydrocarbons (NZ MfE 1999)							
TPH-SG C7-C36 (Total)	%	103			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons (NZ MfE)							
Acenaphthene	%	103			70-130	Pass	
Acenaphthylene	%	107			70-130	Pass	
Anthracene	%	106			70-130	Pass	
Benz(a)anthracene	%	97			70-130	Pass	
Benzo(a)pyrene	%	92			70-130	Pass	
Benzo(b&j)fluoranthene	%	80			70-130	Pass	
Benzo(g.h.i)perylene	%	79			70-130	Pass	
Benzo(k)fluoranthene	%	86			70-130	Pass	
Chrysene	%	91			70-130	Pass	
Dibenz(a.h)anthracene	%	86			70-130	Pass	
Fluoranthene	%	101			70-130	Pass	
Fluorene	%	119			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	88			70-130	Pass	
Naphthalene	%	117			70-130	Pass	
Phenanthrene	%	81			70-130	Pass	
Pyrene	%	97			70-130	Pass	
LCS - % Recovery							
Metals M7 (NZ MfE)							
Arsenic	%	105			80-120	Pass	
Cadmium	%	107			80-120	Pass	
Chromium	%	103			80-120	Pass	
Copper	%	104			80-120	Pass	
Lead	%	103			80-120	Pass	
Nickel	%	103			80-120	Pass	
Zinc	%	104			80-120	Pass	
LCS - % Recovery							
Volatile Organics (NZ MfE)							
1.1-Dichloroethane	%	103			70-130	Pass	
1.1-Dichloroethene	%	109			70-130	Pass	
1.1.1-Trichloroethane	%	100			70-130	Pass	
1.1.2-Trichloroethane	%	119			70-130	Pass	
1.2-Dibromoethane	%	119			70-130	Pass	
1.2-Dichlorobenzene	%	105			70-130	Pass	
1.2-Dichloroethane	%	115			70-130	Pass	
1.2-Dichloropropane	%	96			70-130	Pass	
1.2.4-Trimethylbenzene	%	98			70-130	Pass	
1.3-Dichlorobenzene	%	100			70-130	Pass	
1.3-Dichloropropane	%	118			70-130	Pass	
1.3.5-Trimethylbenzene	%	94			70-130	Pass	
1.4-Dichlorobenzene	%	101			70-130	Pass	
4-Chlorotoluene	%	94			70-130	Pass	
Benzene	%	83			70-130	Pass	
Bromobenzene	%	115			70-130	Pass	
Bromochloromethane	%	109			70-130	Pass	
Bromodichloromethane	%	101			70-130	Pass	
Bromomethane	%	114			70-130	Pass	
Carbon disulfide	%	81			70-130	Pass	
Carbon Tetrachloride	%	97			70-130	Pass	
Chloroform	%	122			70-130	Pass	
cis-1.2-Dichloroethene	%	123			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
cis-1.3-Dichloropropene	%	102			70-130	Pass	
Dibromochloromethane	%	101			70-130	Pass	
Dibromomethane	%	115			70-130	Pass	
Dichlorodifluoromethane	%	119			70-130	Pass	
Ethylbenzene	%	95			70-130	Pass	
Iodomethane	%	104			70-130	Pass	
Isopropyl benzene (Cumene)	%	106			70-130	Pass	
m&p-Xylenes	%	93			70-130	Pass	
o-Xylene	%	111			70-130	Pass	
Xylenes - Total	%	99			70-130	Pass	
Styrene	%	115			70-130	Pass	
Tetrachloroethene	%	82			70-130	Pass	
Toluene	%	76			70-130	Pass	
trans-1.3-Dichloropropene	%	101			70-130	Pass	
Trichloroethene	%	110			70-130	Pass	
Trichlorofluoromethane	%	122			70-130	Pass	
LCS - % Recovery							
Semivolatile Organics							
1-Chloronaphthalene	%	85			70-130	Pass	
1.2-Dichlorobenzene	%	104			70-130	Pass	
1.2.3-Trichlorobenzene	%	109			70-130	Pass	
1.2.3.4-Tetrachlorobenzene	%	97			70-130	Pass	
1.2.3.5-Tetrachlorobenzene	%	101			70-130	Pass	
1.2.4-Trichlorobenzene	%	105			70-130	Pass	
1.2.4.5-Tetrachlorobenzene	%	97			70-130	Pass	
1.3-Dichlorobenzene	%	102			70-130	Pass	
1.3.5-Trichlorobenzene	%	106			70-130	Pass	
1.4-Dichlorobenzene	%	98			70-130	Pass	
2-Chloronaphthalene	%	100			70-130	Pass	
2-Chlorophenol	%	102			25-130	Pass	
2-Methyl-4.6-dinitrophenol	%	96			25-130	Pass	
2-Methylnaphthalene	%	97			70-130	Pass	
2-Methylphenol (o-Cresol)	%	95			25-130	Pass	
2-Naphthylamine	%	99			70-130	Pass	
2-Nitrophenol	%	84			25-130	Pass	
2.4-Dichlorophenol	%	81			25-130	Pass	
2.4-Dimethylphenol	%	99			25-130	Pass	
2.4.5-Trichlorophenol	%	100			25-130	Pass	
2.4.6-Trichlorophenol	%	84			25-130	Pass	
2.6-Dichlorophenol	%	104			25-130	Pass	
3&4-Methylphenol (m&p-Cresol)	%	88			25-130	Pass	
3-Methylcholanthrene	%	76			70-130	Pass	
4-Aminobiphenyl	%	105			70-130	Pass	
4-Bromophenyl phenyl ether	%	95			70-130	Pass	
4-Chlorophenyl phenyl ether	%	116			70-130	Pass	
4-Nitrophenol	%	102			25-130	Pass	
4.4'-DDD	%	75			70-130	Pass	
4.4'-DDE	%	122			70-130	Pass	
4.4'-DDT	%	118			70-130	Pass	
7.12-Dimethylbenz(a)anthracene	%	109			70-130	Pass	
a-HCH	%	118			70-130	Pass	
Acetophenone	%	98			70-130	Pass	
Aldrin	%	88			70-130	Pass	
b-HCH	%	106			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Benzyl chloride	%	102			70-130	Pass	
Bis(2-chloroethoxy)methane	%	100			70-130	Pass	
Bis(2-chloroisopropyl)ether	%	114			70-130	Pass	
Butyl benzyl phthalate	%	77			70-130	Pass	
d-HCH	%	122			70-130	Pass	
Di-n-butyl phthalate	%	112			70-130	Pass	
Dibenzofuran	%	111			70-130	Pass	
Dieldrin	%	113			70-130	Pass	
Diethyl phthalate	%	115			70-130	Pass	
Dimethyl phthalate	%	125			70-130	Pass	
Diphenylamine	%	98			70-130	Pass	
Endosulfan I	%	103			70-130	Pass	
Endosulfan II	%	112			70-130	Pass	
Endosulfan sulphate	%	93			70-130	Pass	
Endrin	%	85			70-130	Pass	
Endrin aldehyde	%	116			70-130	Pass	
Endrin ketone	%	95			70-130	Pass	
g-HCH (Lindane)	%	119			70-130	Pass	
Heptachlor	%	96			70-130	Pass	
Heptachlor epoxide	%	114			70-130	Pass	
Hexachlorobenzene	%	86			70-130	Pass	
Hexachlorobutadiene	%	94			70-130	Pass	
Hexachlorocyclopentadiene	%	115			70-130	Pass	
Hexachloroethane	%	117			70-130	Pass	
Methoxychlor	%	112			70-130	Pass	
N-Nitrosodibutylamine	%	83			70-130	Pass	
N-Nitrosodipropylamine	%	89			70-130	Pass	
N-Nitrosopiperidine	%	92			70-130	Pass	
Pentachlorobenzene	%	110			70-130	Pass	
Pentachloronitrobenzene	%	104			70-130	Pass	
Pentachlorophenol	%	115			25-130	Pass	
Pronamide	%	94			70-130	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances- Trace							
Perfluorooctane sulfonamide (FOSA)	%	150			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	95			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	66			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	69			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	87			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	87			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	96			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs) - Trace							
Perfluorobutanoic acid (PFBA)	%	90			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	89			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	95			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	110			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	107			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	97			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	98			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	114			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	94			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	93			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	137			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)- Trace							
Perfluorobutanesulfonic acid (PFBS)	%	77			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	65			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	78			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	68			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	88			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	84			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	82			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	95			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	91			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	%	97			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	131			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	100			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1					
Acenaphthene	K24-Fe0054021	NCP	%	82			70-130	Pass	
Acenaphthylene	K24-Fe0054021	NCP	%	94			70-130	Pass	
Anthracene	K24-Fe0054762	NCP	%	89			70-130	Pass	
Benz(a)anthracene	K24-Fe0043972	CP	%	88			70-130	Pass	
Benzo(a)pyrene	K24-Fe0043972	CP	%	88			70-130	Pass	
Benzo(b&j)fluoranthene	K24-Fe0043972	CP	%	87			70-130	Pass	
Benzo(k)fluoranthene	K24-Fe0043972	CP	%	91			70-130	Pass	
Chrysene	K24-Fe0043972	CP	%	107			70-130	Pass	
Dibenz(a.h)anthracene	K24-Fe0054762	NCP	%	73			70-130	Pass	
Fluoranthene	K24-Fe0043972	CP	%	118			70-130	Pass	
Fluorene	K24-Fe0054762	NCP	%	95			70-130	Pass	
Indeno(1.2.3-cd)pyrene	K24-Fe0043972	CP	%	75			70-130	Pass	
Naphthalene	K24-Fe0043972	CP	%	75			70-130	Pass	
Phenanthrene	K24-Fe0054762	NCP	%	95			70-130	Pass	
Pyrene	K24-Fe0043972	CP	%	105			70-130	Pass	
Spike - % Recovery									
Metals M7 (NZ MfE)				Result 1					
Lead	K24-Fe0073063	NCP	%	112			75-125	Pass	
Zinc	K24-Fe0073063	NCP	%	119			75-125	Pass	
Spike - % Recovery									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1					
TPH-SG C7-C36 (Total)	K24-Fe0043973	CP	%	104			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances- Trace				Result 1					
Perfluorooctane sulfonamide (FOSA)	K24-Fe0047253	NCP	%	136			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	K24-Fe0047253	NCP	%	102			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	K24-Fe0047253	NCP	%	64			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	K24-Fe0047253	NCP	%	67			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	K24-Fe0047253	NCP	%	58			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	K24-Fe0047253	NCP	%	89			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	K24-Fe0047253	NCP	%	107			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1					
Perfluorobutanoic acid (PFBA)	K24-Fe0047253	NCP	%	83			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	K24-Fe0047253	NCP	%	86			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	K24-Fe0047253	NCP	%	101			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	K24-Fe0047253	NCP	%	103			50-150	Pass	
Perfluorooctanoic acid (PFOA)	K24-Fe0047253	NCP	%	114			50-150	Pass	
Perfluorononanoic acid (PFNA)	K24-Fe0047253	NCP	%	116			50-150	Pass	
Perfluorodecanoic acid (PFDA)	K24-Fe0047253	NCP	%	97			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	K24-Fe0047253	NCP	%	123			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	K24-Fe0047253	NCP	%	98			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	K24-Fe0047253	NCP	%	95			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	K24-Fe0047253	NCP	%	138			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)- Trace				Result 1					
Perfluorobutanesulfonic acid (PFBS)	K24-Fe0047253	NCP	%	82			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	K24-Fe0047253	NCP	%	65			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	K24-Fe0047253	NCP	%	72			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	K24-Fe0047253	NCP	%	72			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	K24-Fe0047253	NCP	%	80			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	K24-Fe0047253	NCP	%	82			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	K24-Fe0047253	NCP	%	83			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	K24-Fe0047253	NCP	%	99			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	K24-Fe0047253	NCP	%	118			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	K24-Fe0047253	NCP	%	106			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	K24-Fe0047253	NCP	%	92			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	K24-Fe0047253	NCP	%	82			50-150	Pass	
Spike - % Recovery									
Metals M7 (NZ MfE)				Result 1					
Arsenic	K24-Fe0043977	CP	%	109			75-125	Pass	
Cadmium	K24-Fe0043977	CP	%	116			75-125	Pass	
Chromium	K24-Fe0043977	CP	%	114			75-125	Pass	
Copper	K24-Fe0043977	CP	%	117			75-125	Pass	
Nickel	K24-Fe0043977	CP	%	115			75-125	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Volatile Organics (NZ MfE)				Result 1					
1.1-Dichloroethane	K24-Fe0043980	CP	%	92			70-130	Pass	
1.1-Dichloroethene	K24-Fe0043980	CP	%	117			70-130	Pass	
1.1.1-Trichloroethane	K24-Fe0043980	CP	%	95			70-130	Pass	
1.1.2-Trichloroethane	K24-Fe0043980	CP	%	116			70-130	Pass	
1.2-Dibromoethane	K24-Fe0043980	CP	%	118			70-130	Pass	
1.2-Dichlorobenzene	K24-Fe0043980	CP	%	87			70-130	Pass	
1.2-Dichloroethane	K24-Fe0043980	CP	%	111			70-130	Pass	
1.2-Dichloropropane	K24-Fe0043980	CP	%	90			70-130	Pass	
1.2.4-Trimethylbenzene	K24-Fe0043980	CP	%	80			70-130	Pass	
1.3-Dichlorobenzene	K24-Fe0043980	CP	%	80			70-130	Pass	
1.3-Dichloropropane	K24-Fe0043980	CP	%	116			70-130	Pass	
1.3.5-Trimethylbenzene	K24-Fe0043980	CP	%	75			70-130	Pass	
1.4-Dichlorobenzene	K24-Fe0043980	CP	%	82			70-130	Pass	
4-Chlorotoluene	K24-Fe0043980	CP	%	77			70-130	Pass	
Allyl chloride	K24-Fe0043980	CP	%	99			70-130	Pass	
Benzene	K24-Fe0043980	CP	%	78			70-130	Pass	
Bromobenzene	K24-Fe0043980	CP	%	111			70-130	Pass	
Bromochloromethane	K24-Fe0043980	CP	%	121			70-130	Pass	
Bromodichloromethane	K24-Fe0043980	CP	%	97			70-130	Pass	
Bromomethane	K24-Fe0043980	CP	%	87			70-130	Pass	
Carbon disulfide	K24-Fe0043980	CP	%	106			70-130	Pass	
Carbon Tetrachloride	K24-Fe0043980	CP	%	91			70-130	Pass	
Chloroethane	K24-Fe0043980	CP	%	124			70-130	Pass	
Chloroform	K24-Fe0043980	CP	%	118			70-130	Pass	
cis-1.3-Dichloropropene	K24-Fe0043980	CP	%	99			70-130	Pass	
Dibromochloromethane	K24-Fe0043980	CP	%	109			70-130	Pass	
Dichlorodifluoromethane	K24-Fe0043980	CP	%	124			70-130	Pass	
Ethylbenzene	K24-Fe0043980	CP	%	91			70-130	Pass	
Iodomethane	K24-Fe0043980	CP	%	91			70-130	Pass	
Isopropyl benzene (Cumene)	K24-Fe0043980	CP	%	103			70-130	Pass	
Methylene Chloride	K24-Fe0043980	CP	%	111			70-130	Pass	
m&p-Xylenes	K24-Fe0043980	CP	%	90			70-130	Pass	
o-Xylene	K24-Fe0043980	CP	%	108			70-130	Pass	
Xylenes - Total	K24-Fe0043980	CP	%	96			70-130	Pass	
Styrene	K24-Fe0043980	CP	%	111			70-130	Pass	
Tetrachloroethene	K24-Fe0043980	CP	%	81			70-130	Pass	
Toluene	K24-Fe0043980	CP	%	78			70-130	Pass	
trans-1.3-Dichloropropene	K24-Fe0043980	CP	%	97			70-130	Pass	
Trichloroethene	K24-Fe0043980	CP	%	94			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1	Result 2	RPD			
TPH-SG C7-C9	K24-Fe0048163	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
TPH-SG C10-C14	K24-Fe0048163	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
TPH-SG C15-C36	K24-Fe0048163	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TPH-SG C7-C36 (Total)	K24-Fe0048163	NCP	mg/kg	< 35	< 35	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1	Result 2	RPD			
Acenaphthene	K24-Fe0054020	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Acenaphthylene	K24-Fe0054020	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Anthracene	K24-Fe0054020	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benz(a)anthracene	K24-Fe0054020	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(a)pyrene	K24-Fe0054020	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1	Result 2	RPD			
Benzo(b&j)fluoranthene	K24-Fe0054020	NCP	mg/kg	0.05	0.05	7.7	30%	Pass	
Benzo(g.h.i)perylene	K24-Fe0054020	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(k)fluoranthene	K24-Fe0054020	NCP	mg/kg	0.04	0.04	20	30%	Pass	
Chrysene	K24-Fe0054020	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Dibenz(a.h)anthracene	K24-Fe0054020	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Fluoranthene	K24-Fe0054020	NCP	mg/kg	0.04	0.05	39	30%	Fail	Q15
Fluorene	K24-Fe0054020	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	K24-Fe0054020	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Naphthalene	K24-Fe0054020	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Phenanthrene	K24-Fe0054020	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Pyrene	K24-Fe0054020	NCP	mg/kg	0.04	0.05	40	30%	Fail	Q15
Duplicate									
Metals M7 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	K24-Fe0043976	CP	mg/kg	6.1	6.3	3.9	30%	Pass	
Cadmium	K24-Fe0043976	CP	mg/kg	0.15	0.15	1.4	30%	Pass	
Chromium	K24-Fe0043976	CP	mg/kg	47	47	<1	30%	Pass	
Copper	K24-Fe0043976	CP	mg/kg	25	24	1.7	30%	Pass	
Lead	K24-Fe0043976	CP	mg/kg	38	35	7.0	30%	Pass	
Nickel	K24-Fe0043976	CP	mg/kg	31	31	<1	30%	Pass	
Zinc	K24-Fe0043976	CP	mg/kg	68	69	2.2	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	K24-Fe0043976	CP	%	15	15	2.3	30%	Pass	
Duplicate									
Volatile Organics (NZ MfE)				Result 1	Result 2	RPD			
1.1-Dichloroethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.1.1-Trichloroethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.1.1.2-Tetrachloroethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.1.2-Trichloroethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.1.2.2-Tetrachloroethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.2-Dibromoethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.2-Dichloroethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.2-Dichloropropane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.2.3-Trichloropropane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.2.4-Trimethylbenzene	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.3-Dichloropropane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.3.5-Trimethylbenzene	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.4-Dichlorobenzene	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2-Butanone (MEK)	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Chlorotoluene	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Methyl-2-pentanone (MIBK)	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Allyl chloride	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzene	K24-Fe0043976	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Bromobenzene	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Bromochloromethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Bromodichloromethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Bromoform	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Bromomethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Carbon Tetrachloride	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chlorobenzene	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chloroethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chloroform	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
cis-1.2-Dichloroethene	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
cis-1.3-Dichloropropene	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Volatile Organics (NZ MfE)				Result 1	Result 2	RPD			
Dibromochloromethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibromomethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dichlorodifluoromethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Ethylbenzene	K24-Fe0043976	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Isopropyl benzene (Cumene)	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
m&p-Xylenes	K24-Fe0043976	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	K24-Fe0043976	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	K24-Fe0043976	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Tetrachloroethene	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Toluene	K24-Fe0043976	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
trans-1.2-Dichloroethene	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
trans-1.3-Dichloropropene	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Trichloroethene	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Trichlorofluoromethane	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Vinyl chloride	K24-Fe0043976	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Semivolatile Organics				Result 1	Result 2	RPD			
2-Chlorophenol	K24-Fe0054020	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2-Methyl-4.6-dinitrophenol	K24-Fe0054020	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Methylphenol (o-Cresol)	K24-Fe0054020	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
2-Nitrophenol	K24-Fe0054020	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4-Dichlorophenol	K24-Fe0054020	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dimethylphenol	K24-Fe0054020	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dinitrophenol	K24-Fe0054020	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
2.4.5-Trichlorophenol	K24-Fe0054020	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4.6-Trichlorophenol	K24-Fe0054020	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.6-Dichlorophenol	K24-Fe0054020	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
3&4-Methylphenol (m&p-Cresol)	K24-Fe0054020	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
4-Chloro-3-methylphenol	K24-Fe0054020	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
4-Nitrophenol	K24-Fe0054020	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
4.4'-DDD	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4.4'-DDE	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4.4'-DDT	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
a-HCH	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Aldrin	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
b-HCH	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
d-HCH	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Dieldrin	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan I	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan II	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan sulphate	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin aldehyde	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin ketone	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
g-HCH (Lindane)	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor epoxide	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Hexachlorobenzene	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Methoxychlor	K24-Fe0054020	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Pentachlorophenol	K24-Fe0054020	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Phenol	K24-Fe0054020	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances- Trace				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)- Trace				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	K24-Fe0047252	NCP	ug/kg	< 1	< 1	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
N16	Analysis performed by Eurofins Environment Testing Australia
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Katyana Gausel	Analytical Services Manager
Jonathon Angell	Senior Analyst-PFAS
Raymond Siu	Senior Analyst-Metal
Raymond Siu	Senior Analyst-Organic
Raymond Siu	Senior Analyst-Volatile

Raymond Siu
Senior Instrument Chemist (Key Technical Personnel)

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please click here.

Williamson Water and Land Advisory Limited
Unit 10 | 1 Putaki Drive
Kumeu
Auckland 0810

ACCREDITED TESTING LABORATORY

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

Attention: **SHANE MOORE**

Report **1072988-S**
Project name
Project ID WWLA 1078
Received Date Feb 28, 2024

Client Sample ID			**AH03 1.5-1.6**	**AH03 1.6-1.7**	**AH03 2.0-2.1**	**AH04 2.1-2.2**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**K24-Fe0069672**	**K24-Fe0069673**	**K24-Fe0069674**	**K24-Fe0069675**
Date Sampled			**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture[N16]	1	%	33	31	24	13
PFASs Summations						
Sum (PFHxS + PFOS)*[N16]	0.1	ug/kg	< 1	-	-	< 1
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*[N16]	0.1	ug/kg	< 1	-	-	< 1
Sum of PFASs (n=30)*[N16]	0.5	ug/kg	< 1	-	-	< 1
Sum of US EPA PFAS (PFOS + PFOA)*[N16]	0.1	ug/kg	< 1	-	-	< 1
Sum of WA DWER PFAS (n=10)*[N16]	0.5	ug/kg	< 1	-	-	< 1
Perfluoroalkyl sulfonamido substances- Trace						
Perfluorooctane sulfonamide (FOSA)[N11, N16]	0.5	ug/kg	< 1	-	-	< 1
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11, N16]	0.5	ug/kg	< 1	-	-	< 1
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11, N16]	0.5	ug/kg	< 1	-	-	< 1
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)[N11, N16]	0.5	ug/kg	< 1	-	-	< 1
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)[N11, N16]	0.5	ug/kg	< 1	-	-	< 1
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11, N16]	0.5	ug/kg	< 1	-	-	< 1
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11, N16]	0.5	ug/kg	< 1	-	-	< 1
13C8-FOSA (surr.)[N16]	1	%	91	-	-	102
D3-N-MeFOSA (surr.)[N16]	1	%	92	-	-	112
D5-N-EtFOSA (surr.)[N16]	1	%	76	-	-	78
D7-N-MeFOSE (surr.)[N16]	1	%	112	-	-	106
D9-N-EtFOSE (surr.)[N16]	1	%	101	-	-	114
D5-N-EtFOSAA (surr.)[N16]	1	%	81	-	-	95
D3-N-MeFOSAA (surr.)[N16]	1	%	94	-	-	113
Perfluoroalkyl carboxylic acids (PFCAs) - Trace						
Perfluorobutanoic acid (PFBA)[N11, N16]	0.5	ug/kg	< 1	-	-	< 1
Perfluoropentanoic acid (PFPeA)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluorohexanoic acid (PFHxA)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluoroheptanoic acid (PFHpA)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluorooctanoic acid (PFOA)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluorononanoic acid (PFNA)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluorodecanoic acid (PFDA)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluorotridecanoic acid (PFTrDA)[N15, N16]	0.1	ug/kg	< 1	-	-	< 1

Client Sample ID			AH03 1.5-1.6	AH03 1.6-1.7	AH03 2.0-2.1	AH04 2.1-2.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K24-Fe0069672	K24-Fe0069673	K24-Fe0069674	K24-Fe0069675
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs) - Trace						
Perfluoroundecanoic acid (PFUnDA)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluorododecanoic acid (PFDoDA)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluorotetradecanoic acid (PFTeDA)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
13C4-PFBA (surr.)[N16]	1	%	90	-	-	93
13C5-PFPeA (surr.)[N16]	1	%	112	-	-	118
13C5-PFHxA (surr.)[N16]	1	%	97	-	-	91
13C4-PFHpA (surr.)[N16]	1	%	124	-	-	137
13C8-PFOA (surr.)[N16]	1	%	120	-	-	107
13C5-PFNA (surr.)[N16]	1	%	125	-	-	126
13C6-PFDA (surr.)[N16]	1	%	137	-	-	128
13C2-PFUnDA (surr.)[N16]	1	%	107	-	-	107
13C2-PFDoDA (surr.)[N16]	1	%	119	-	-	119
13C2-PFTeDA (surr.)[N16]	1	%	140	-	-	137
Perfluoroalkyl sulfonic acids (PFSAs)- Trace						
Perfluorobutanesulfonic acid (PFBS)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluorononanesulfonic acid (PFNS)[N15, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluoropropanesulfonic acid (PFPrS)[N15, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluoropentanesulfonic acid (PFPeS)[N15, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluorohexanesulfonic acid (PFHxS)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluoroheptanesulfonic acid (PFHpS)[N15, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluorooctanesulfonic acid (PFOS)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
Perfluorodecanesulfonic acid (PFDS)[N15, N16]	0.1	ug/kg	< 1	-	-	< 1
13C3-PFBS (surr.)[N16]	1	%	133	-	-	120
18O2-PFHxS (surr.)[N16]	1	%	130	-	-	114
13C8-PFOS (surr.)[N16]	1	%	93	-	-	100
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)[N11, N16]	0.5	ug/kg	< 1	-	-	< 1
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11, N16]	0.1	ug/kg	< 1	-	-	< 1
13C2-4:2 FTSA (surr.)[N16]	1	%	75	-	-	51
13C2-6:2 FTSA (surr.)[N16]	1	%	91	-	-	77
13C2-8:2 FTSA (surr.)[N16]	1	%	73	-	-	76
13C2-10:2 FTSA (surr.)[N16]	1	%	102	-	-	97
Volatile Organics (NZ MfE)						
1.1-Dichloroethane	0.5	mg/kg	-	< 0.5	-	-
1.1-Dichloroethene	0.5	mg/kg	-	< 0.5	-	-
1.1.1-Trichloroethane	0.5	mg/kg	-	< 0.5	-	-
1.1.1.2-Tetrachloroethane	0.5	mg/kg	-	< 0.5	-	-
1.1.2-Trichloroethane	0.5	mg/kg	-	< 0.5	-	-
1.1.2.2-Tetrachloroethane	0.5	mg/kg	-	< 0.5	-	-
1.2-Dibromoethane	0.5	mg/kg	-	< 0.5	-	-
1.2-Dichlorobenzene	0.5	mg/kg	-	< 0.5	-	-
1.2-Dichloroethane	0.5	mg/kg	-	< 0.5	-	-
1.2-Dichloropropane	0.5	mg/kg	-	< 0.5	-	-
1.2.3-Trichloropropane	0.5	mg/kg	-	< 0.5	-	-

Client Sample ID			AH03 1.5-1.6	AH03 1.6-1.7	AH03 2.0-2.1	AH04 2.1-2.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K24-Fe0069672	K24-Fe0069673	K24-Fe0069674	K24-Fe0069675
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Volatile Organics (NZ MfE)						
1.2.4-Trimethylbenzene	0.5	mg/kg	-	< 0.5	-	-
1.3-Dichlorobenzene	0.5	mg/kg	-	< 0.5	-	-
1.3-Dichloropropane	0.5	mg/kg	-	< 0.5	-	-
1.3.5-Trimethylbenzene	0.5	mg/kg	-	< 0.5	-	-
1.4-Dichlorobenzene	0.5	mg/kg	-	< 0.5	-	-
2-Butanone (MEK)	0.5	mg/kg	-	< 0.5	-	-
2-Propanone (Acetone)	0.5	mg/kg	-	< 0.5	-	-
4-Chlorotoluene	0.5	mg/kg	-	< 0.5	-	-
4-Methyl-2-pentanone (MIBK)	0.5	mg/kg	-	< 0.5	-	-
Allyl chloride	0.5	mg/kg	-	< 0.5	-	-
Benzene	0.1	mg/kg	-	< 0.1	-	-
Bromobenzene	0.5	mg/kg	-	< 0.5	-	-
Bromochloromethane	0.5	mg/kg	-	< 0.5	-	-
Bromodichloromethane	0.5	mg/kg	-	< 0.5	-	-
Bromoform	0.5	mg/kg	-	< 0.5	-	-
Bromomethane	0.5	mg/kg	-	< 0.5	-	-
Carbon disulfide	0.5	mg/kg	-	< 0.5	-	-
Carbon Tetrachloride	0.5	mg/kg	-	< 0.5	-	-
Chlorobenzene	0.5	mg/kg	-	< 0.5	-	-
Chloroethane	0.5	mg/kg	-	< 0.5	-	-
Chloroform	0.5	mg/kg	-	< 0.5	-	-
Chloromethane	0.5	mg/kg	-	< 0.5	-	-
cis-1.2-Dichloroethene	0.5	mg/kg	-	< 0.5	-	-
cis-1.3-Dichloropropene	0.5	mg/kg	-	< 0.5	-	-
Dibromochloromethane	0.5	mg/kg	-	< 0.5	-	-
Dibromomethane	0.5	mg/kg	-	< 0.5	-	-
Dichlorodifluoromethane	0.5	mg/kg	-	< 0.5	-	-
Ethylbenzene	0.1	mg/kg	-	< 0.1	-	-
Iodomethane	0.5	mg/kg	-	< 0.5	-	-
Isopropyl benzene (Cumene)	0.5	mg/kg	-	< 0.5	-	-
Methylene Chloride	0.5	mg/kg	-	< 0.5	-	-
m&p-Xylenes	0.2	mg/kg	-	< 0.2	-	-
o-Xylene	0.1	mg/kg	-	< 0.1	-	-
Xylenes - Total	0.3	mg/kg	-	< 0.3	-	-
Styrene	0.5	mg/kg	-	< 0.5	-	-
Tetrachloroethene	0.5	mg/kg	-	< 0.5	-	-
Toluene	0.1	mg/kg	-	< 0.1	-	-
trans-1.2-Dichloroethene	0.5	mg/kg	-	< 0.5	-	-
trans-1.3-Dichloropropene	0.5	mg/kg	-	< 0.5	-	-
Trichloroethene	0.5	mg/kg	-	< 0.5	-	-
Trichlorofluoromethane	0.5	mg/kg	-	< 0.5	-	-
Vinyl chloride	0.5	mg/kg	-	< 0.5	-	-
Total MAH*	0.5	mg/kg	-	< 0.5	-	-
4-Bromofluorobenzene (surr.)	1	%	-	INT	-	-
Toluene-d8 (surr.)	1	%	-	INT	-	-

Client Sample ID			AH03 1.5-1.6	AH03 1.6-1.7	AH03 2.0-2.1	AH04 2.1-2.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K24-Fe0069672	K24-Fe0069673	K24-Fe0069674	K24-Fe0069675
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Semivolatile Organics						
1-Chloronaphthalene	0.5	mg/kg	-	< 0.5	-	-
Total PAH*	0.1	mg/kg	-	< 0.1	-	-
1-Naphthylamine	0.5	mg/kg	-	< 0.5	-	-
1.2-Dichlorobenzene	0.5	mg/kg	-	< 0.5	-	-
1.2.3-Trichlorobenzene	0.5	mg/kg	-	< 0.5	-	-
1.2.3.4-Tetrachlorobenzene	0.5	mg/kg	-	< 0.5	-	-
1.2.3.5-Tetrachlorobenzene	0.5	mg/kg	-	< 0.5	-	-
1.2.4-Trichlorobenzene	0.5	mg/kg	-	< 0.5	-	-
1.2.4.5-Tetrachlorobenzene	0.5	mg/kg	-	< 0.5	-	-
1.3-Dichlorobenzene	0.5	mg/kg	-	< 0.5	-	-
1.3.5-Trichlorobenzene	0.5	mg/kg	-	< 0.5	-	-
1.4-Dichlorobenzene	0.5	mg/kg	-	< 0.5	-	-
2-Chloronaphthalene	0.5	mg/kg	-	< 0.5	-	-
2-Chlorophenol	0.5	mg/kg	-	< 0.5	-	-
2-Fluorobiphenyl (surr.)	1	%	-	77	-	-
2-Methyl-4.6-dinitrophenol	5	mg/kg	-	< 5	-	-
2-Methylnaphthalene	0.5	mg/kg	-	< 0.5	-	-
2-Methylphenol (o-Cresol)	0.2	mg/kg	-	< 0.2	-	-
2-Naphthylamine	0.5	mg/kg	-	< 0.5	-	-
2-Nitroaniline	0.5	mg/kg	-	< 0.5	-	-
2-Nitrophenol	1	mg/kg	-	< 1	-	-
2-Picoline	0.5	mg/kg	-	< 0.5	-	-
2.3.4.6-Tetrachlorophenol	5	mg/kg	-	< 5	-	-
2.4-Dichlorophenol	0.5	mg/kg	-	< 0.5	-	-
2.4-Dimethylphenol	0.5	mg/kg	-	< 0.5	-	-
2.4-Dinitrophenol	5	mg/kg	-	< 5	-	-
2.4-Dinitrotoluene	0.5	mg/kg	-	< 0.5	-	-
2.4.5-Trichlorophenol	1	mg/kg	-	< 1	-	-
2.4.6-Tribromophenol (surr.)	1	%	-	80	-	-
2.4.6-Trichlorophenol	1	mg/kg	-	< 1	-	-
2.6-Dichlorophenol	0.5	mg/kg	-	< 0.5	-	-
2.6-Dinitrotoluene	0.5	mg/kg	-	< 0.5	-	-
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	-	< 0.4	-	-
3-Methylcholanthrene	0.5	mg/kg	-	< 0.5	-	-
3.3'-Dichlorobenzidine	0.5	mg/kg	-	< 0.5	-	-
4-Aminobiphenyl	0.5	mg/kg	-	0.7	-	-
4-Bromophenyl phenyl ether	0.5	mg/kg	-	< 0.5	-	-
4-Chloro-3-methylphenol	1	mg/kg	-	< 1	-	-
4-Chlorophenyl phenyl ether	0.5	mg/kg	-	< 0.5	-	-
4-Nitrophenol	5	mg/kg	-	< 5	-	-
4.4'-DDD	0.01	mg/kg	-	< 0.01	-	-
4.4'-DDE	0.01	mg/kg	-	< 0.01	-	-
4.4'-DDT	0.01	mg/kg	-	< 0.01	-	-
7.12-Dimethylbenz(a)anthracene	0.5	mg/kg	-	< 0.5	-	-
a-HCH	0.01	mg/kg	-	< 0.01	-	-
Acenaphthene	0.03	mg/kg	-	< 0.03	-	-
Acenaphthylene	0.03	mg/kg	-	< 0.03	-	-
Acetophenone	0.5	mg/kg	-	< 0.5	-	-
Aldrin	0.01	mg/kg	-	< 0.01	-	-

Client Sample ID			AH03 1.5-1.6	AH03 1.6-1.7	AH03 2.0-2.1	AH04 2.1-2.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K24-Fe0069672	K24-Fe0069673	K24-Fe0069674	K24-Fe0069675
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Semivolatile Organics						
Aniline	0.5	mg/kg	-	0.7	-	-
Anthracene	0.03	mg/kg	-	< 0.03	-	-
b-HCH	0.01	mg/kg	-	< 0.01	-	-
Benz(a)anthracene	0.03	mg/kg	-	< 0.03	-	-
Benzo(a)pyrene	0.03	mg/kg	-	< 0.03	-	-
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	-	< 0.03	-	-
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	-	0.04	-	-
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	-	0.08	-	-
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	-	< 0.03	-	-
Benzo(g.h.i)perylene	0.03	mg/kg	-	< 0.03	-	-
Benzo(k)fluoranthene	0.03	mg/kg	-	< 0.03	-	-
Benzyl chloride	0.5	mg/kg	-	< 0.5	-	-
Bis(2-chloroethoxy)methane	0.5	mg/kg	-	< 0.5	-	-
Bis(2-chloroisopropyl)ether	0.5	mg/kg	-	< 0.5	-	-
Bis(2-ethylhexyl)phthalate	0.5	mg/kg	-	< 0.5	-	-
Butyl benzyl phthalate	0.5	mg/kg	-	< 0.5	-	-
Chrysene	0.03	mg/kg	-	< 0.03	-	-
d-HCH	0.01	mg/kg	-	< 0.01	-	-
Di-n-butyl phthalate	0.5	mg/kg	-	< 0.5	-	-
Di-n-octyl phthalate	0.5	mg/kg	-	< 0.5	-	-
Dibenz(a.h)anthracene	0.03	mg/kg	-	< 0.03	-	-
Dibenz(a.j)acridine	0.5	mg/kg	-	< 0.5	-	-
Dibenzofuran	0.5	mg/kg	-	< 0.5	-	-
Dieldrin	0.01	mg/kg	-	< 0.01	-	-
Diethyl phthalate	0.5	mg/kg	-	< 0.5	-	-
Dimethyl phthalate	0.5	mg/kg	-	< 0.5	-	-
Dimethylaminoazobenzene	0.5	mg/kg	-	< 0.5	-	-
Diphenylamine	0.5	mg/kg	-	< 0.5	-	-
Endosulfan I	0.01	mg/kg	-	< 0.01	-	-
Endosulfan II	0.01	mg/kg	-	< 0.01	-	-
Endosulfan sulphate	0.01	mg/kg	-	< 0.01	-	-
Endrin	0.01	mg/kg	-	< 0.01	-	-
Endrin aldehyde	0.01	mg/kg	-	< 0.01	-	-
Endrin ketone	0.01	mg/kg	-	< 0.01	-	-
Fluoranthene	0.03	mg/kg	-	< 0.03	-	-
Fluorene	0.03	mg/kg	-	< 0.03	-	-
g-HCH (Lindane)	0.01	mg/kg	-	< 0.01	-	-
Heptachlor	0.01	mg/kg	-	< 0.01	-	-
Heptachlor epoxide	0.01	mg/kg	-	< 0.01	-	-
Hexachlorobenzene	0.01	mg/kg	-	< 0.01	-	-
Hexachlorobutadiene	0.5	mg/kg	-	< 0.5	-	-
Hexachlorocyclopentadiene	0.5	mg/kg	-	< 0.5	-	-
Hexachloroethane	0.5	mg/kg	-	< 0.5	-	-
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	-	< 0.03	-	-
Methoxychlor	0.01	mg/kg	-	< 0.01	-	-
N-Nitrosodibutylamine	0.5	mg/kg	-	< 0.5	-	-
N-Nitrosodipropylamine	0.5	mg/kg	-	< 0.5	-	-
N-Nitrosopiperidine	0.5	mg/kg	-	< 0.5	-	-
Naphthalene	0.1	mg/kg	-	< 0.1	-	-

Client Sample ID			AH03 1.5-1.6	AH03 1.6-1.7	AH03 2.0-2.1	AH04 2.1-2.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K24-Fe0069672	K24-Fe0069673	K24-Fe0069674	K24-Fe0069675
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Semivolatile Organics						
Nitrobenzene	0.5	mg/kg	-	< 0.5	-	-
Nitrobenzene-d5 (surr.)	1	%	-	81	-	-
Pentachlorobenzene	0.5	mg/kg	-	< 0.5	-	-
Pentachloronitrobenzene	0.5	mg/kg	-	< 0.5	-	-
Pentachlorophenol	1	mg/kg	-	< 1	-	-
Phenanthrene	0.03	mg/kg	-	< 0.03	-	-
Phenol	0.5	mg/kg	-	< 0.5	-	-
Phenol-d6 (surr.)	1	%	-	88	-	-
Pronamide	0.5	mg/kg	-	< 0.5	-	-
Pyrene	0.03	mg/kg	-	< 0.03	-	-
Trifluralin	0.5	mg/kg	-	< 0.5	-	-
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	-	-	< 5	-
TPH-SG C10-C14	10	mg/kg	-	-	< 10	-
TPH-SG C15-C36	20	mg/kg	-	-	< 20	-
TPH-SG C7-C36 (Total)	35	mg/kg	-	-	< 35	-
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	-	-	< 0.03	-
Acenaphthylene	0.03	mg/kg	-	-	< 0.03	-
Anthracene	0.03	mg/kg	-	-	< 0.03	-
Benz(a)anthracene	0.03	mg/kg	-	-	< 0.03	-
Benzo(a)pyrene	0.03	mg/kg	-	-	< 0.03	-
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	-	-	< 0.03	-
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	-	-	0.04	-
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	-	-	0.08	-
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	-	-	< 0.03	-
Benzo(g.h.i)perylene	0.03	mg/kg	-	-	< 0.03	-
Benzo(k)fluoranthene	0.03	mg/kg	-	-	< 0.03	-
Chrysene	0.03	mg/kg	-	-	< 0.03	-
Dibenz(a.h)anthracene	0.03	mg/kg	-	-	< 0.03	-
Fluoranthene	0.03	mg/kg	-	-	< 0.03	-
Fluorene	0.03	mg/kg	-	-	< 0.03	-
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	-	-	< 0.03	-
Naphthalene	0.1	mg/kg	-	-	< 0.1	-
Phenanthrene	0.03	mg/kg	-	-	< 0.03	-
Pyrene	0.03	mg/kg	-	-	< 0.03	-
Total PAH*	0.1	mg/kg	-	-	< 0.1	-
p-Terphenyl-d14 (surr.)	1	%	-	-	92	-
2-Fluorobiphenyl (surr.)	1	%	-	-	79	-
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	-	-	6.6	-
Cadmium	0.01	mg/kg	-	-	0.03	-
Chromium	0.1	mg/kg	-	-	12	-
Copper	0.1	mg/kg	-	-	7.1	-
Lead	0.1	mg/kg	-	-	22	-
Nickel	0.1	mg/kg	-	-	5.4	-
Zinc	5	mg/kg	-	-	15	-

Client Sample ID			AH04 2.4-2.5	AH04 3.2-3.3
Sample Matrix			Soil	Soil
Eurofins Sample No.			K24-Fe0069676	K24-Fe0069677
Date Sampled			Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit		
Sample Properties				
% Moisture[N16]	1	%	12	29
Volatile Organics (NZ MfE)				
1.1-Dichloroethane	0.5	mg/kg	< 0.5	-
1.1-Dichloroethene	0.5	mg/kg	< 0.5	-
1.1.1-Trichloroethane	0.5	mg/kg	< 0.5	-
1.1.1.2-Tetrachloroethane	0.5	mg/kg	< 0.5	-
1.1.2-Trichloroethane	0.5	mg/kg	< 0.5	-
1.1.2.2-Tetrachloroethane	0.5	mg/kg	< 0.5	-
1.2-Dibromoethane	0.5	mg/kg	< 0.5	-
1.2-Dichlorobenzene	0.5	mg/kg	< 0.5	-
1.2-Dichloroethane	0.5	mg/kg	< 0.5	-
1.2-Dichloropropane	0.5	mg/kg	< 0.5	-
1.2.3-Trichloropropane	0.5	mg/kg	< 0.5	-
1.2.4-Trimethylbenzene	0.5	mg/kg	< 0.5	-
1.3-Dichlorobenzene	0.5	mg/kg	< 0.5	-
1.3-Dichloropropane	0.5	mg/kg	< 0.5	-
1.3.5-Trimethylbenzene	0.5	mg/kg	< 0.5	-
1.4-Dichlorobenzene	0.5	mg/kg	< 0.5	-
2-Butanone (MEK)	0.5	mg/kg	< 0.5	-
2-Propanone (Acetone)	0.5	mg/kg	< 0.5	-
4-Chlorotoluene	0.5	mg/kg	< 0.5	-
4-Methyl-2-pentanone (MIBK)	0.5	mg/kg	< 0.5	-
Allyl chloride	0.5	mg/kg	< 0.5	-
Benzene	0.1	mg/kg	< 0.1	-
Bromobenzene	0.5	mg/kg	< 0.5	-
Bromochloromethane	0.5	mg/kg	< 0.5	-
Bromodichloromethane	0.5	mg/kg	< 0.5	-
Bromoform	0.5	mg/kg	< 0.5	-
Bromomethane	0.5	mg/kg	< 0.5	-
Carbon disulfide	0.5	mg/kg	< 0.5	-
Carbon Tetrachloride	0.5	mg/kg	< 0.5	-
Chlorobenzene	0.5	mg/kg	< 0.5	-
Chloroethane	0.5	mg/kg	< 0.5	-
Chloroform	0.5	mg/kg	< 0.5	-
Chloromethane	0.5	mg/kg	< 0.5	-
cis-1.2-Dichloroethene	0.5	mg/kg	< 0.5	-
cis-1.3-Dichloropropene	0.5	mg/kg	< 0.5	-
Dibromochloromethane	0.5	mg/kg	< 0.5	-
Dibromomethane	0.5	mg/kg	< 0.5	-
Dichlorodifluoromethane	0.5	mg/kg	< 0.5	-
Ethylbenzene	0.1	mg/kg	< 0.1	-
Iodomethane	0.5	mg/kg	< 0.5	-
Isopropyl benzene (Cumene)	0.5	mg/kg	< 0.5	-
Methylene Chloride	0.5	mg/kg	< 0.5	-
m&p-Xylenes	0.2	mg/kg	< 0.2	-
o-Xylene	0.1	mg/kg	< 0.1	-
Xylenes - Total	0.3	mg/kg	< 0.3	-
Styrene	0.5	mg/kg	< 0.5	-
Tetrachloroethene	0.5	mg/kg	< 0.5	-

Client Sample ID			AH04 2.4-2.5	AH04 3.2-3.3
Sample Matrix			Soil	Soil
Eurofins Sample No.			K24-Fe0069676	K24-Fe0069677
Date Sampled			Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit		
Volatile Organics (NZ MfE)				
Toluene	0.1	mg/kg	< 0.1	-
trans-1.2-Dichloroethene	0.5	mg/kg	< 0.5	-
trans-1.3-Dichloropropene	0.5	mg/kg	< 0.5	-
Trichloroethene	0.5	mg/kg	< 0.5	-
Trichlorofluoromethane	0.5	mg/kg	< 0.5	-
Vinyl chloride	0.5	mg/kg	< 0.5	-
Total MAH*	0.5	mg/kg	< 0.5	-
4-Bromofluorobenzene (surr.)	1	%	144	-
Toluene-d8 (surr.)	1	%	98	-
Semivolatile Organics				
Comments			G01	
1-Chloronaphthalene	0.5	mg/kg	< 0.5	-
Total PAH*	0.1	mg/kg	< 0.3	-
1-Naphthylamine	0.5	mg/kg	< 5	-
1.2-Dichlorobenzene	0.5	mg/kg	< 5	-
1.2.3-Trichlorobenzene	0.5	mg/kg	< 5	-
1.2.3.4-Tetrachlorobenzene	0.5	mg/kg	< 5	-
1.2.3.5-Tetrachlorobenzene	0.5	mg/kg	< 5	-
1.2.4-Trichlorobenzene	0.5	mg/kg	< 5	-
1.2.4.5-Tetrachlorobenzene	0.5	mg/kg	< 5	-
1.3-Dichlorobenzene	0.5	mg/kg	< 5	-
1.3.5-Trichlorobenzene	0.5	mg/kg	< 5	-
1.4-Dichlorobenzene	0.5	mg/kg	< 5	-
2-Chloronaphthalene	0.5	mg/kg	< 0.5	-
2-Chlorophenol	0.5	mg/kg	< 2	-
2-Fluorobiphenyl (surr.)	1	%	83	-
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5	-
2-Methylnaphthalene	0.5	mg/kg	< 0.5	-
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 2	-
2-Naphthylamine	0.5	mg/kg	< 5	-
2-Nitroaniline	0.5	mg/kg	< 5	-
2-Nitrophenol	1	mg/kg	< 2	-
2-Picoline	0.5	mg/kg	< 5	-
2.3.4.6-Tetrachlorophenol	5	mg/kg	< 5	-
2.4-Dichlorophenol	0.5	mg/kg	< 2	-
2.4-Dimethylphenol	0.5	mg/kg	< 2	-
2.4-Dinitrophenol	5	mg/kg	< 5	-
2.4-Dinitrotoluene	0.5	mg/kg	< 5	-
2.4.5-Trichlorophenol	1	mg/kg	< 2	-
2.4.6-Tribromophenol (surr.)	1	%	INT	-
2.4.6-Trichlorophenol	1	mg/kg	< 2	-
2.6-Dichlorophenol	0.5	mg/kg	< 2	-
2.6-Dinitrotoluene	0.5	mg/kg	< 5	-
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 2	-
3-Methylcholanthrene	0.5	mg/kg	< 0.5	-
3.3'-Dichlorobenzidine	0.5	mg/kg	< 5	-
4-Aminobiphenyl	0.5	mg/kg	< 5	-
4-Bromophenyl phenyl ether	0.5	mg/kg	< 5	-
4-Chloro-3-methylphenol	1	mg/kg	< 2	-

Client Sample ID			AH04 2.4-2.5	AH04 3.2-3.3
Sample Matrix			Soil	Soil
Eurofins Sample No.			K24-Fe0069676	K24-Fe0069677
Date Sampled			Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit		
Semivolatile Organics				
4-Chlorophenyl phenyl ether	0.5	mg/kg	< 5	-
4-Nitrophenol	5	mg/kg	< 5	-
4.4'-DDD	0.01	mg/kg	< 0.1	-
4.4'-DDE	0.01	mg/kg	< 0.1	-
4.4'-DDT	0.01	mg/kg	< 0.1	-
7.12-Dimethylbenz(a)anthracene	0.5	mg/kg	< 0.5	-
a-HCH	0.01	mg/kg	< 0.1	-
Acenaphthene	0.03	mg/kg	< 0.3	-
Acenaphthylene	0.03	mg/kg	< 0.3	-
Acetophenone	0.5	mg/kg	< 5	-
Aldrin	0.01	mg/kg	< 0.1	-
Aniline	0.5	mg/kg	< 5	-
Anthracene	0.03	mg/kg	< 0.3	-
b-HCH	0.01	mg/kg	< 0.1	-
Benz(a)anthracene	0.03	mg/kg	< 0.3	-
Benzo(a)pyrene	0.03	mg/kg	< 0.3	-
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.3	-
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.4	-
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.8	-
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.3	-
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.3	-
Benzo(k)fluoranthene	0.03	mg/kg	< 0.3	-
Benzyl chloride	0.5	mg/kg	< 5	-
Bis(2-chloroethoxy)methane	0.5	mg/kg	< 5	-
Bis(2-chloroisopropyl)ether	0.5	mg/kg	< 5	-
Bis(2-ethylhexyl)phthalate	0.5	mg/kg	< 5	-
Butyl benzyl phthalate	0.5	mg/kg	< 5	-
Chrysene	0.03	mg/kg	< 0.3	-
d-HCH	0.01	mg/kg	< 0.1	-
Di-n-butyl phthalate	0.5	mg/kg	< 5	-
Di-n-octyl phthalate	0.5	mg/kg	< 5	-
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.3	-
Dibenz(a.j)acridine	0.5	mg/kg	< 0.5	-
Dibenzofuran	0.5	mg/kg	< 5	-
Dieldrin	0.01	mg/kg	< 0.1	-
Diethyl phthalate	0.5	mg/kg	< 5	-
Dimethyl phthalate	0.5	mg/kg	< 5	-
Dimethylaminoazobenzene	0.5	mg/kg	< 5	-
Diphenylamine	0.5	mg/kg	< 5	-
Endosulfan I	0.01	mg/kg	< 0.1	-
Endosulfan II	0.01	mg/kg	< 0.1	-
Endosulfan sulphate	0.01	mg/kg	< 0.1	-
Endrin	0.01	mg/kg	< 0.1	-
Endrin aldehyde	0.01	mg/kg	< 0.1	-
Endrin ketone	0.01	mg/kg	< 0.1	-
Fluoranthene	0.03	mg/kg	< 0.3	-
Fluorene	0.03	mg/kg	< 0.3	-
g-HCH (Lindane)	0.01	mg/kg	< 0.1	-
Heptachlor	0.01	mg/kg	< 0.1	-

Client Sample ID			AH04 2.4-2.5	AH04 3.2-3.3
Sample Matrix			Soil	Soil
Eurofins Sample No.			K24-Fe0069676	K24-Fe0069677
Date Sampled			Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit		
Semivolatile Organics				
Heptachlor epoxide	0.01	mg/kg	< 0.1	-
Hexachlorobenzene	0.01	mg/kg	< 5	-
Hexachlorobutadiene	0.5	mg/kg	< 5	-
Hexachlorocyclopentadiene	0.5	mg/kg	< 5	-
Hexachloroethane	0.5	mg/kg	< 5	-
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.3	-
Methoxychlor	0.01	mg/kg	< 0.1	-
N-Nitrosodibutylamine	0.5	mg/kg	< 5	-
N-Nitrosodipropylamine	0.5	mg/kg	< 5	-
N-Nitrosopiperidine	0.5	mg/kg	< 5	-
Naphthalene	0.1	mg/kg	< 0.3	-
Nitrobenzene	0.5	mg/kg	< 5	-
Nitrobenzene-d5 (surr.)	1	%	79	-
Pentachlorobenzene	0.5	mg/kg	< 5	-
Pentachloronitrobenzene	0.5	mg/kg	< 5	-
Pentachlorophenol	1	mg/kg	< 2	-
Phenanthrene	0.03	mg/kg	< 0.3	-
Phenol	0.5	mg/kg	< 2	-
Phenol-d6 (surr.)	1	%	79	-
Pronamide	0.5	mg/kg	< 5	-
Pyrene	0.03	mg/kg	< 0.3	-
Trifluralin	0.5	mg/kg	< 5	-
Total Petroleum Hydrocarbons (NZ MfE 1999)				
TPH-SG C7-C9	5	mg/kg	< 5	< 5
TPH-SG C10-C14	10	mg/kg	< 10	< 10
TPH-SG C15-C36	20	mg/kg	< 20	< 20
TPH-SG C7-C36 (Total)	35	mg/kg	< 35	< 35
Polycyclic Aromatic Hydrocarbons (NZ MfE)				
Comments			G01	
Acenaphthene	0.03	mg/kg	< 0.3	< 0.03
Acenaphthylene	0.03	mg/kg	< 0.3	< 0.03
Anthracene	0.03	mg/kg	< 0.3	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 0.3	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 0.3	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.3	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.4	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.8	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.3	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.3	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 0.3	< 0.03
Chrysene	0.03	mg/kg	< 0.3	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.3	< 0.03
Fluoranthene	0.03	mg/kg	< 0.3	< 0.03
Fluorene	0.03	mg/kg	< 0.3	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.3	< 0.03
Naphthalene	0.1	mg/kg	< 0.3	< 0.1
Phenanthrene	0.03	mg/kg	< 0.3	< 0.03
Pyrene	0.03	mg/kg	< 0.3	< 0.03
Total PAH*	0.1	mg/kg	< 0.3	< 0.1

Client Sample ID			AH04 2.4-2.5	AH04 3.2-3.3
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**K24-Fe0069676**	**K24-Fe0069677**
Date Sampled			**Not Provided**[I12]	**Not Provided**[I12]
Test/Reference	LOR	Unit		
Polycyclic Aromatic Hydrocarbons (NZ MfE)				
p-Terphenyl-d14 (surr.)	1	%	78	60
2-Fluorobiphenyl (surr.)	1	%	83	55
Metals M7 (NZ MfE)				
Arsenic	0.1	mg/kg	2.1	6.0
Cadmium	0.01	mg/kg	0.08	0.04
Chromium	0.1	mg/kg	23	8.6
Copper	0.1	mg/kg	48	2.3
Lead	0.1	mg/kg	7.9	20
Nickel	0.1	mg/kg	85	3.3
Zinc	5	mg/kg	55	34

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
% Moisture	Auckland	Feb 28, 2024	14 Days
- Method: LTM-GEN-7080 Moisture			
- Method: LTM-GEN-7080 Moisture Content in Soil by Gravimetry			
Per- and Polyfluoroalkyl Substances (PFASs) - Trace			
Perfluoroalkyl sulfonamido substances- Trace	Brisbane	Mar 04, 2024	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Perfluoroalkyl carboxylic acids (PFCAs) - Trace	Brisbane	Mar 04, 2024	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Perfluoroalkyl sulfonic acids (PFSAs)- Trace	Brisbane	Mar 04, 2024	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace	Brisbane	Mar 04, 2024	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			
Volatile Organics (NZ MfE)	Auckland	Mar 07, 2024	14 Days
- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices			
Semivolatile Organics	Auckland	Mar 07, 2024	14 Days
- Method: LTM-ORG-2190 SVOC in Water & Soil by GC-MS			
Total Petroleum Hydrocarbons (NZ MfE 1999)	Auckland	Mar 07, 2024	14 Days
- Method: LTM-ORG-2010 TRH and BTEX in Soil and Water by GC FID and PT GCMS			
Polycyclic Aromatic Hydrocarbons (NZ MfE)	Auckland	Mar 07, 2024	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water by GC MSMS			
Metals M7 (NZ MfE)	Auckland	Feb 28, 2024	6 Months
- Method: LTM-MET-3040 Metals in Waters Soils Sediments by ICP-MS			

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Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	NSW 2304
+61 3 8564 5000	+61 3 8564 5000	+61 2 9900 8400	+61 2 6113 8091	T: +61 7 3902 4600	+61 2 4968 8448
NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

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Welshpool
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+61 8 6253 4444
NATA# 2377
Site# 2370

Company Name: Williamson Water and Land Advisory Ltd
Address: Unit 10 | 1 Putaki Drive
Kumeu
Auckland 0810

Project Name:
Project ID: WWLA 1078

Order No.: WWLA 1078
Report #: 1072988
Phone: s 9(2)(a)
Fax:

Received: Feb 28, 2024 10:42 AM
Due: Mar 8, 2024
Priority: 7 Day
Contact Name: SHANE MOORE

Eurofins Analytical Services Manager : Katyana Gausel

Sample Detail	HOLD	Moisture Set	Moisture Set	Metals M7 (NZ MfE)	Eurofins Suite B4B-NZ: TPH, PAH (NZ MfE)	Per- and Polyfluoroalkyl Substances (PFASs) - Trace	SVV: SVOC/VOC (NZ MfE)
Auckland Laboratory - IANZ# 1327	X	X	X	X	X		X
Auckland (asbestos) Laboratory - IANZ# 1308							
Christchurch Laboratory - IANZ# 1290							
Tauranga Laboratory - IANZ# 1402							
Brisbane Laboratory - NATA # 1261 Site # 20794		X	X			X	
External Laboratory							

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID							
1	AH03 1.5-1.6	Not Provided		Soil	K24-Fe0069672		X				X	
2	AH03 1.6-1.7	Not Provided		Soil	K24-Fe0069673			X				X
3	AH03 2.0-2.1	Not Provided		Soil	K24-Fe0069674			X	X	X		
4	AH04 2.1-2.2	Not Provided		Soil	K24-Fe0069675		X				X	
5	AH04 2.4-2.5	Not Provided		Soil	K24-Fe0069676			X	X	X		X
6	AH04 3.2-3.3	Not Provided		Soil	K24-Fe0069677			X	X	X		
7	AH03 2.3-2.6	Not Provided		Soil	K24-Fe0069678	X						
8	AH04 1.4-1.5	Not Provided		Soil	K24-Fe0069679	X						
9	AH04 1.5-1.6	Not Provided		Soil	K24-Fe0069680	X						

eurofins

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Eurofins Environment Testing NZ Ltd
NZBN: 9429046024954

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IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Eurofins Environment Testing Australia Pty Ltd
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Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West
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Auckland Laboratory - IANZ# 1327						X	X	X	X	X		X
Auckland (asbestos) Laboratory - IANZ# 1308												
Christchurch Laboratory - IANZ# 1290												
Tauranga Laboratory - IANZ# 1402												
10	AH04 2.8-2.9	Not Provided		Soil	K24-Fe0069681	X						
Test Counts						4	6	6	3	3	2	2

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013. They are included in this QC report where applicable. Additional QC data may be available on request.
2. Unless otherwise stated, all soil/sediment/solid results are reported on a dry weight basis.
3. Unless otherwise stated, all biota/food results are reported on a wet weight basis on the edible portion.
4. For CEC results where the sample's origin is unknown or environmentally contaminated, the results should be used advisedly.
5. Actual LORs are matrix dependent. Quoted LORs may be raised where sample extracts are diluted due to interferences.
6. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
7. SVOC analysis on waters is performed on homogenised, unfiltered samples unless noted otherwise.
8. Samples were analysed on an 'as received' basis.
9. Information identified in this report with **blue** colour indicates data provided by customers that may have an impact on the results.
10. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit	**Colour:** Pt-Co Units	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where moisture has been determined on a solid sample, the result is expressed on a dry weight basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples, these are performed on laboratory-certified clean sands and in the case of water samples, these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC represents the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment; however, free tributyltin was measured, and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 6.0
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

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

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

Results <10 times the LOR:	No Limit
Results between 10-20 times the LOR:	RPD must lie between 0-50%
Results >20 times the LOR:	RPD must lie between 0-30%

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

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%, VOC recoveries 70 – 130%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl sulfonamido substances- Trace							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 0.5			0.5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 0.5			0.5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 0.5			0.5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/kg	< 0.5			0.5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/kg	< 0.5			0.5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 0.5			0.5	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs) - Trace							
Perfluorobutanoic acid (PFBA)	ug/kg	< 0.5			0.5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 0.1			0.1	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 0.1			0.1	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 0.1			0.1	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 0.1			0.1	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 0.1			0.1	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 0.1			0.1	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 0.1			0.1	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 0.1			0.1	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 0.1			0.1	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 0.1			0.1	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)- Trace							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 0.1			0.1	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 0.1			0.1	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 0.1			0.1	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 0.1			0.1	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 0.1			0.1	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 0.1			0.1	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 0.1			0.1	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 0.1			0.1	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 0.1			0.1	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/kg	< 0.5			0.5	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 0.1			0.1	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 0.1			0.1	Pass	
Method Blank							
Volatile Organics (NZ MfE)							
1.1-Dichloroethane	mg/kg	< 0.5			0.5	Pass	
1.1-Dichloroethene	mg/kg	< 0.5			0.5	Pass	
1.1.1-Trichloroethane	mg/kg	< 0.5			0.5	Pass	
1.1.1.2-Tetrachloroethane	mg/kg	< 0.5			0.5	Pass	
1.1.2-Trichloroethane	mg/kg	< 0.5			0.5	Pass	
1.1.2.2-Tetrachloroethane	mg/kg	< 0.5			0.5	Pass	
1.2-Dibromoethane	mg/kg	< 0.5			0.5	Pass	
1.2-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.2-Dichloroethane	mg/kg	< 0.5			0.5	Pass	
1.2-Dichloropropane	mg/kg	< 0.5			0.5	Pass	
1.2.3-Trichloropropane	mg/kg	< 0.5			0.5	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1.2.4-Trimethylbenzene	mg/kg	< 0.5			0.5	Pass	
1.3-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.3-Dichloropropane	mg/kg	< 0.5			0.5	Pass	
1.3.5-Trimethylbenzene	mg/kg	< 0.5			0.5	Pass	
1.4-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
2-Butanone (MEK)	mg/kg	< 0.5			0.5	Pass	
2-Propanone (Acetone)	mg/kg	< 0.5			0.5	Pass	
4-Chlorotoluene	mg/kg	< 0.5			0.5	Pass	
4-Methyl-2-pentanone (MIBK)	mg/kg	< 0.5			0.5	Pass	
Allyl chloride	mg/kg	< 0.5			0.5	Pass	
Benzene	mg/kg	< 0.1			0.1	Pass	
Bromobenzene	mg/kg	< 0.5			0.5	Pass	
Bromochloromethane	mg/kg	< 0.5			0.5	Pass	
Bromodichloromethane	mg/kg	< 0.5			0.5	Pass	
Bromoform	mg/kg	< 0.5			0.5	Pass	
Bromomethane	mg/kg	< 0.5			0.5	Pass	
Carbon disulfide	mg/kg	< 0.5			0.5	Pass	
Carbon Tetrachloride	mg/kg	< 0.5			0.5	Pass	
Chlorobenzene	mg/kg	< 0.5			0.5	Pass	
Chloroethane	mg/kg	< 0.5			0.5	Pass	
Chloroform	mg/kg	< 0.5			0.5	Pass	
Chloromethane	mg/kg	< 0.5			0.5	Pass	
cis-1.2-Dichloroethene	mg/kg	< 0.5			0.5	Pass	
cis-1.3-Dichloropropene	mg/kg	< 0.5			0.5	Pass	
Dibromochloromethane	mg/kg	< 0.5			0.5	Pass	
Dibromomethane	mg/kg	< 0.5			0.5	Pass	
Dichlorodifluoromethane	mg/kg	< 0.5			0.5	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
Iodomethane	mg/kg	< 0.5			0.5	Pass	
Isopropyl benzene (Cumene)	mg/kg	< 0.5			0.5	Pass	
Methylene Chloride	mg/kg	< 0.5			0.5	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Styrene	mg/kg	< 0.5			0.5	Pass	
Tetrachloroethene	mg/kg	< 0.5			0.5	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
trans-1.2-Dichloroethene	mg/kg	< 0.5			0.5	Pass	
trans-1.3-Dichloropropene	mg/kg	< 0.5			0.5	Pass	
Trichloroethene	mg/kg	< 0.5			0.5	Pass	
Trichlorofluoromethane	mg/kg	< 0.5			0.5	Pass	
Vinyl chloride	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Semivolatile Organics							
1-Chloronaphthalene	mg/kg	< 0.5			0.5	Pass	
1-Naphthylamine	mg/kg	< 0.5			0.5	Pass	
1.2-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.2.3-Trichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.2.3.4-Tetrachlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.2.3.5-Tetrachlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.2.4-Trichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.2.4.5-Tetrachlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.3-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.3.5-Trichlorobenzene	mg/kg	< 0.5			0.5	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1.4-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
2-Chloronaphthalene	mg/kg	< 0.5			0.5	Pass	
2-Chlorophenol	mg/kg	< 0.5			0.5	Pass	
2-Methyl-4.6-dinitrophenol	mg/kg	< 5			5	Pass	
2-Methylnaphthalene	mg/kg	< 0.5			0.5	Pass	
2-Methylphenol (o-Cresol)	mg/kg	< 0.2			0.2	Pass	
2-Naphthylamine	mg/kg	< 0.5			0.5	Pass	
2-Nitroaniline	mg/kg	< 0.5			0.5	Pass	
2-Nitrophenol	mg/kg	< 1			1	Pass	
2-Picoline	mg/kg	< 0.5			0.5	Pass	
2.3.4.6-Tetrachlorophenol	mg/kg	< 5			5	Pass	
2.4-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dimethylphenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dinitrophenol	mg/kg	< 5			5	Pass	
2.4-Dinitrotoluene	mg/kg	< 0.5			0.5	Pass	
2.4.5-Trichlorophenol	mg/kg	< 1			1	Pass	
2.4.6-Trichlorophenol	mg/kg	< 1			1	Pass	
2.6-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
2.6-Dinitrotoluene	mg/kg	< 0.5			0.5	Pass	
3&4-Methylphenol (m&p-Cresol)	mg/kg	< 0.4			0.4	Pass	
3-Methylcholanthrene	mg/kg	< 0.5			0.5	Pass	
3.3'-Dichlorobenzidine	mg/kg	< 0.5			0.5	Pass	
4-Aminobiphenyl	mg/kg	< 0.5			0.5	Pass	
4-Bromophenyl phenyl ether	mg/kg	< 0.5			0.5	Pass	
4-Chloro-3-methylphenol	mg/kg	< 1			1	Pass	
4-Chlorophenyl phenyl ether	mg/kg	< 0.5			0.5	Pass	
4-Nitrophenol	mg/kg	< 5			5	Pass	
4.4'-DDD	mg/kg	< 0.01			0.01	Pass	
4.4'-DDE	mg/kg	< 0.01			0.01	Pass	
4.4'-DDT	mg/kg	< 0.01			0.01	Pass	
7.12-Dimethylbenz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
a-HCH	mg/kg	< 0.01			0.01	Pass	
Acenaphthene	mg/kg	< 0.03			0.03	Pass	
Acenaphthylene	mg/kg	< 0.03			0.03	Pass	
Acetophenone	mg/kg	< 0.5			0.5	Pass	
Aldrin	mg/kg	< 0.01			0.01	Pass	
Aniline	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.03			0.03	Pass	
b-HCH	mg/kg	< 0.01			0.01	Pass	
Benz(a)anthracene	mg/kg	< 0.03			0.03	Pass	
Benzo(a)pyrene	mg/kg	< 0.03			0.03	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.03			0.03	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.03			0.03	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.03			0.03	Pass	
Benzyl chloride	mg/kg	< 0.5			0.5	Pass	
Bis(2-chloroethoxy)methane	mg/kg	< 0.5			0.5	Pass	
Bis(2-chloroisopropyl)ether	mg/kg	< 0.5			0.5	Pass	
Bis(2-ethylhexyl)phthalate	mg/kg	< 0.5			0.5	Pass	
Butyl benzyl phthalate	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.03			0.03	Pass	
d-HCH	mg/kg	< 0.01			0.01	Pass	
Di-n-butyl phthalate	mg/kg	< 0.5			0.5	Pass	
Di-n-octyl phthalate	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.03			0.03	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Dibenz(a.j)acridine	mg/kg	< 0.5			0.5	Pass	
Dibenzofuran	mg/kg	< 0.5			0.5	Pass	
Dieldrin	mg/kg	< 0.01			0.01	Pass	
Diethyl phthalate	mg/kg	< 0.5			0.5	Pass	
Dimethyl phthalate	mg/kg	< 0.5			0.5	Pass	
Dimethylaminoazobenzene	mg/kg	< 0.5			0.5	Pass	
Diphenylamine	mg/kg	< 0.5			0.5	Pass	
Endosulfan I	mg/kg	< 0.01			0.01	Pass	
Endosulfan II	mg/kg	< 0.01			0.01	Pass	
Endosulfan sulphate	mg/kg	< 0.01			0.01	Pass	
Endrin	mg/kg	< 0.01			0.01	Pass	
Endrin aldehyde	mg/kg	< 0.01			0.01	Pass	
Endrin ketone	mg/kg	< 0.01			0.01	Pass	
Fluoranthene	mg/kg	< 0.03			0.03	Pass	
Fluorene	mg/kg	< 0.03			0.03	Pass	
g-HCH (Lindane)	mg/kg	< 0.01			0.01	Pass	
Heptachlor	mg/kg	< 0.01			0.01	Pass	
Heptachlor epoxide	mg/kg	< 0.01			0.01	Pass	
Hexachlorobenzene	mg/kg	< 0.01			0.01	Pass	
Hexachlorobutadiene	mg/kg	< 0.5			0.5	Pass	
Hexachlorocyclopentadiene	mg/kg	< 0.5			0.5	Pass	
Hexachloroethane	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.03			0.03	Pass	
Methoxychlor	mg/kg	< 0.01			0.01	Pass	
N-Nitrosodibutylamine	mg/kg	< 0.5			0.5	Pass	
N-Nitrosodipropylamine	mg/kg	< 0.5			0.5	Pass	
N-Nitrosopiperidine	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.1			0.1	Pass	
Nitrobenzene	mg/kg	< 0.5			0.5	Pass	
Pentachlorobenzene	mg/kg	< 0.5			0.5	Pass	
Pentachloronitrobenzene	mg/kg	< 0.5			0.5	Pass	
Pentachlorophenol	mg/kg	< 1			1	Pass	
Phenanthrene	mg/kg	< 0.03			0.03	Pass	
Phenol	mg/kg	< 0.5			0.5	Pass	
Pronamide	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.03			0.03	Pass	
Trifluralin	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Total Petroleum Hydrocarbons (NZ MfE 1999)							
TPH-SG C7-C9	mg/kg	< 5			5	Pass	
TPH-SG C10-C14	mg/kg	< 10			10	Pass	
TPH-SG C15-C36	mg/kg	< 20			20	Pass	
TPH-SG C7-C36 (Total)	mg/kg	< 35			35	Pass	
Method Blank							
Metals M7 (NZ MfE)							
Arsenic	mg/kg	< 0.1			0.1	Pass	
Cadmium	mg/kg	< 0.01			0.01	Pass	
Chromium	mg/kg	< 0.1			0.1	Pass	
Copper	mg/kg	< 0.1			0.1	Pass	
Lead	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 0.1			0.1	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances- Trace							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorooctane sulfonamide (FOSA)	%	110			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	126			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	108			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	%	131			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	%	127			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	112			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	141			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs) - Trace							
Perfluorobutanoic acid (PFBA)	%	118			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	91			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	127			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	91			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	82			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	117			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	127			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	116			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	128			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	111			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	123			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)- Trace							
Perfluorobutanesulfonic acid (PFBS)	%	113			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	102			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	109			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	119			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	128			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	110			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	114			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	98			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	146			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	%	143			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	125			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	124			50-150	Pass	
LCS - % Recovery							
Volatile Organics (NZ MfE)							
1.1-Dichloroethene	%	125			70-130	Pass	
1.1.1-Trichloroethane	%	116			70-130	Pass	
1.1.1.2-Tetrachloroethane	%	118			70-130	Pass	
1.1.2-Trichloroethane	%	116			70-130	Pass	
1.2-Dibromoethane	%	113			70-130	Pass	
1.2-Dichlorobenzene	%	97			70-130	Pass	
1.2-Dichloroethane	%	125			70-130	Pass	
1.2-Dichloropropane	%	114			70-130	Pass	
1.2.4-Trimethylbenzene	%	83			70-130	Pass	
1.3-Dichlorobenzene	%	89			70-130	Pass	
1.3-Dichloropropane	%	113			70-130	Pass	
1.3.5-Trimethylbenzene	%	79			70-130	Pass	
1.4-Dichlorobenzene	%	94			70-130	Pass	
4-Chlorotoluene	%	87			70-130	Pass	
Allyl chloride	%	113			70-130	Pass	
Benzene	%	95			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Bromobenzene	%	118			70-130	Pass	
Bromodichloromethane	%	107			70-130	Pass	
Bromomethane	%	95			70-130	Pass	
Carbon disulfide	%	117			70-130	Pass	
Carbon Tetrachloride	%	108			70-130	Pass	
Chlorobenzene	%	102			70-130	Pass	
Chloroethane	%	119			70-130	Pass	
Chloroform	%	123			70-130	Pass	
Chloromethane	%	111			70-130	Pass	
cis-1.2-Dichloroethene	%	116			70-130	Pass	
cis-1.3-Dichloropropene	%	110			70-130	Pass	
Dibromochloromethane	%	116			70-130	Pass	
Dibromomethane	%	122			70-130	Pass	
Dichlorodifluoromethane	%	103			70-130	Pass	
Ethylbenzene	%	102			70-130	Pass	
Iodomethane	%	110			70-130	Pass	
Isopropyl benzene (Cumene)	%	105			70-130	Pass	
Methylene Chloride	%	121			70-130	Pass	
m&p-Xylenes	%	96			70-130	Pass	
o-Xylene	%	106			70-130	Pass	
Xylenes - Total	%	100			70-130	Pass	
Styrene	%	113			70-130	Pass	
Tetrachloroethene	%	97			70-130	Pass	
Toluene	%	94			70-130	Pass	
trans-1.2-Dichloroethene	%	110			70-130	Pass	
trans-1.3-Dichloropropene	%	109			70-130	Pass	
Trichloroethene	%	107			70-130	Pass	
Trichlorofluoromethane	%	88			70-130	Pass	
Vinyl chloride	%	105			70-130	Pass	
LCS - % Recovery							
Semivolatile Organics							
1-Naphthylamine	%	78			70-130	Pass	
1.2-Dichlorobenzene	%	75			70-130	Pass	
1.2.3-Trichlorobenzene	%	94			70-130	Pass	
1.2.3.4-Tetrachlorobenzene	%	82			70-130	Pass	
1.2.3.5-Tetrachlorobenzene	%	86			70-130	Pass	
1.2.4-Trichlorobenzene	%	82			70-130	Pass	
1.2.4.5-Tetrachlorobenzene	%	85			70-130	Pass	
1.3-Dichlorobenzene	%	81			70-130	Pass	
1.3.5-Trichlorobenzene	%	82			70-130	Pass	
1.4-Dichlorobenzene	%	79			70-130	Pass	
2-Chloronaphthalene	%	80			70-130	Pass	
2-Chlorophenol	%	82			25-130	Pass	
2-Methyl-4.6-dinitrophenol	%	110			25-130	Pass	
2-Methylnaphthalene	%	81			70-130	Pass	
2-Methylphenol (o-Cresol)	%	80			25-130	Pass	
2-Nitroaniline	%	82			70-130	Pass	
2-Nitrophenol	%	90			25-130	Pass	
2.3.4.6-Tetrachlorophenol	%	87			70-130	Pass	
2.4-Dichlorophenol	%	86			25-130	Pass	
2.4-Dimethylphenol	%	82			25-130	Pass	
2.4-Dinitrotoluene	%	84			70-130	Pass	
2.4.5-Trichlorophenol	%	94			25-130	Pass	
2.4.6-Trichlorophenol	%	92			25-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
2.6-Dichlorophenol	%	88			25-130	Pass	
2.6-Dinitrotoluene	%	89			70-130	Pass	
3&4-Methylphenol (m&p-Cresol)	%	81			25-130	Pass	
3-Methylcholanthrene	%	85			70-130	Pass	
4-Bromophenyl phenyl ether	%	79			70-130	Pass	
4-Chloro-3-methylphenol	%	85			25-130	Pass	
4-Chlorophenyl phenyl ether	%	79			70-130	Pass	
4.4'-DDD	%	100			70-130	Pass	
4.4'-DDE	%	90			70-130	Pass	
4.4'-DDT	%	108			70-130	Pass	
7.12-Dimethylbenz(a)anthracene	%	85			70-130	Pass	
a-HCH	%	85			70-130	Pass	
Acenaphthene	%	79			70-130	Pass	
Acenaphthylene	%	84			70-130	Pass	
Acetophenone	%	89			70-130	Pass	
Aldrin	%	82			70-130	Pass	
Anthracene	%	82			70-130	Pass	
b-HCH	%	88			70-130	Pass	
Benz(a)anthracene	%	89			70-130	Pass	
Benzo(a)pyrene	%	88			70-130	Pass	
Benzo(b&j)fluoranthene	%	91			70-130	Pass	
Benzo(g.h.i)perylene	%	86			70-130	Pass	
Benzo(k)fluoranthene	%	90			70-130	Pass	
Benzyl chloride	%	79			70-130	Pass	
Bis(2-chloroethoxy)methane	%	81			70-130	Pass	
Bis(2-chloroisopropyl)ether	%	112			70-130	Pass	
Bis(2-ethylhexyl)phthalate	%	92			70-130	Pass	
Butyl benzyl phthalate	%	91			70-130	Pass	
Chrysene	%	83			70-130	Pass	
d-HCH	%	99			70-130	Pass	
Di-n-butyl phthalate	%	84			70-130	Pass	
Di-n-octyl phthalate	%	86			70-130	Pass	
Dibenz(a.h)anthracene	%	89			70-130	Pass	
Dibenz(a.j)acridine	%	83			70-130	Pass	
Dibenzofuran	%	81			70-130	Pass	
Dieldrin	%	87			70-130	Pass	
Diethyl phthalate	%	80			70-130	Pass	
Dimethyl phthalate	%	79			70-130	Pass	
Dimethylaminoazobenzene	%	81			70-130	Pass	
Diphenylamine	%	84			70-130	Pass	
Endosulfan I	%	85			70-130	Pass	
Endosulfan II	%	87			70-130	Pass	
Endosulfan sulphate	%	91			70-130	Pass	
Endrin	%	94			70-130	Pass	
Endrin aldehyde	%	81			70-130	Pass	
Endrin ketone	%	94			70-130	Pass	
Fluoranthene	%	76			70-130	Pass	
Fluorene	%	82			70-130	Pass	
g-HCH (Lindane)	%	94			70-130	Pass	
Heptachlor	%	89			70-130	Pass	
Heptachlor epoxide	%	84			70-130	Pass	
Hexachlorobenzene	%	76			70-130	Pass	
Hexachlorobutadiene	%	83			70-130	Pass	
Hexachlorocyclopentadiene	%	97			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Hexachloroethane	%	80			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	87			70-130	Pass	
Methoxychlor	%	106			70-130	Pass	
N-Nitrosodibutylamine	%	77			70-130	Pass	
N-Nitrosodipropylamine	%	84			70-130	Pass	
N-Nitrosopiperidine	%	83			70-130	Pass	
Naphthalene	%	82			70-130	Pass	
Nitrobenzene	%	95			70-130	Pass	
Pentachlorobenzene	%	84			70-130	Pass	
Pentachloronitrobenzene	%	85			70-130	Pass	
Pentachlorophenol	%	81			25-130	Pass	
Phenanthrene	%	106			70-130	Pass	
Phenol	%	93			25-130	Pass	
Pronamide	%	78			70-130	Pass	
Pyrene	%	85			70-130	Pass	
Trifluralin	%	81			70-130	Pass	
LCS - % Recovery							
Total Petroleum Hydrocarbons (NZ MfE 1999)							
TPH-SG C7-C36 (Total)	%	107			70-130	Pass	
LCS - % Recovery							
Metals M7 (NZ MfE)							
Arsenic	%	109			80-120	Pass	
Cadmium	%	106			80-120	Pass	
Chromium	%	106			80-120	Pass	
Copper	%	107			80-120	Pass	
Lead	%	110			80-120	Pass	
Nickel	%	111			80-120	Pass	
Zinc	%	114			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Semivolatile Organics				Result 1					
4.4'-DDE	K24-Ma0005452	NCP	%	78			70-130	Pass	
4.4'-DDT	K24-Ma0005452	NCP	%	105			70-130	Pass	
a-HCH	K24-Ma0005452	NCP	%	74			70-130	Pass	
Acenaphthene	Z24-Fe0073887	NCP	%	71			70-130	Pass	
Acenaphthylene	Z24-Fe0073887	NCP	%	90			70-130	Pass	
Aldrin	K24-Ma0005452	NCP	%	71			70-130	Pass	
Anthracene	Z24-Fe0073887	NCP	%	71			70-130	Pass	
b-HCH	K24-Ma0005452	NCP	%	78			70-130	Pass	
Benz(a)anthracene	Z24-Fe0073887	NCP	%	84			70-130	Pass	
Benzo(a)pyrene	Z24-Fe0073887	NCP	%	83			70-130	Pass	
Benzo(b&j)fluoranthene	Z24-Fe0073887	NCP	%	89			70-130	Pass	
Benzo(g.h.i)perylene	K24-Fe0069922	NCP	%	98			70-130	Pass	
Benzo(k)fluoranthene	K24-Fe0069922	NCP	%	123			70-130	Pass	
Chrysene	Z24-Fe0073887	NCP	%	83			70-130	Pass	
d-HCH	K24-Ma0005452	NCP	%	84			70-130	Pass	
Dibenz(a.h)anthracene	Z24-Fe0073887	NCP	%	75			70-130	Pass	
Dieldrin	K24-Ma0005452	NCP	%	78			70-130	Pass	
Endosulfan I	Z24-Fe0073887	NCP	%	76			70-130	Pass	
Endosulfan II	K24-Ma0005452	NCP	%	78			70-130	Pass	
Endosulfan sulphate	K24-Ma0005452	NCP	%	86			70-130	Pass	
Endrin	K24-Ma0005452	NCP	%	88			70-130	Pass	
Endrin aldehyde	K24-Ma0005452	NCP	%	79			70-130	Pass	
Endrin ketone	K24-Ma0005452	NCP	%	95			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Fluoranthene	Z24-Fe0073887	NCP	%	73			70-130	Pass	
Fluorene	Z24-Fe0073887	NCP	%	76			70-130	Pass	
g-HCH (Lindane)	K24-Ma0005452	NCP	%	76			70-130	Pass	
Heptachlor	K24-Ma0005452	NCP	%	77			70-130	Pass	
Heptachlor epoxide	K24-Ma0005452	NCP	%	76			70-130	Pass	
Hexachlorobenzene	K24-Fe0069922	NCP	%	82			70-130	Pass	
Indeno(1.2.3-cd)pyrene	Z24-Fe0073887	NCP	%	74			70-130	Pass	
Methoxychlor	K24-Ma0005452	NCP	%	106			70-130	Pass	
Naphthalene	Z24-Fe0073887	NCP	%	73			70-130	Pass	
Phenanthrene	Z24-Fe0073887	NCP	%	96			70-130	Pass	
Pyrene	Z24-Fe0073887	NCP	%	79			70-130	Pass	
Spike - % Recovery									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1					
TPH-SG C7-C36 (Total)	K24-Ma0000383	NCP	%	119			70-130	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances- Trace				Result 1					
Perfluorooctane sulfonamide (FOSA)	K24-Fe0069675	CP	%	75			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	K24-Fe0069675	CP	%	102			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	K24-Fe0069675	CP	%	97			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	K24-Fe0069675	CP	%	79			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	K24-Fe0069675	CP	%	99			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	K24-Fe0069675	CP	%	80			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	K24-Fe0069675	CP	%	99			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1					
Perfluorobutanoic acid (PFBA)	K24-Fe0069675	CP	%	86			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	K24-Fe0069675	CP	%	81			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	K24-Fe0069675	CP	%	102			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	K24-Fe0069675	CP	%	83			50-150	Pass	
Perfluorooctanoic acid (PFOA)	K24-Fe0069675	CP	%	70			50-150	Pass	
Perfluorononanoic acid (PFNA)	K24-Fe0069675	CP	%	103			50-150	Pass	
Perfluorodecanoic acid (PFDA)	K24-Fe0069675	CP	%	101			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	K24-Fe0069675	CP	%	70			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	K24-Fe0069675	CP	%	99			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	K24-Fe0069675	CP	%	81			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	K24-Fe0069675	CP	%	89			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)- Trace				Result 1					
Perfluorobutanesulfonic acid (PFBS)	K24-Fe0069675	CP	%	97			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	K24-Fe0069675	CP	%	90			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	K24-Fe0069675	CP	%	97			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	K24-Fe0069675	CP	%	106			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorohexanesulfonic acid (PFHxS)	K24-Fe0069675	CP	%	94			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	K24-Fe0069675	CP	%	96			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	K24-Fe0069675	CP	%	92			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	K24-Fe0069675	CP	%	86			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	K24-Fe0069675	CP	%	114			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	K24-Fe0069675	CP	%	119			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	K24-Fe0069675	CP	%	94			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	K24-Fe0069675	CP	%	105			50-150	Pass	
Spike - % Recovery									
Metals M7 (NZ MfE)				Result 1					
Arsenic	K24-Fe0069676	CP	%	107			75-125	Pass	
Cadmium	K24-Fe0069676	CP	%	107			75-125	Pass	
Chromium	K24-Fe0069676	CP	%	110			75-125	Pass	
Copper	K24-Fe0069676	CP	%	111			75-125	Pass	
Lead	K24-Fe0069676	CP	%	101			75-125	Pass	
Nickel	K24-Fe0069676	CP	%	115			75-125	Pass	
Zinc	K24-Fe0069676	CP	%	114			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Perfluoroalkyl sulfonamido substances- Trace				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	B24-Ma0018961	NCP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B24-Ma0018961	NCP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B24-Ma0018961	NCP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	B24-Ma0018961	NCP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	B24-Ma0018961	NCP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B24-Ma0018961	NCP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B24-Ma0018961	NCP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B24-Ma0018961	NCP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	

Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1	Result 2	RPD			
Perfluoroundecanoic acid (PFUnDA)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)- Trace				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	B24-Ma0018961	NCP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B24-Ma0018961	NCP	ug/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	K24-Fe0069673	CP	%	31	32	3.0	30%	Pass	
Duplicate									
Volatile Organics (NZ MfE)				Result 1	Result 2	RPD			
Benzene	K24-Fe0021616	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	K24-Fe0021616	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	K24-Fe0021616	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	K24-Fe0021616	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	K24-Fe0021616	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Toluene	K24-Fe0021616	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1	Result 2	RPD			
TPH-SG C7-C9	K24-Fe0074096	NCP	mg/kg	160	190	16	30%	Pass	
TPH-SG C10-C14	K24-Fe0074096	NCP	mg/kg	100	110	1.9	30%	Pass	
TPH-SG C15-C36	K24-Fe0074096	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TPH-SG C7-C36 (Total)	K24-Fe0074096	NCP	mg/kg	270	300	11	30%	Pass	

Duplicate									
Metals M7 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	K24-Fe0069674	CP	mg/kg	6.6	6.2	6.0	30%	Pass	
Cadmium	K24-Fe0069674	CP	mg/kg	0.03	0.03	5.8	30%	Pass	
Chromium	K24-Fe0069674	CP	mg/kg	12	12	<1	30%	Pass	
Copper	K24-Fe0069674	CP	mg/kg	7.1	7.2	1.5	30%	Pass	
Lead	K24-Fe0069674	CP	mg/kg	22	23	2.3	30%	Pass	
Nickel	K24-Fe0069674	CP	mg/kg	5.4	5.5	2.1	30%	Pass	
Zinc	K24-Fe0069674	CP	mg/kg	15	15	<1	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
N16	Analysis performed by Eurofins Environment Testing Australia

Authorised by:

Swati Oberoi	Analytical Services Manager
Jonathon Angell	Senior Analyst-PFAS
Raymond Siu	Senior Analyst-Metal
Raymond Siu	Senior Analyst-Organic
Raymond Siu	Senior Analyst-Volatile

Raymond Siu
Senior Instrument Chemist (Key Technical Personnel)

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please click here.

Appendix C. Gas Monitoring Records

Site name	Date sampled	Atmospheric pressure (Stable, rising, falling)	Equipment calibration	Weather conditions	Sampled by

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%			ppm	ppm	m btoc
S1	21/2	1016	Peak			Peak during 5 minute period		400				
			Static			0m,	0	[illegible]	20.9	0	0	
Additional comments						0.25	0	450	20.9	0	0	
						1.30	0	575	"	0	0	
						Out	0	>10000	19.6	9	0	
						After	11	11	20	0	6	
						Max	0	0	0	0	0	

1m

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
S2			Peak			Peak during 5 minute period						
			Static			0m	0	400	20.9	0	0	
Additional comments						0.25	0	450	20.9	0	0	
						1.30m	0	600	20.9	0	0	
						Out	0	600	20.9	0	0	
						After	0	2050	20.9	0	0	
						Max	0	0	0	0	0	

1m

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
S3			Peak			Peak during 5 minute period						
			Static			0m	0	400	20.9	0	0	
Additional comments						0.25	0	625	20.9	0	0	
						1.30	0	500	20.9	0	0	
						Out	0	1450	20.9	0	0	
						After	0	2100	20.9	0	0	
						Max	0	0	0	0	0	

1m

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
S4	22/2	1026	Peak			Peak during 5 minute period						
			Static			0	0	575	20.9	0	0	
Additional comments						0.25	1	525	20.9	0	0	
						1.30	3	850	20.9	0	0	
						Out	3	950	20.9	0	0	
						After	4	1250	20.9	0	0	
						Max	0	0	0	0	0	

1m

Site name	Date sampled	Atmospheric pressure (Stable, rising, falling)	Equipment calibration	Weather conditions	Sampled by

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
S5	22/2		Peak			Peak during 5 minute period						
			Static			1	0	0				
Additional comments						2	0.5					
						3	1.0					
						4	out					
						5	After					
						Max	0	0	0	0	0	

Install to 1m

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
S5	22/2		Peak			Peak during 5 minute period						
			Static			0	0	500	20.9	0	0	
Additional comments						0.5	0	645	20.9	0	0	
						1.0	1	525	20.9	22	0	
					1.5	~~Out~~	0	775	20.9	1	0	
					2.0	~~After~~	0	775	20.9	1	0	
					0	Max	1	7010	20.9	10	0	
						After	0	<10000	19.8	0	0	

Install to 2m

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
S6			Peak			Peak during 5 minute period						
			Static			0.5	0	1200	20.9	15	2	
Additional comments						1.0	0	750	20.9	7	0	
						Out.	0	575	20.9	0	0	
						After.	11	76550	14.8	28	0	
						5						
						Max	0	0	0	0	0	

Install to 2m

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
S7			Peak			Peak during 5 minute period						
			Static			0	0	600	20.9	0	0	
Additional comments						1m.	7	1000	20.9	30	0	
						2m	0	625	20.9	0	0	
						Out						
						After	1	2450	20.9	0	0	
						Max	0	0	0	0	0	

2m.

Site name	Date sampled	Atmospheric pressure (Stable, rising, falling)	Equipment calibration	Weather conditions	Sampled by

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
88			Peak			Peak during 5 minute period						
			Static			0 1	0	500	20.9	0	0	
Additional comments						0 2·5	0	560	20.9	0	0	
						1 3 0	1	575	20.9	0	0	
						Out 4						
						After 5	1	10000	18.5	0	0	
						Max	0	0	0	0	0	

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
			Peak			Peak during 5 minute period						
			Static			1						
Additional comments						2						
						3						
						4						
						5						
						Max	0	0	0	0	0	

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
			Peak			Peak during 5 minute period						
			Static			1						
Additional comments						2						
						3						
						4						
						5						
						Max	0	0	0	0	0	

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
			Peak			Peak during 5 minute period						
			Static			1						
Additional comments						2						
						3						
						4						
						5						
						Max	0	0	0	0	0	

W

Site name	Date sampled	Atmospheric pressure (Stable, rising, falling)	Equipment calibration	Weather conditions	Sampled by
Rakaunga Count		Rising.	G5 10132 / 17/9/24	Cloudy	CHM

Balance.

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
S2	27/3	1013	Peak		0	~~Peak during 5 minute period~~	0	1.3	19.6	0	0	
			Static			1	0	0.2	20.2	0	0	
Additional comments						2	0	0.2	20.2	0	0	
						3	0	0.1	20.2	0	0	
						4	0	0.1	20.2	0	0	
						5	0	0.1	20.1	0	0	
						Max	0	0	0	0	0	

19.4
19.6
19.6
19.7
19.7
19.7

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
S1	27/3	1014	Peak		+0.1	Peak during 5 minute period	0	5.7	17.1	4	0	
			Static			1	0	1.8	18.9	0	0	
Additional comments						2	0	1.5	19.1	0	0	
						3	0	1.4	19.1	0	0	
						4	0	1.9	19.2	0	0	
						5	0	1.3	19.2	0	0	
						Max	0	0	0	0	0	

18.7.
19.3
19.4
19.4
19.4.

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
S7		1015	Peak		0.	Peak during 5 minute period						
			Static			1						
Additional comments						2						
Pump stopped, GW was pumping to ~~Ground~~ surface						3						
						4						
						5						
						Max	0	0	0	0	0	

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
S6		1015.	Peak		0.1	Peak during 5 minute period	0.1	5.8	18.5	39	1	
			Static			1	0.0	1.9	18.4	1	0	
Additional comments						2	0.0	1.0	19.3	0	0	
						3	0.0	0.9	19.4	0	0	
						4	0	0.8	19.6	0	0	
						5	0	0.7	19.6	0	0	
						Max	0	0	0	0	0	

19.9.
19.8
19.7
19.7
19.6.

Site name	Date sampled	Atmospheric pressure (Stable, rising, falling)	Equipment calibration	Weather conditions	Sampled by

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
SS		1015	Peak	7.91	0.0	Peak during 5 minute period	0	6.5	19.8	30	19	
			Static			1						
Additional comments						2	Pump failed					
						3						
						4						
						5						
						Max	0	0	0	0	0	

80.4

3 times

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
S3		1015	Peak	0.80		Peak during 5 minute period	0	0.1	20.3	33	1	
			Static			1	0	1.2	19.3	2	1	
Additional comments						2	0	1.2	19.3	1	0	
						3	0	1.2	19.2	1	0	
						4	0	1.2	19.2	1	0	
						5	0	1.2	19.2	1	0	
						Max	0	0	0	0	0	

78.8
79.6.
79.6.
79.6.
79.6.
79.5.

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
S4		1016.	Peak	11.09	0	Peak during 5 minute period	0	6.1	20.1	9	0	79.8.
			Static			1						
Additional comments						2						
						3	Pump failed.					
						4						
						5						
						Max	0	0	0	0	0	

Location	Date and time	Pressure		Diff pressure	Flow	Time	CH4	CO2	O2	CO	H2S	Water level
		mbars		mbars	L/hr	minutes	%	%	%	ppm	ppm	m btoc
S8		1016.	Peak	~~0.01~~ -0.1		Peak during 5 minute period	0	0.1	20.2	1	0	
			Static	-0.11		1	0	1.3	19.3	0	0	
Additional comments						2	0	1.2	19.4	0	0	
						3	0	1.2	19.4	0	0	
						4	0	1.2	19.4	0	0	
						5	0	1.2	19.4	0	0	
						Max	0	0	0	0	0	

79.4.
79.4
79.4
79.4.
79.4

To:	Hannah Pettengell, Alisa Neal (Barker)
Copy:	Tess Brown, Olivia Heaslip (TBIG)
From:	Melanie Parsons
Date:	27 March 2024
Job Number:	226_03
SUBJECT:	Proposed Papakura District Courthouse (New) – Pre-application Transport Assessment

Gray Matter
2 Alfred Street Hamilton 3252
97 Duke Street Cambridge 3434
Tel: 07 853 8997

1. INTRODUCTION

The Ministry of Justice (MOJ) have engaged Gray Matter Limited to provide an Integrated Transport Assessment (ITA) to support their application.

The purpose of this memo is to inform discussion at the pre-application meeting by providing:

- An outline of the transport aspects of the proposal
- High-level comments on how the proposal adequately responds to traffic generation, access and parking demand (vehicle and bike).

2. TRANSPORT ASPECTS OF THE PROPOSAL

The transport aspects of the proposal are as follows:

- Existing courthouse transport demand and trip generation will transfer to proposed site, based on:
  - The proposal has same number of staff and judges as the existing courthouse.
  - The proposal is expected to attract the same number of visitors as the existing courthouse.
- Estimated trip generation is:
  - 487 veh/day and 92 veh/hr in a peak hour.
  - Allowing for minor increase in private vehicle trips due to increased distance from public transport, the provision of on-site parking and free unrestricted on-street parking in the vicinity, the estimated mode split is:
    - 95% private vehicle trips (approx. 10% increase from current estimate of 88% mode share from Census data)
    - 5% walking and public transport (Census data indicates 0% of trips by cycling).
- The daily traffic volume on Elliot Street is expected to increase by approximately 4% to around 13,310 vehicles per day.
- New vehicle crossing 8.0m wide at boundary to accommodate swept path of trucks, allow two-way movement of vehicles and match width of internal access.
- The two existing vehicle crossings (each approx. 7.7m wide) will become redundant and will be reinstated with kerb, berm and footpath to tie into existing.

- On-site parking is proposed as follows:
    - Secure fenced area containing:
        - 31 parking spaces for staff
        - 6 parking spaces for judges
    - Visitor parking area containing:
        - 29 parking spaces for visitors (including 2 accessible spaces with ramp access to entrance)
        - 1 loading space for courier /delivery van.
- Estimated visitor car parking demand is 84 vehicles (based on an estimated 28 visitor vehicles arriving to the site in a peak hour and assuming an average duration of stay of 3 hours).
- There is sufficient on-street parking within a 5-minute walk of the proposed site.
- Cycle parking provisions:
    - 5 visitor spaces and 3 secure spaces required (based on 760m^2 of office space and 890m^2 of public space).
    - Proposal includes
        - 4 secure spaces at rear for staff (2 double-sided racks).
        - 8 visitor spaces at front entrance (4 double-sided racks).
- End of journey facilities provided for staff – at least one shower and change area is provided in accordance with AUP(OP) requirement and additional space for gear storage provided at staff entrance.
- Pedestrian access via two connections to street – one at public entrance, one at carpark entrance.
- Pedestrian refuge crossing on Elliot Street, 40m south of the site with excellent sight distance.
- Loading space not required for the activity, but the following provisions are included:
    - A loading space for a courier/delivery van will be provided in the front visitor carpark.
    - Layout of rear carpark provides a turnaround area for an 8m medium rigid truck (Police/Corrections transport trucks and fortnightly secure document destruction service).
    - Vehicle tracking shows 8m medium rigid truck access to Sallyport secure area, which provides adequate space for safe manoeuvring within the site.
    - All design vehicles (8m medium rigid truck) can exit the site in a forward direction.
    - Check vehicle (11.5m large rigid truck, e.g. fire truck) must reverse from the site.
    - Rubbish/recycling collection will be via Auckland Council kerbside collection, with staff responsible for placing bins at kerb.

Civil Design Memo

PAPAKURA INTERIM COURTHOUSE

Project no: 23-1920
Address: 40 Elliot Street, Papakura, Auckland
Prepared for: The Building Intelligence Group c/ Ministry of Justice
Date: 02-05-2024
Revision: 2

1 INTRODUCTION

BCD Group Limited (BCD) has been engaged to undertake civil design for the proposed development at the above referenced site. This memo provides a high-level summary of the three-waters servicing strategy, retaining walls, earthworks and flooding to support an application for a Notice of Requirement.

2 INFRASTRUCTURE

Please see attached calculations in Appendix B showing existing and proposed water supply, wastewater and stormwater flowrates and demands.

2.1 Water Supply

- Re-use existing 50ØMS connection
- Fire-fighting to be supplied by nearby fire hydrants. Nearby hydrants can provide FW3. Fire engineers will need to be engaged to confirm fire cell separation.

2.2 Wastewater

- Re-align existing main that runs under the existing building as per C-105 & C-107 attached.
- One 150Ø connection to this re-aligned main, location shown on C-105.

2.3 Stormwater

- We understand there is sufficient capacity in the existing stormwater network to accommodate the proposal.
- Appropriate stormwater mitigation will be provided at the time of future development which will be managed by stormwater conditions to mitigate the effects of stormwater runoff associated with the proposal.

The proposal will be able to be appropriately serviced with respect to three waters and can be accommodated within the existing reticulated network. Any potential adverse infrastructure and servicing effects will be appropriately managed by consent conditions.

2.4 Power and Telecommunication

The proposal will be appropriately serviced with respect to power and telecommunications.

3 RETAINING WALLS

- Three retaining walls are proposed:

- Basement:
  - Masonry wall with ground floor slab on top tied into the wall.
  - 2.70m max height
- Northern
  - Timber pole wall supporting landscape.
  - 0.74m max height
- Eastern
  - Timber pole supporting judges courtyard and landscape.
  - 3.07m max height.

The detailed design of the retaining walls will be informed by the recommendations of a qualified geotechnical specialists to ensure they are appropriate for the site and managed by relevant conditions.

4 FLOODING

The project area contains flood hazards, including an overland flow path, floodplain and flood prone area, as identified on Auckland Council's GeoMaps. Site specific flood modelling will be undertaken and design mitigation measures will be implemented at the time of future development to avoid adverse flooding effects on the receiving environment. These measures will ensure that natural hazard risk is appropriately managed. In regards to climate change risk, the project area is setback over 160m from the Pahurehure Inlet, and therefore, the potential risk of coastal inundation or sea level rise is low, and is not a risk that would prevent future development of the site.

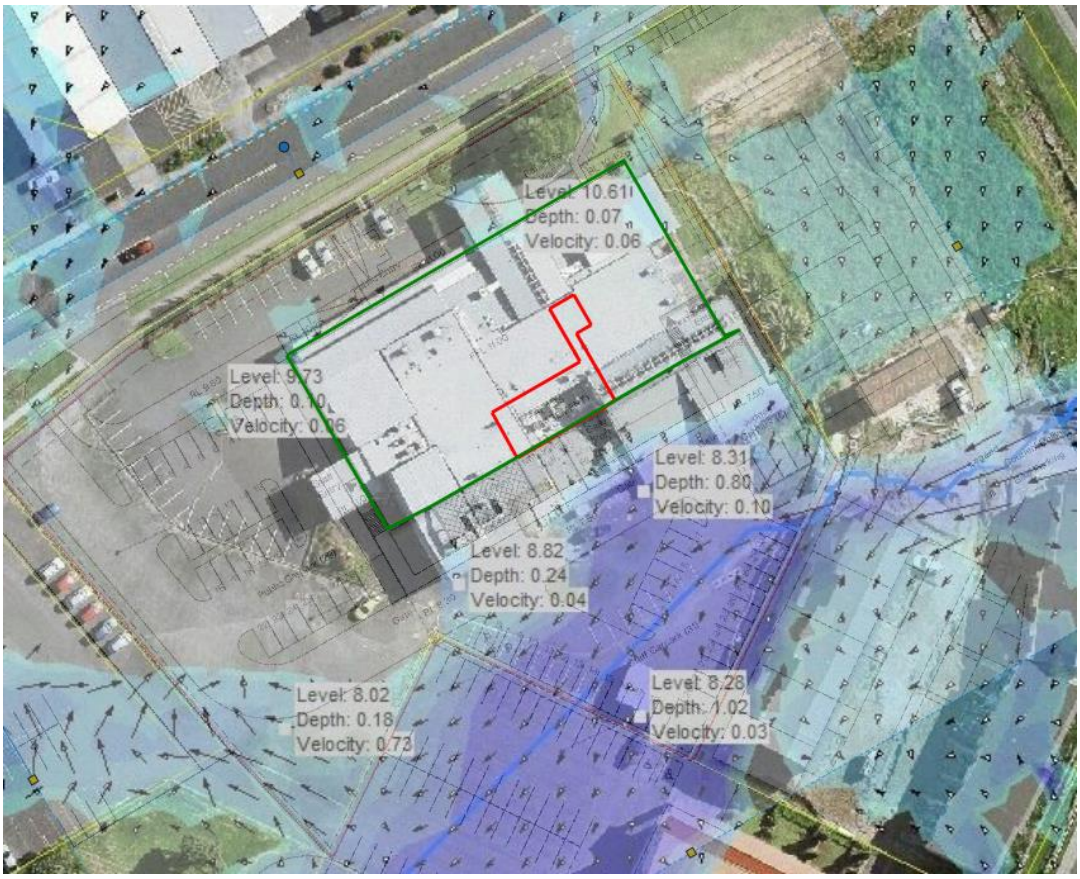


Figure 1: Flood and building overlay.

5 EARTHWORKS

The general earthworks required to facilitate the proposed courthouse development is approximately 2,400m³ over an area of approximately 7,925m². All earthworks activities will be undertaken in accordance with Auckland Council's GD05 Erosion and Sediment Control Guidelines to ensure potential adverse effects associated with dust and sediment control are appropriately managed.

6 REGIONAL SIGNIFICANCE

As noted above, the project area is well connected to Council's reticulated servicing network, including three waters, power and telecommunications, and is a suitable location for the proposed future development. The implementation of mitigation measures to address earthworks, stormwater and flooding effects, will support the establishment of this facility, which is a nationally significant project for the Ministry of Justice, to allow the continued operation of the Papakura District Court in Auckland.

7 REPORT LIMITATIONS

This memo has been prepared for our client for their purposes. It is not to be relied upon or used out of context by any other person without reference to BCD Group Ltd. The reliance by other parties on the information or opinions contained in this report shall, without prior review and agreement in writing, be at such parties' sole risk.

This memo is draft report and is not to be used for design purposes.

Engineering design and/or engineering design recommendations have been made based on the preliminary information provided to BCD. Should these recommendations be utilised for construction, BCD are to sight approved Building Consent drawings to ensure compliance with recommendations made within this report. If a Producer Statement 4 or construction observation is required from BCD (see BCD report and/or consent requirements from council), we are to be contacted prior to construction to outline appropriate inspections milestones.

Prepared by:

Josh Buckley
Graduate Civil/Environmental Engineer
BCD Group Ltd

Reviewed and approved for release by:

Callum Davison
Hamilton Office Manager
BCD Group Ltd

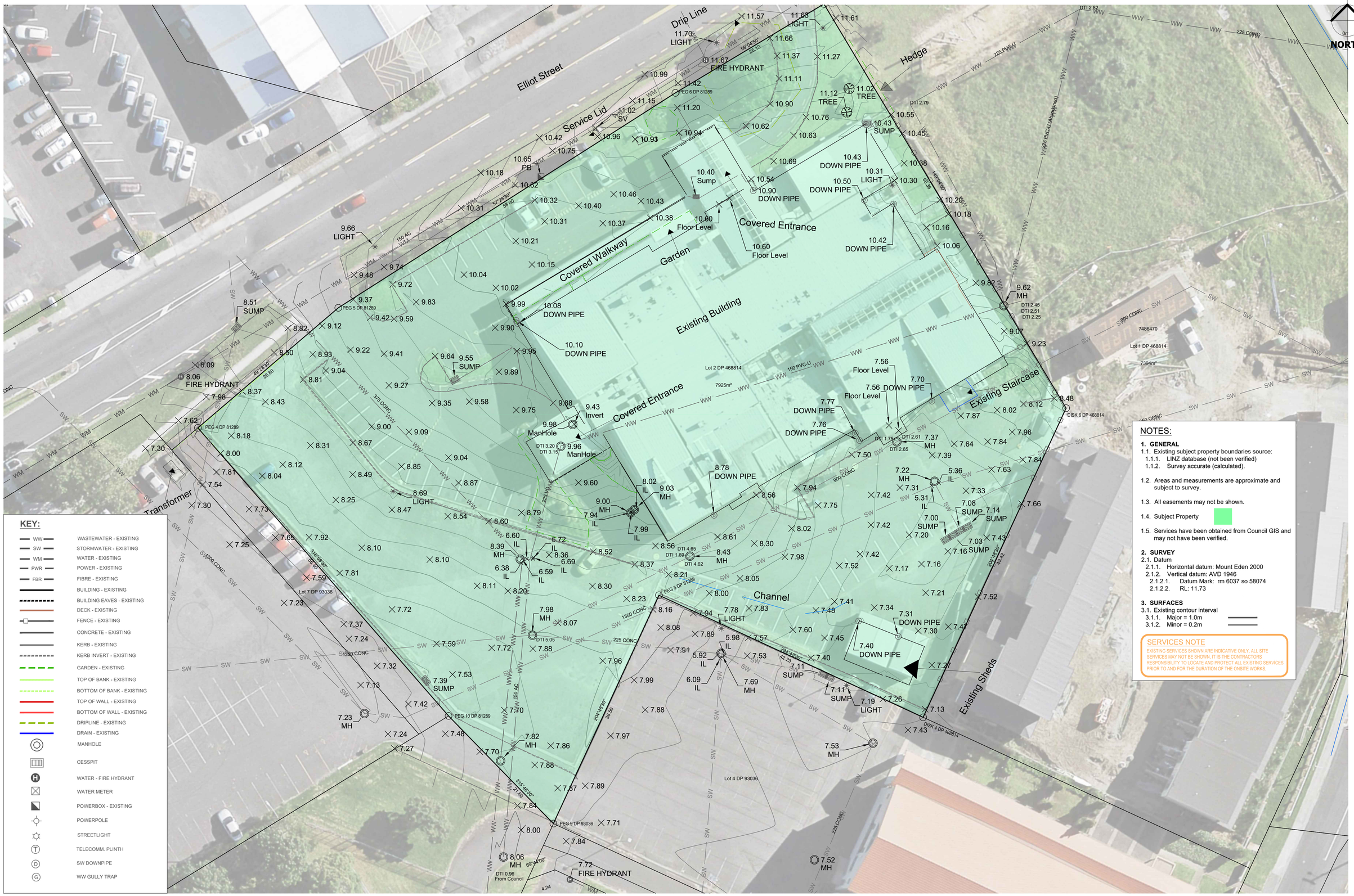
ATTACHMENTS

Appendix A: Survey Topographical Plan

Appendix B: Three Waters Calculations

Appendix C: WIP Civil Drawings

APPENDIX A – Survey Topographical Plan



KEY:

- WW — WASTEWATER - EXISTING
- SW — STORMWATER - EXISTING
- WM — WATER - EXISTING
- PWR — POWER - EXISTING
- FBR — FIBRE - EXISTING
- BUILDING - EXISTING
- BUILDING EAVES - EXISTING
- DECK - EXISTING
- FENCE - EXISTING
- CONCRETE - EXISTING
- KERB - EXISTING
- KERB INVERT - EXISTING
- GARDEN - EXISTING
- TOP OF BANK - EXISTING
- BOTTOM OF BANK - EXISTING
- TOP OF WALL - EXISTING
- BOTTOM OF WALL - EXISTING
- DRIPLINE - EXISTING
- DRAIN - EXISTING
- MANHOLE
- CESSPIT
- WATER - FIRE HYDRANT
- WATER METER
- POWERBOX - EXISTING
- POWERPOLE
- STREETLIGHT
- TELECOMM. PLINTH
- SW DOWNPIPE
- WW GULLY TRAP

NOTES:

1. GENERAL

1.1. Existing subject property boundaries source:
- 1.1.1. LINZ database (not been verified)
- 1.1.2. Survey accurate (calculated).

1.2. Areas and measurements are approximate and subject to survey.

1.3. All easements may not be shown.

1.4. Subject Property

1.5. Services have been obtained from Council GIS and may not have been verified.

2. SURVEY

2.1. Datum
- 2.1.1. Horizontal datum: Mount Eden 2000
- 2.1.2. Vertical datum: AVD 1946
  - 2.1.2.1. Datum Mark: rm 6037 so 58074
  - 2.1.2.2. RL: 11.73

3. SURFACES

3.1. Existing contour interval
- 3.1.1. Major = 1.0m
- 3.1.2. Minor = 0.2m

SERVICES NOTE

EXISTING SERVICES SHOWN ARE INDICATIVE ONLY. ALL SITE SERVICES MAY NOT BE SHOWN. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE AND PROTECT ALL EXISTING SERVICES PRIOR TO AND FOR THE DURATION OF THE ONSITE WORKS.

Client

Contractor

BCD GROUP

Sheet
TOPOGRAPHICAL SURVEY OF LOT 2 DP 468814

Project Title
PAPAKURA ITERIM COURTHOUSE
40 Elliot Street, Papakura

Rev	Date	by	Reason
1	22/01/24	DL	FOR INFORMATION

Drawn: DL | Scale: 1:250 | at A1
Engineer: SJ
Job No: 23-1920 | Sheet No: C-001 | Revision 1

all dimensions to be verified on site before making any shop drawings or commencing any work.

BCD GROUP

FOR INFO
FOR INFORMATION PURPOSES ONLY

DRAFT

JOB NUMBER: 23-1920

PAPAKURA INTERIM COURTHOUSE
40 ELLIOT STREET, PAPAKURA, AUCKLAND

bcdgroup.nz

NORTH

Tender Notes

1. Drawings issued prior to the completion of Building Consent issue are for the purpose of enabling the client/contractor to prepare, submit and negotiate a cost competitive and compliant tender for the project only.
2. The client acknowledges that the Preliminary Design is an incomplete design, prepared with a limited time frame, with input provided by the client, other organisations and third parties and in many respects relied on experienced engineering judgement. Accordingly, amendments to the design may be required when further information is obtained as design/construction progresses. Such amendments may include additional work, increased quantities and or additional time. The consultant shall not be responsible for the cost of such additional work, quantities or time unless the consultant is proven to have been negligent in preparation of the design. Furthermore, the consultant shall not be liable for any inaccuracies or incompleteness of any information not collected under the consultants direct control notwithstanding any coordination or management role undertaken by the consultants part of the services. To mitigate such risks of errors or omissions, the consultant will exercise due care and diligence in preparing the Design Documentation and will be available at the clients request to participate in a cost risk analysis with the client to enable a contingency sum for risk to be included in the tendered price for the project.
3. The parties agree that:
   - 3.a. The services and design documents do not and cannot constitute a complete Engineering Design and are likely to contain differences from the final engineering design when produced.
   - 3.b. The risk of any such differences and any consequences that may flow from such differences (whether in relation to cost or otherwise) are solely the risk of the client.
   - 3.c. BCD has provided Preliminary Design information and such information cannot be considered to be a fully detailed and checked design and that the client will prepare and price tender generally having regard to issues which arise as a result of not having such a fully detailed and checked design.
4. The client must act in good faith and use all reasonable endeavours to work on a regular basis with the consultant to minimise the risk of error to develop solutions that fulfil the project requirements and embrace the clients preferred construction methodologies and practices.

Standard Abbreviations

Structural Abbreviations

UB	universal beam
UC	universal column
SHS	square hollow section
RHS	rectangle hollow section
UA	unequal angle
EA	equal angle
PFC	parrallel flange channel
CHS	circular hollow section
TFB	tapered flange beam
WB	welded beam
G	grade
Galv	galvanised
SP	splice
DB	drossbach tube
PC	precast concrete panel
CON	concrete
CJ	control joint
EJ	expansion joint
HDG	hot dip galvanised
MS	mild steel
FT	flat
PLY	plywood
SS	stainless steel
FWAR	fillet weld all round
BW	butt weld
FP	full penetration

Foundation / Reinforcing Abbreviations

crs	centres
T&B	top & bottom
EW	each way
EF	each face
vert	vertical reinforcing
horz	horzontal reinforcing
IF	inside face
OF	outside face
BF	both faces
SSL	structural slab level

Civil Abbreviations

MH	manhole
CP	catchpit
LL	lid level
IL	invert level
RL	reduced level
SW	stormwater
SS	sanitary sewer
WW	waste water
WM/S	water main/supply
ROW	right of way
BC	basecourse
SB	subbase
SG	subgrade

General Abbreviations

TBC	to be confirmed
NTS	not to scale
COS	confirm on site
RL	reduced level
FFL	finish floor level
EX	existing
DTF	document transmittal form
max	maximum
min	minimum
APPR	approved
BLDG	building
CL	centre line
CNR	corner
DIM	dimension
m	metre
mm	millimetre
MISC	miscellaneous
NO	number
NZS	New Zealand Standard
R	radius
REF	reference
SK	sketch
SPEC	specification
TYP	typical

Plumbing Abbreviations

GT	gully trap
ORG	overflow relief gully
TV	terminal vent
FWG	floor waste gully
WC	water closet
HT	hose tap
GT	gully trap
DP	down pipe
DIA	diameter
ID	inside diameter
OD	outside diameter
IL	invert level
OF	over flow
OFO	over flow outlet

Architectural Abbreviations

DPM	damp proof membrane
DPC	damp proof course

Drawing List

Sheet Number	Sheet Name	Current Revision Date	Revision
C-000	INDEX & STANDARD NOTES	22-03-2024	2
C-001	EXISTING SITE PLAN	13-02-2024	1
C-100	PROPOSED SITE PLAN	22-03-2024	1
C-105	SITE SERVICES PLAN	22-03-2024	2
C-107	WASTEWATER PIPE SECTIONS	22-03-2024	2
C-200	CHANGE IN LEVELS PLAN	22-03-2024	1
C-250	SITE SECTIONS SHEET 1	22-03-2024	1
C-251	SITE SECTIONS SHEET 2	22-03-2024	1
C-252	SITE SECTIONS SHEET 3	22-03-2024	1
C-260	RETAINING WALL ELEVATIONS	22-03-2024	1

Sheet Setouts

C-001 series - civil drawings
A-100 series - architectural plans
A-200 series - architectural elevations & sections
A-300 series - architectural details
A-400 series - door & window schedule and details
A-450 series - joinery details
A-460 series - interior finishes schedules

S-500 series - structural ground floor and mid floor plans
S-550 series - foundation details
S-560 series - mid floor details
S-600 series - precast & masonry elevations & details
S-620 series - precast stairs & details
S-700 series - holding down bolt plans
S-705 series - structural roof framing plans
S-800 series - structural elevations and sections
S-900 series - structural details
S-1000 series - 3D views

Hamilton Auckland
Tauranga Napier
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FOR INFORMATION PURPOSES ONLY

Original in Colour

Client: MINISTRY OF JUSTICE Tāhū o te Ture

Contractor

BCD GROUP

Sheet: INDEX & STANDARD NOTES

Project Title: PAPAKURA INTERIM COURTHOUSE
40 ELLIOT STREET, PAPAKURA

Rev	Date	by	Reason
2	22-03-2024	JGB	FOR INFORMATION
1	13-02-2024	JGB	FOR INFORMATION

Drawn: JGB Scale: at A1
Engineer: JGB
Job No: 23-1920 Sheet No: C-000 Revision: 2

NORTH

Notes:

- While all due care has been taken during design, the Contractor is to confirm all invert levels and existing surface levels prior to commencing permanent works construction. If any levels are significantly different, these are to be reported to the Engineer immediately.
- The location and extent of existing services shown may not be exhaustive and cannot be guaranteed. All efforts have been made to identify the utilities in the construction area.
- **The Contractor MUST confirm the location of all existing services, and pothole potentially conflicting services prior to commencing permanent works construction if required.**
- If the Contractor locates any utilities not shown on the drawings, or identified by the relevant authority, they are to inform the Engineer immediately. The Engineer shall then advise the Contractor on how to proceed. The Contractor is to include the location of the extra services in the As-Built information they provide to the Engineer.
- Not all service connections have been shown.
- Levels in terms of Auckland Vertical Datum 1946 (AVD 1946)

Legend

- property boundary
- existing contours (0.2m intervals)
- existing manhole
- existing catchpit
- existing hydrant
- SW — existing stormwater
- WW — existing wastewater
- WM — existing water supply
- existing light pole
- existing downpipe

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Client: MINISTRY OF JUSTICE Tāhū o te Ture

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Sheet: **EXISTING SITE PLAN**

Project Title: **PAPAKURA INTERIM COURTHOUSE**

40 ELLIOT STREET, PAPAKURA

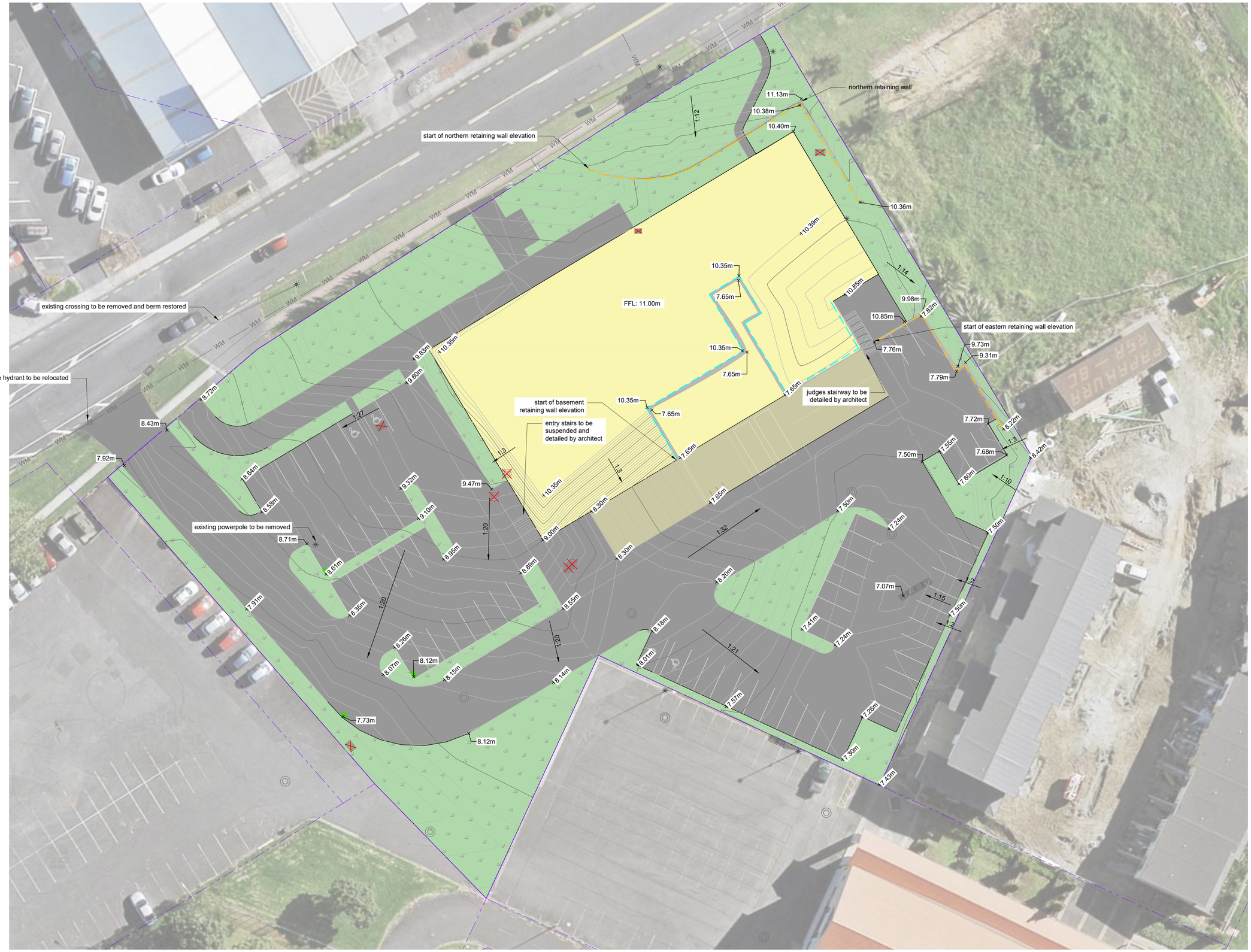
Rev	Date	by	Reason
1	13-02-2024	JGB	FOR INFORMATION

Drawn: JGB | Scale: 1:250 | at A1

Engineer: JGB

Job No:	Sheet No:	Revision
23-1920	C-001	1

all dimensions to be verified on site before making any shop drawings or commencing any work.



NORTH

Notes:

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- Not all service connections have been shown.
- Levels in terms of Auckland Vertical Datum 1946 (AVD 1946)

Legend

- property boundary
- proposed contours (0.1m intervals)
- vehicle asphalt pavement
- vehicle concrete pavement
- concrete footpath
- existing manhole
- existing manhole to be removed
- proposed stormwater manhole
- proposed wastewater manhole
- existing catchpit
- existing catchpit to be removed
- proposed catchpit
- existing hydrant
- existing downpipe
- masonry retaining wall
- timber pole retaining wall

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FOR INFORMATION PURPOSES ONLY

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Client: MINISTRY OF JUSTICE Tāhū o te Ture

Contractor

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Sheet: **PROPOSED SITE PLAN**

Project Title: **PAPAKURA INTERIM COURTHOUSE**

40 ELLIOT STREET, PAPAKURA

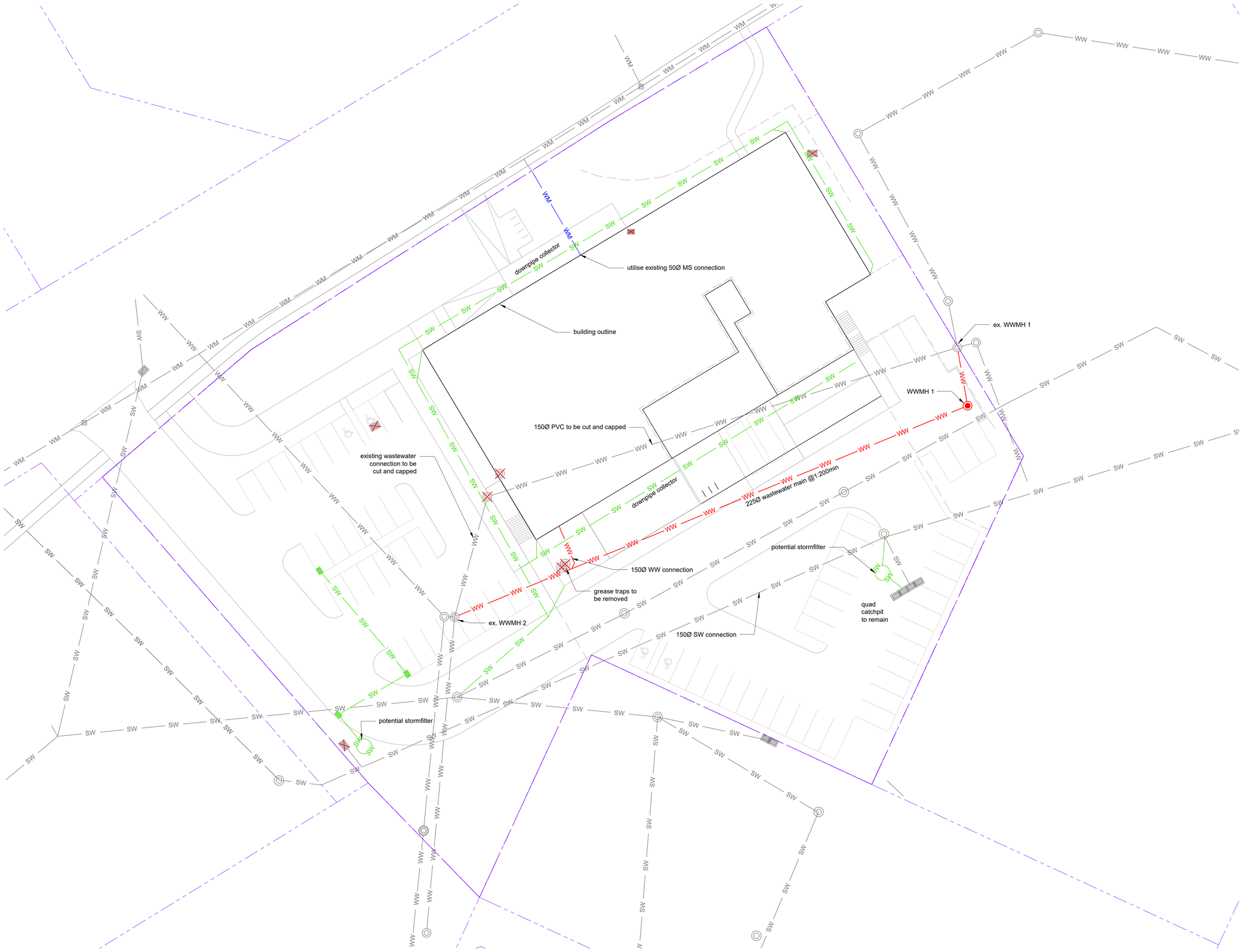
Rev	Date	by	Reason
1	22-03-2024	JGB	FOR INFORMATION

Drawn: JGB | Scale: 1:250 | at A1

Engineer: JGB

Job No:	Sheet No:	Revision
23-1920	C-100	2

all dimensions to be verified on site before making any shop drawings or commencing any work.



Notes:

- While all due care has been taken during design, the Contractor is to confirm all invert levels and existing surface levels prior to commencing permanent works construction. If any levels are significantly different, these are to be reported to the Engineer immediately.
- The location and extent of existing services shown may not be exhaustive and cannot be guaranteed. All efforts have been made to identify the utilities in the construction area.
- **The Contractor MUST confirm the location of all existing services, and pothole potentially conflicting services prior to commencing permanent works construction if required.**
- If the Contractor locates any utilities not shown on the drawings, or identified by the relevant authority, they are to inform the Engineer immediately. The Engineer shall then advise the Contractor on how to proceed. The Contractor is to include the location of the extra services in the As-Built information they provide to the Engineer.
- Not all service connections have been shown.
- All manholes to be 1050Ø unless otherwise noted.
- All pipes uPVC SN10 or greater unless otherwise noted.
- Refer to sheet C-107 for wastewater section.

Legend

- property boundary
- existing manhole
- existing manhole to be removed
- existing catchpit
- existing catchpit to be removed
- existing hydrant
- SW — existing stormwater
- WW — existing wastewater
- WM — existing water supply
- proposed stormwater
- WW — proposed wastewater
- WM — proposed water supply
- SW — potential stormfilter
- retaining wall

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Client: MINISTRY OF JUSTICE Tāhu o te Ture

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Sheet: **SITE SERVICES PLAN**

Project Title: **PAPAKURA INTERIM COURTHOUSE**

40 ELLIOT STREET, PAPAKURA

Rev	Date	by	Reason
2	22-03-2024	JGB	FOR INFORMATION
1	13-02-2024	JGB	FOR INFORMATION

Drawn: JGB | Scale: 1:250 | at A1

Engineer: JGB

Job No: 23-1920 | Sheet No: C-105 | Revision: 2

all dimensions to be verified on site before making any shop drawings or commencing any work.

	ex. WWMH 1		WWMH 1			ex. WWMH 2	
pipe details	225NB UPVC SN16 0.50% (1:200)		225NB UPVC SN16 0.58% (1:172)		150 NB AC 8.51% (1:12)		
lid level	9.62		7.74		8.56		8.52
invert level	7.11		7.07 / 7.02		6.58		6.53 / 6.41
cover to pipe	2.27		1.19 / 1.24		1.54		0.00 / 0.00
distance	0.00		8.08		83.91		85.32

WW longsection

Notes:

- Assumed groundwater RL: 5.6m based on auger results from Soil & Rock
- **The Contractor MUST confirm the location of all existing services, and pothole potentially conflicting services prior to commencing permanent works construction if required.**
- All pipes uPVC SN10 or greater unless otherwise noted.
- Levels in terms of Auckland Vertical Datum 1946

NORTH

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Client	Contractor		
MINISTRY OF JUSTICE Tāhū o te Ture		BCD GROUP	

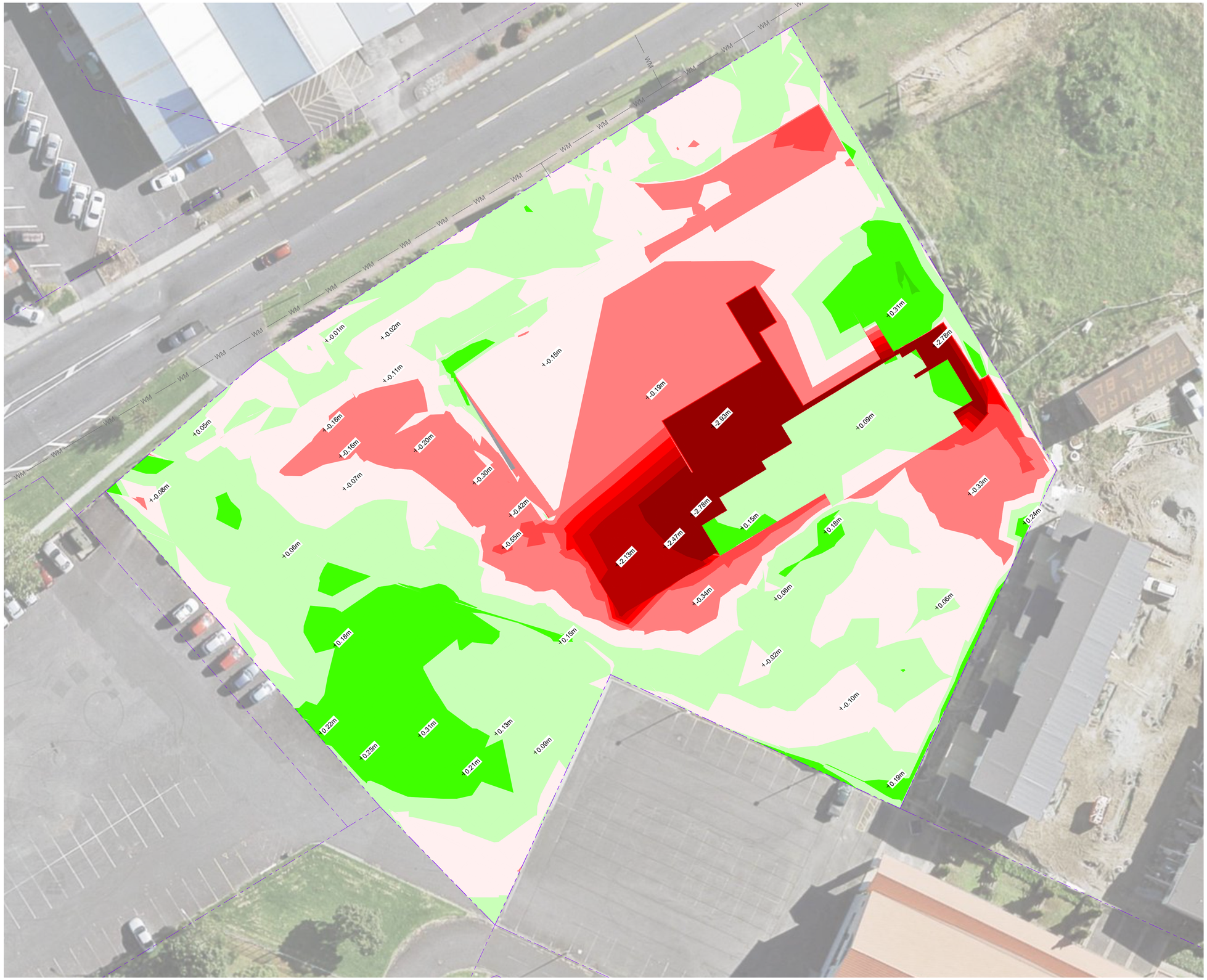
Sheet: **WASTEWATER PIPE SECTION**

Project Title: **PAPAKURA INTERIM COURTHOUSE**
40 ELLIOT STREET, PAPAKURA

Rev	Date	by	Reason
2	22-03-2024	JGB	FOR INFORMATION
1	13-02-2024	JGB	FOR INFORMATION

Drawn: JGB	Scale: 1:200	at A1
Engineer: JGB		
Job No: 23-1920	Sheet No: C-107	Revision 2

all dimensions to be verified on site before making any shop drawings or commencing any work.



NORTH

Notes:

Plan shows necessary change in levels required to achieve finished ground levels. Including proposed and existing pavement seal and build up.

- Any site won material to be used as Fill is to be approved by a Geotechnical Engineer

To be read in conjunction with Soil & Rock Consultants Geotechnical Report.

Earthworks Summary

- Affected Area
  - 7906m^2
- Cut (to achieve finished ground levels)
  - 2044m^3
- Fill (to achieve finished ground levels)
  - 356m^3

Note: Volumes are indicative only, as they are solid measure, and do not take in to consideration:

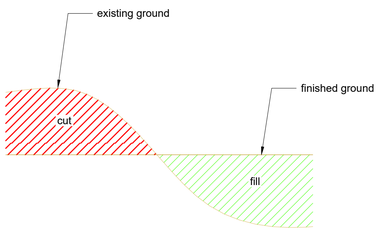
- *service trenching;*
- *temporary site works; or*
- *additional excavation beneath pavement or structure following discovery of unsuitable material.*

Legend

property boundary

Surface Analysis: Elevation

Number	Color	Minimum Elevation (m)	M
1		-3.500	
2		-3.000	
3		-2.500	
4		-2.000	
5		-1.500	
6		-1.000	



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Client: MINISTRY OF JUSTICE Tāhū o te Ture

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Sheet: **CHANGE IN LEVELS PLAN**

Project Title: **PAPAKURA INTERIM COURTHOUSE**

40 ELLIOT STREET, PAPAKURA

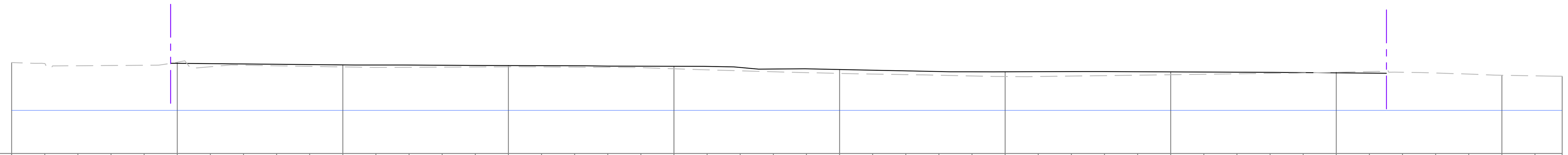
Rev	Date	by	Reason
1	22-03-2024	JGB	FOR INFORMATION

Drawn: JGB | Scale: 1:250 | at A1

Engineer: JGB

Job No:	Sheet No:	Revision
23-1920	C-200	1

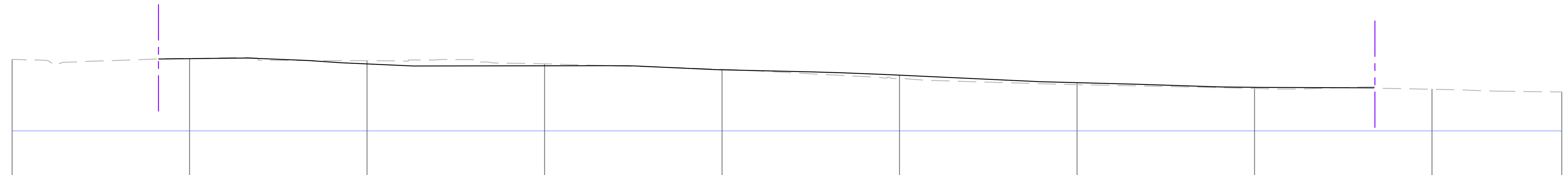
all dimensions to be verified on site before making any shop drawings or commencing any work.



design level						8.46	8.44	8.43	8.41	8.39	8.37	8.36	8.36	8.34	8.33	8.32	8.32	8.31	8.29	8.29	8.28	8.28	8.21	8.12
existing level	8.51	8.45	8.32	8.33	8.34	8.53	8.25	8.35	8.31	8.28	8.25	8.22	8.22	8.23	8.24	8.25	8.25	8.23	8.22	8.20	8.13	8.07	8.01	7.95
change in levels						-0.06	0.19	0.08	0.10	0.11	0.12	0.14	0.13	0.11	0.09	0.07	0.07	0.08	0.07	0.08	0.15	0.21	0.20	0.17
distance	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00	24.00	26.00	28.00	30.00	32.00	34.00	36.00	38.00	40.00	42.00	44.00	46.00

design level	8.13	8.09	8.04	8.01	7.96	7.95	7.95	7.96	7.96	7.96	7.95	7.94	7.93	7.93	7.92	7.90	7.88	7.87						
existing level	7.90	7.85	7.81	7.78	7.74	7.70	7.66	7.66	7.69	7.72	7.74	7.77	7.80	7.83	7.86	7.88	7.92	7.96	7.92	7.88	7.81	7.74	7.70	7.68
change in levels	0.23	0.23	0.23	0.23	0.22	0.25	0.29	0.29	0.27	0.25	0.21	0.17	0.14	0.10	0.06	0.02	-0.04	-0.09						
distance	48.00	50.00	52.00	54.00	56.00	58.00	60.00	62.00	64.00	66.00	68.00	70.00	72.00	74.00	76.00	78.00	80.00	82.00	84.00	86.00	88.00	90.00	92.00	93.64

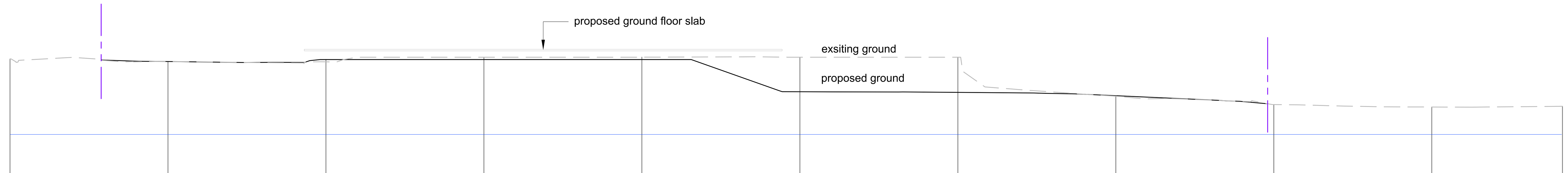
Section A longsection



design level						9.67	9.69	9.68	9.59	9.48	9.37	9.28	9.26	9.26	9.27	9.27	9.27	9.27	9.22	9.13	9.04	9.00	8.95
existing level	9.63	9.57	9.51	9.57	9.64	9.69	9.72	9.57	9.57	9.56	9.56	9.54	9.61	9.62	9.41	9.38	9.32	9.27	9.21	9.14	9.07	8.98	8.87
change in levels						-0.02	-0.03	0.10	0.03	-0.08	-0.18	-0.25	-0.35	-0.35	-0.15	-0.11	-0.05	0.01	0.01	-0.02	-0.03	0.02	0.08
distance	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00	24.00	26.00	28.00	30.00	32.00	34.00	36.00	38.00	40.00	42.00	44.00

design level	8.90	8.82	8.74	8.65	8.55	8.46	8.37	8.32	8.26	8.21	8.14	8.08	8.05	8.04	8.04	8.03						
existing level	8.76	8.66	8.55	8.44	8.38	8.32	8.26	8.21	8.17	8.13	8.08	8.04	7.99	7.96	8.01	8.07	7.99	7.95	7.90	7.83	7.81	7.79
change in levels	0.13	0.16	0.18	0.21	0.18	0.14	0.11	0.11	0.10	0.08	0.06	0.05	0.06	0.09	0.03	-0.04						
distance	46.00	48.00	50.00	52.00	54.00	56.00	58.00	60.00	62.00	64.00	66.00	68.00	70.00	72.00	74.00	76.00	78.00	80.00	82.00	84.00	86.00	87.31

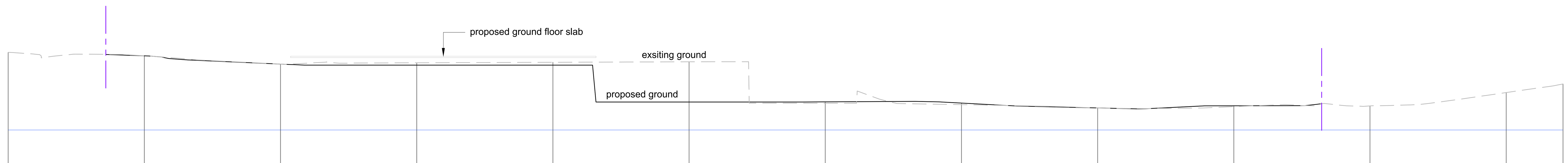
Section B longsection



design level				10.32	10.25	10.23	10.20	10.18	10.17	10.17	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.04	9.33	8.62
existing level	10.39	10.38	10.49	10.29	10.20	10.22	10.21	10.18	10.15	10.14	10.20	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.51	10.51	10.52	10.52
change in levels				0.03	0.04	0.00	-0.01	-0.01	0.02	0.03	0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.16	-0.47	-1.19	-1.90
distance	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00	24.00	26.00	28.00	30.00	32.00	34.00	36.00	38.00	40.00	42.00	44.00	46.00	48.00

design level	8.31	8.30	8.30	8.29	8.29	8.27	8.25	8.24	8.20	8.15	8.06	7.97	7.88	7.78	7.69											
existing level	10.50	10.50	10.50	10.50	10.50	10.50	8.59	8.44	8.29	8.15	8.03	7.86	7.86	7.78	7.70	7.50	7.47	7.41	7.37	7.35	7.34	7.33	7.35	7.36	7.38	7.39
change in levels	-2.19	-2.20	-2.20	-2.21	-2.21	-2.23	-0.34	-0.20	-0.10	-0.01	0.03	0.11	0.02	0.01	-0.01											
distance	50.00	52.00	54.00	56.00	58.00	60.00	62.00	64.00	66.00	68.00	70.00	72.00	74.00	76.00	78.00	80.00	82.00	84.00	86.00	88.00	90.00	92.00	94.00	96.00	98.00	98.27

Section C longsection

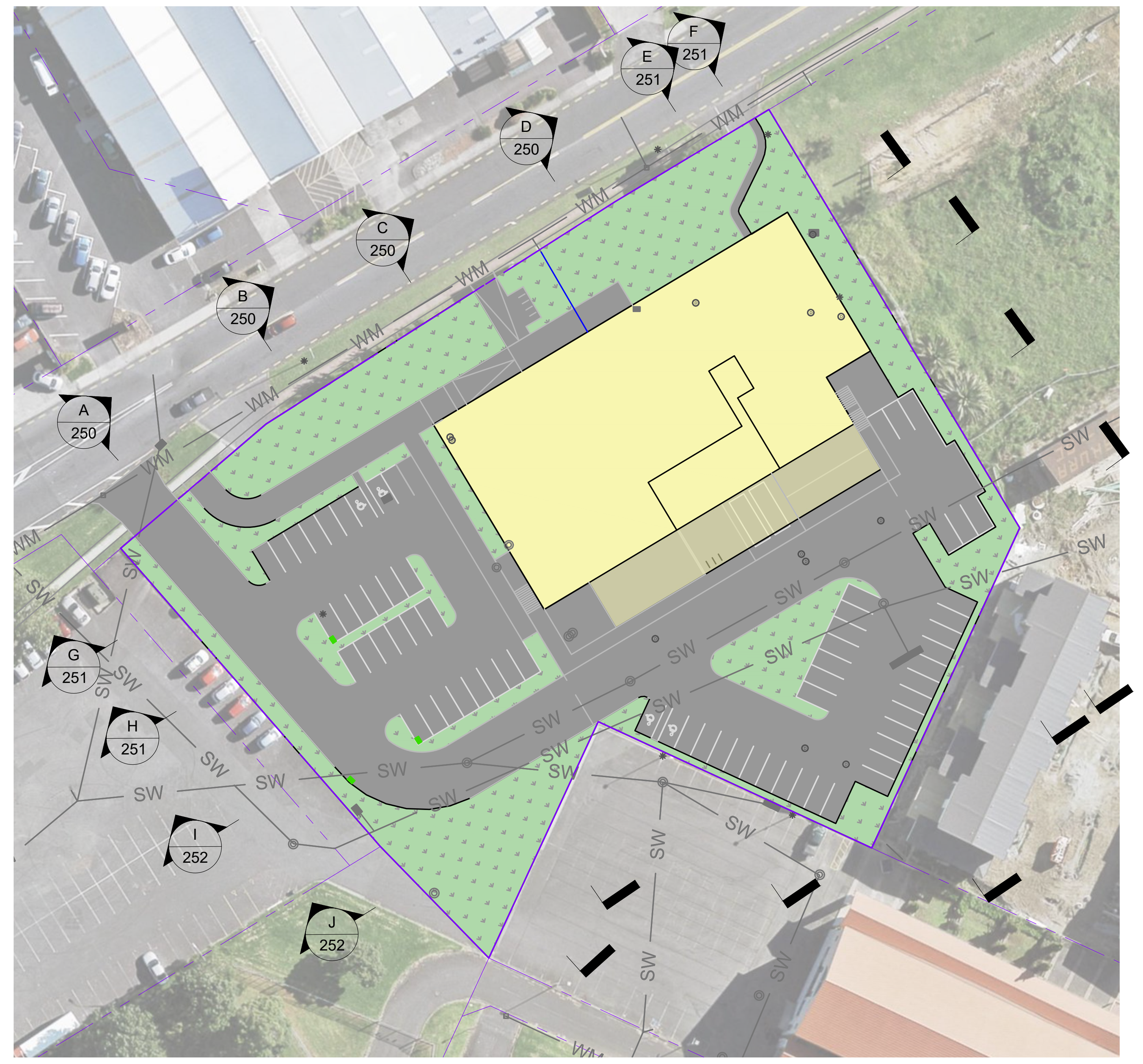


design level					11.10	11.03	10.82	10.70	10.60	10.51	10.42	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	10.35	7.65	7.65	7.65	7.65	7.65	7.65	7.65
existing level	11.28	11.15	11.07	11.15	11.14	11.03	10.89	10.73	10.63	10.53	10.43	10.49	10.51	10.50	10.51	10.52	10.53	10.53	10.54	10.55	10.56	10.56	10.57	10.58	10.59	10.59	10.60	10.60	7.56
change in levels					-0.04	0.00	-0.08	-0.03	-0.02	-0.01	0.00	-0.14	-0.16	-0.15	-0.16	-0.17	-0.18	-0.18	-0.19	-0.20	-0.21	-0.21	-2.92	-2.93	-2.94	-2.94	-2.95	-2.95	0.09
distance	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00	24.00	26.00	28.00	30.00	32.00	34.00	36.00	38.00	40.00	42.00	44.00	46.00	48.00	50.00	52.00	54.00	56.00

design level	7.65	7.66	7.67	7.68	7.69	7.67	7.57	7.46	7.36	7.31	7.26	7.22	7.17	7.18	7.28	7.37	7.37	7.38	7.38	7.47										
existing level	7.56	7.56	7.56	7.85	7.53	7.49	7.46	7.42	7.38	7.34	7.29	7.21	7.18	7.17	7.19	7.23	7.31	7.39	7.45	7.37	7.40	7.36	7.41	7.51	7.77	8.05	8.34	8.63	8.94	8.97
change in levels	0.09	0.10	0.11	-0.17	0.17	0.18	0.11	0.04	-0.02	-0.03	-0.03	0.00	-0.01	0.00	0.08	0.15	0.06	-0.02	-0.07	0.10										
distance	58.00	60.00	62.00	64.00	66.00	68.00	70.00	72.00	74.00	76.00	78.00	80.00	82.00	84.00	86.00	88.00	90.00	92.00	94.00	96.00	98.00	100.00	102.00	104.00	106.00	108.00	110.00	112.00	114.00	114.17

Section D longsection

NORTH



Site Section Reference Plan
scale 1:750

Notes:

- Assumed groundwater RL: 5.6m based on auger results from Soil & Rock
- Levels in terms of Auckland Vertical Datum 1946
- Levels beyond boundary are retrieved from LINZ

FOR INFO
FOR INFORMATION PURPOSES ONLY

DRAFT

Client: MINISTRY OF JUSTICE Tāhū o te Ture

Contractor

BCD GROUP

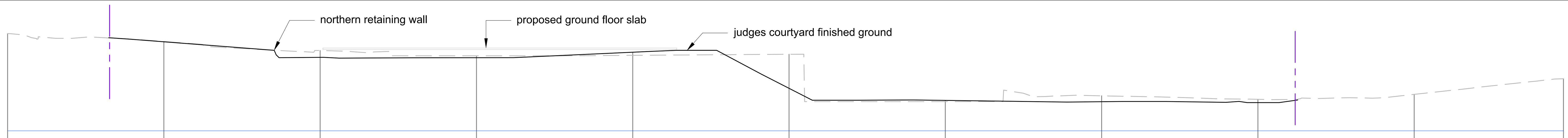
Sheet: SITE SECTIONS SHEET 1

Project Title: PAPAKURA INTERIM COURTHOUSE
40 ELLIOT STREET, PAPAKURA

Rev	Date	by	Reason
1	21-03-2024	JGB	FOR INFORMATION

Drawn: JGB | Scale: 1:200 at A1
Engineer: JGB
Job No: 23-1920 | Sheet No: C-250 | Revision: 1

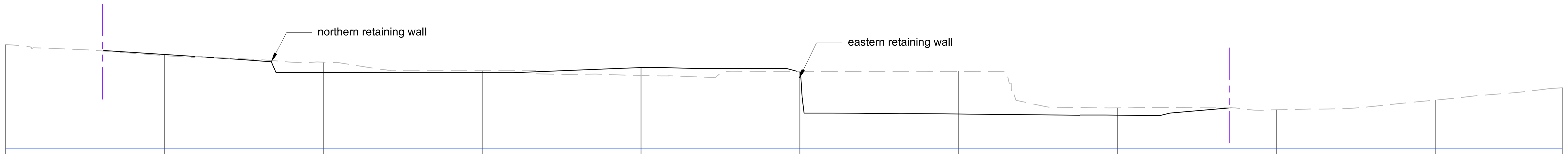
all dimensions to be verified on site before making any shop drawings or commencing any work.



VERT EXAG 1:1
Datum 3.000

distance	design level	existing level	change in levels
0.00		11.93	
2.00		11.71	
4.00		11.62	
6.00		11.67	
8.00	11.55	11.56	0.00
10.00	11.40	11.42	-0.02
12.00	11.24	11.27	-0.03
14.00	11.09	11.02	0.07
16.00	10.93	10.91	0.02
18.00	10.38	10.81	-0.42
20.00	10.40	10.84	-0.44
22.00	10.35	10.77	-0.42
24.00	10.36	10.77	-0.40
26.00	10.37	10.50	-0.13
28.00	10.38	10.50	-0.12
30.00	10.38	10.50	-0.12
32.00	10.38	10.50	-0.12
34.00	10.46	10.50	-0.04
36.00	10.55	10.50	0.04
38.00	10.64	10.52	0.12
40.00	10.73	10.53	0.20
42.00	10.82	10.54	0.27
44.00	10.85	10.56	0.29
46.00	10.51	10.57	-0.06
48.00	9.44	10.59	-1.14
50.00	8.41	10.60	-2.18
52.00	7.65	7.56	0.09
54.00	7.65	7.56	0.09
56.00	7.66	7.56	0.10
58.00	7.67	7.56	0.11
60.00	7.64	7.56	0.08
62.00	7.61	7.56	0.05
64.00	7.59	8.26	-0.67
66.00	7.56	7.88	-0.32
68.00	7.54	7.96	-0.42
70.00	7.56	7.93	-0.38
72.00	7.57	7.90	-0.33
74.00	7.57	7.86	-0.29
76.00	7.54	7.79	-0.25
78.00	7.52	7.74	-0.22
80.00	7.50	7.71	-0.21
82.00	7.59	7.70	-0.11
84.00		7.76	
86.00		7.81	
88.00		7.82	
90.00		8.03	
92.00		8.24	
94.00		8.47	
96.00		8.69	
98.00		8.90	
99.55		9.03	

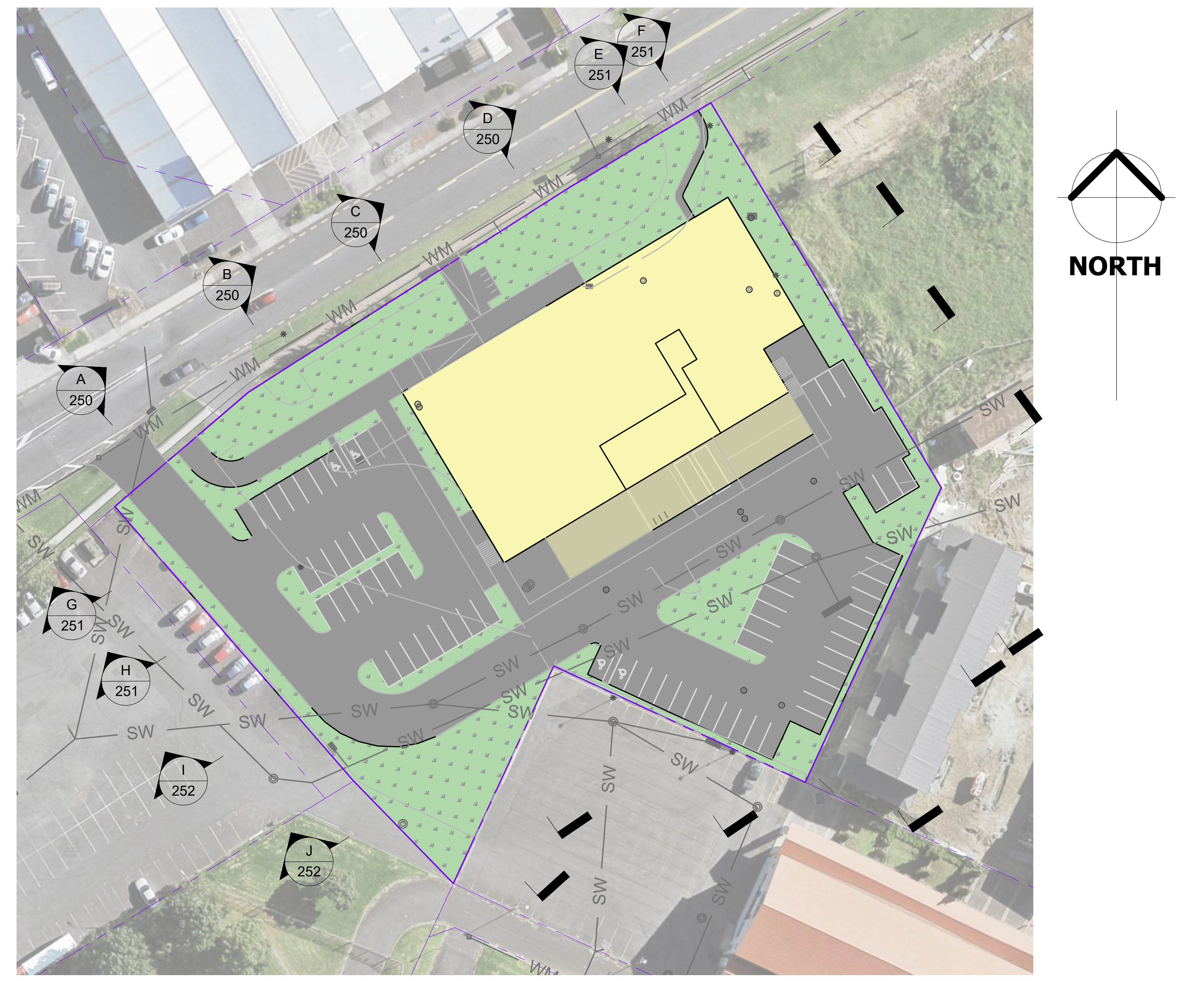
Section E longsection



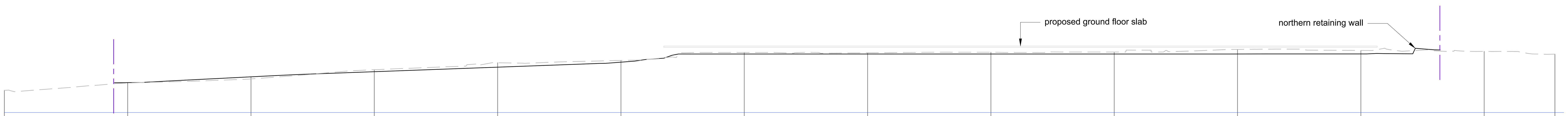
VERT EXAG 1:1
Datum 3.000

distance	design level	existing level	change in levels
0.00		12.16	
2.00		11.95	
4.00		11.87	
6.00		11.76	
8.00	11.66	11.61	0.05
10.00	11.53	11.46	0.07
12.00	11.40	11.41	-0.01
14.00	11.27	11.30	-0.03
16.00	11.12	11.20	-0.08
18.00	10.39	11.04	-0.66
20.00	10.39	11.05	-0.66
22.00	10.38	10.85	-0.46
24.00	10.38	10.55	-0.17
26.00	10.38	10.50	-0.12
28.00	10.38	10.50	-0.12
30.00	10.38	10.50	-0.12
32.00	10.38	10.50	-0.12
34.00	10.46	10.30	0.17
36.00	10.54	10.28	0.27
38.00	10.62	10.26	0.36
40.00	10.70	10.20	0.50
42.00	10.68	10.17	0.51
44.00	10.65	10.09	0.55
46.00	10.65	10.44	0.21
48.00	10.65	10.44	0.20
50.00	10.42	10.45	-0.03
52.00	7.82	10.45	-2.63
54.00	7.81	10.46	-2.64
56.00	7.79	10.46	-2.68
58.00	7.78	10.47	-2.68
60.00	7.77	10.45	-2.69
62.00	7.74	10.46	-2.72
64.00	7.72	8.55	-0.82
66.00	7.71	8.19	-0.49
68.00	7.70	8.17	-0.47
70.00	7.69	8.15	-0.46
72.00	7.67	8.17	-0.50
74.00	7.89	8.18	-0.30
76.00	8.06	8.16	-0.10
78.00		8.07	
80.00		8.03	
82.00		8.08	
84.00		8.10	
86.00		8.24	
88.00		8.45	
90.00		8.65	
92.00		8.86	
94.00		9.03	
96.00		9.22	
98.00		9.43	

Section F longsection



Site Section Reference Plan
scale 1:750



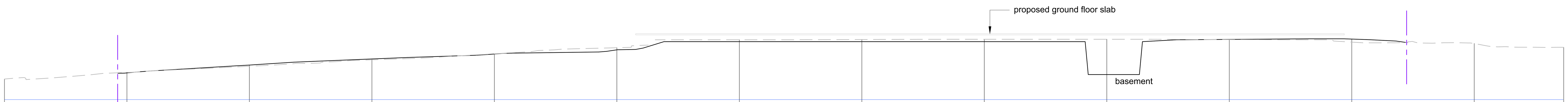
VERT EXAG 1:1
Datum 3.000

distance	design level	existing level	change in levels
0.00		7.40	
2.00		7.38	
4.00		7.53	
6.00		7.69	
8.00		7.86	
10.00	8.03	7.99	0.04
12.00	8.09	8.06	0.03
14.00	8.19	8.10	0.09
16.00	8.29	8.17	0.13
18.00	8.40	8.24	0.15
20.00	8.50	8.33	0.17
22.00	8.60	8.48	0.12
24.00	8.69	8.63	0.07
26.00	8.77	8.81	-0.04
28.00	8.84	8.98	-0.13
30.00	8.92	9.07	-0.16
32.00	8.99	9.16	-0.17
34.00	9.06	9.24	-0.17
36.00	9.14	9.32	-0.18
38.00	9.21	9.52	-0.31
40.00	9.28	9.64	-0.36
42.00	9.36	9.61	-0.25
44.00	9.43	9.67	-0.24
46.00	9.51	9.73	-0.23
48.00	9.58	9.78	-0.20
50.00	9.69	9.83	-0.14
52.00	9.91	9.90	0.00
54.00	10.20	10.10	0.10
56.00	10.35	10.48	-0.13
58.00	10.35	10.48	-0.13
60.00	10.35	10.48	-0.13
62.00	10.35	10.48	-0.13
64.00	10.35	10.43	-0.08
66.00	10.35	10.48	-0.13
68.00	10.35	10.43	-0.08
70.00	10.35	10.45	-0.10
72.00	10.35	10.47	-0.12
74.00	10.35	10.48	-0.13
76.00	10.35	10.50	-0.15
78.00	10.35	10.50	-0.15
80.00	10.35	10.50	-0.15
82.00	10.35	10.48	-0.13
84.00	10.35	10.47	-0.12
86.00	10.35	10.51	-0.16
88.00	10.35	10.51	-0.16
90.00	10.35	10.51	-0.16
92.00	10.35	10.67	-0.32
94.00	10.35	10.52	-0.17
96.00	10.35	10.59	-0.24
98.00	10.35	10.67	-0.32
100.00	10.35	10.73	-0.38
102.00	10.36	10.74	-0.39
104.00	10.36	10.75	-0.39
106.00	10.36	10.67	-0.31
108.00	10.36	10.66	-0.30
110.00	10.36	10.65	-0.28
112.00	10.39	10.79	-0.40
114.00	10.37	10.61	-0.24
116.00	10.69	10.61	0.08
118.00		10.61	0.09
120.00		10.56	
122.00		10.56	
124.00		10.35	
125.74		10.35	

Section G longsection

Notes:

- Assumed groundwater RL: 5.6m based on auger results from Soil & Rock
- Levels in terms of Auckland Vertical Datum 1946
- Levels beyond boundary are retrieved from LINZ



VERT EXAG 1:1
Datum 3.000

distance	design level	existing level	change in levels
0.00		7.28	
2.00		7.25	
4.00		7.38	
6.00		7.54	
8.00		7.74	
10.00	7.79	7.83	-0.04
12.00	7.95	7.94	0.00
14.00	8.07	8.04	0.03
16.00	8.19	8.13	0.06
18.00	8.31	8.23	0.08
20.00	8.43	8.33	0.10
22.00	8.56	8.43	0.13
24.00	8.68	8.57	0.11
26.00	8.76	8.66	0.10
28.00	8.85	8.78	0.07
30.00	8.93	8.86	0.07
32.00	9.01	8.93	0.09
34.00	9.09	9.00	0.09
36.00	9.15	9.12	0.04
38.00	9.22	9.24	-0.02
40.00	9.34	9.35	-0.02
42.00	9.41	9.47	-0.06
44.00	9.44	9.64	-0.20
46.00	9.47	9.75	-0.28
48.00	9.50	9.80	-0.30
50.00	9.68	9.85	-0.17
52.00	9.80	10.04	-0.25
54.00	10.35	10.50	-0.15
56.00	10.35	10.50	-0.15
58.00	10.35	10.50	-0.15
60.00	10.35	10.50	-0.15
62.00	10.35	10.50	-0.15
64.00	10.35	10.50	-0.15
66.00	10.35	10.51	-0.16
68.00	10.35	10.51	-0.16
70.00	10.35	10.52	-0.17
72.00	10.35	10.53	-0.18
74.00	10.35	10.54	-0.19
76.00	10.35	10.54	-0.19
78.00	10.35	10.54	-0.19
80.00	10.35	10.54	-0.19
82.00	10.35	10.54	-0.19
84.00	10.35	10.54	-0.19
86.00	10.35	10.54	-0.19
88.00	10.35	10.54	-0.19
90.00	7.65	10.54	-2.89
92.00	7.65	10.54	-2.89
94.00	10.41	10.54	-0.13
96.00	10.50	10.53	-0.03
98.00	10.52	10.52	-0.01
100.00	10.53	10.52	0.01
102.00	10.55	10.51	0.04
104.00	10.56	10.50	0.06
106.00	10.58	10.50	0.08
108.00	10.58	10.50	0.08
110.00	10.56	10.31	0.25
112.00	10.48	10.25	0.23
114.00	10.34	10.27	0.08
116.00		10.23	0.00
118.00		10.26	
120.00		10.19	
122.00		9.92	
124.00		9.89	
126.00		9.87	
127.30		9.88	

Section H longsection

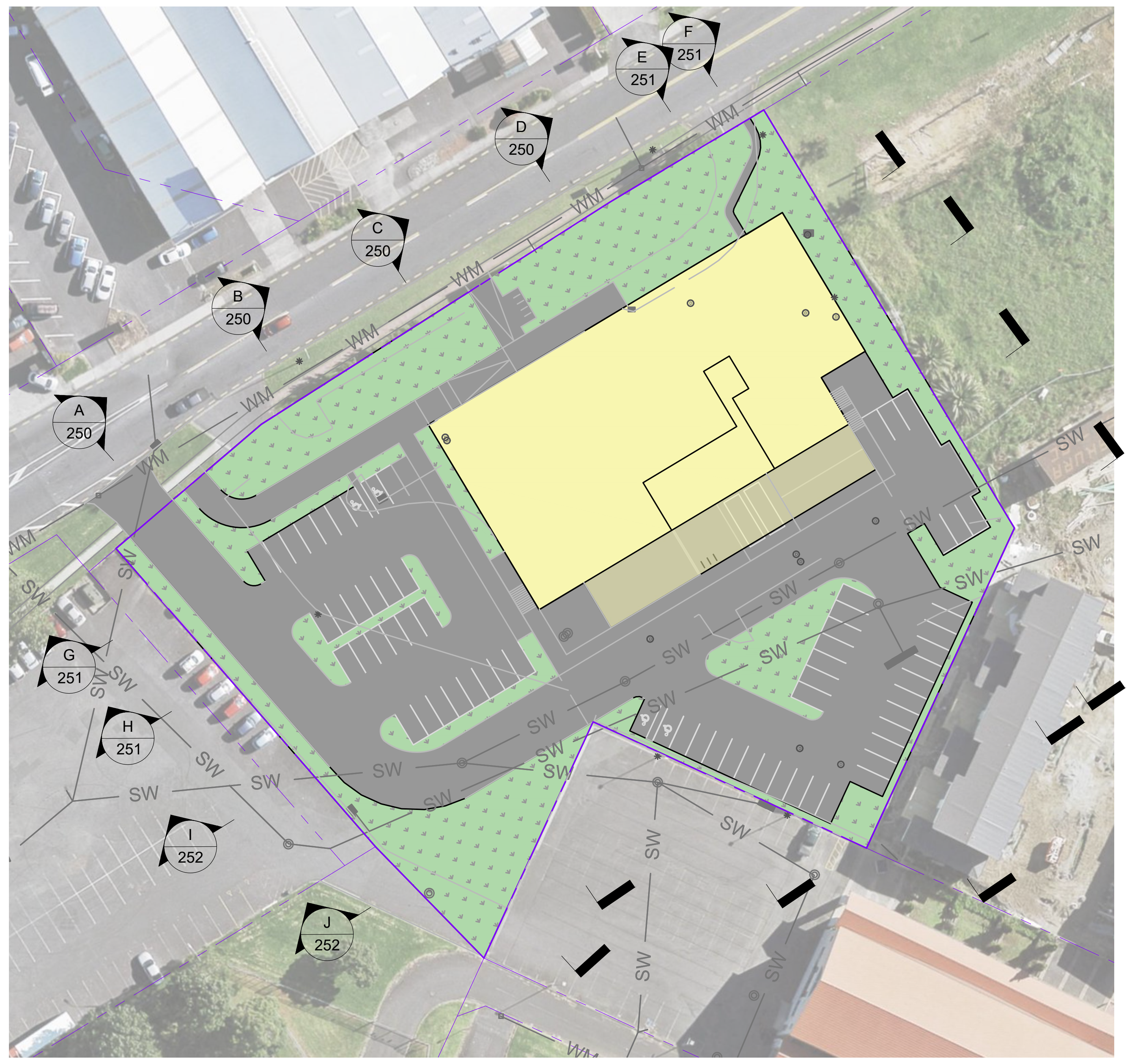
FOR INFO
FOR INFORMATION PURPOSES ONLY

DRAFT

Client	Contractor	Sheet			
MINISTRY OF JUSTICE Tāhū o te Ture		SITE SECTIONS SHEET 2			
		Project Title: PAPAKURA INTERIM COURTHOUSE, 40 ELLIOT STREET, PAPAKURA			

Rev	Date	by	Reason
1	22-03-2024	JGB	FOR INFORMATION

Drawn: JGB	Scale: 1:200	at A1
Engineer: JGB		
Job No: 23-1920	Sheet No: C-251	Revision: 1



Site Section Reference Plan
scale 1:750

Notes:

- Assumed groundwater RL: 5.6m based on auger results from Soil & Rock
- Levels in terms of Auckland Vertical Datum 1946
- Levels beyond boundary are retrieved from LINZ

NORTH

eastern retaining wall

VERT EXAG 1:1
Datum 3.000

distance	design level	existing level	change in levels
0.00		7.08	
2.00		7.13	
4.00		7.19	
6.00		7.16	
8.00		7.21	
10.00		7.32	
12.00		7.43	
14.00	7.70	7.48	0.23
16.00	7.81	7.57	0.24
18.00	7.89	7.66	0.22
20.00	7.96	7.73	0.23
22.00	8.04	7.81	0.23
24.00	8.12	7.90	0.22
26.00	8.19	7.99	0.20
28.00	8.25	8.07	0.18
30.00	8.32	8.16	0.16
32.00	8.39	8.24	0.15
34.00	8.46	8.32	0.14
36.00	8.52	8.36	0.16
38.00	8.56	8.38	0.18
40.00	8.60	8.46	0.14
42.00	8.67	8.55	0.12
44.00	8.74	8.70	0.04
46.00	8.81	8.85	-0.04
48.00	8.86	8.99	-0.14
50.00	8.85	9.05	-0.21
52.00	8.78	9.12	-0.33
54.00	8.72	9.15	-0.43
56.00	8.60	10.50	-1.90
58.00	8.42	10.50	-2.08
60.00	8.27	10.50	-2.23
62.00	8.18	10.50	-2.32
64.00	8.09	10.54	-2.45
66.00	8.00	10.57	-2.57
68.00	7.91	10.58	-2.66
70.00	7.82	10.58	-2.76
72.00	7.73	10.59	-2.86
74.00	7.65	10.59	-2.94
76.00	7.65	10.60	-2.95
78.00	7.65	10.60	-2.95
80.00	7.65	10.60	-2.95
82.00	7.65	10.60	-2.95
84.00	7.65	10.60	-2.95
86.00	7.65	10.60	-2.95
88.00	7.65	7.56	0.09
90.00	7.65	7.56	0.09
92.00	7.65	7.56	0.09
94.00	7.65	7.56	0.09
96.00	7.65	7.56	0.09
98.00	7.65	7.56	0.09
100.00	7.65	7.56	0.09
102.00	7.65	7.56	0.09
104.00	7.66	7.56	0.10
106.00	7.69	7.56	0.13
108.00	7.73	10.60	-2.87
110.00	7.79	10.58	-2.79
112.00	8.63	10.11	-1.48
114.00	9.79	9.77	0.02
116.00		9.97	0.00
118.00		9.97	
120.00		9.97	
122.00		9.96	
124.00		9.86	
126.00		9.87	
126.18		9.88	

Section I longsection

VERT EXAG 1:1
Datum 3.000

distance	design level	existing level	change in levels
0.00		7.64	
2.00		7.56	
4.00		7.62	
6.00		7.70	
8.00	7.68	7.76	-0.08
10.00	7.70	7.76	-0.06
12.00	7.78	7.77	0.01
14.00	7.87	7.78	0.09
16.00	7.94	7.84	0.11
18.00	7.98	7.87	0.11
20.00	8.03	7.89	0.13
22.00	8.04	7.91	0.13
24.00	8.02	7.93	0.09
26.00	8.03	7.98	0.05
28.00	8.04	8.03	0.00
30.00	8.04	8.02	0.03
32.00		8.04	
34.00		8.04	
36.00		8.01	
38.00		7.97	
40.00		7.96	
42.00		7.92	
44.00		7.87	
46.00	7.92	7.91	0.00
48.00	7.94	7.91	0.03
50.00	7.94	7.82	0.12
52.00	7.94	7.83	0.11
54.00	7.94	7.89	0.05
56.00	7.92	7.91	0.01
58.00	7.89	7.89	0.00
60.00	7.87	7.85	0.02
62.00	7.81	7.78	0.03
64.00	7.73	7.69	0.04
66.00	7.65	7.62	0.03
68.00	7.57	7.56	0.01
70.00	7.49	7.50	-0.01
72.00	7.40	7.43	-0.02
74.00	7.34	7.36	-0.03
76.00	7.29	7.31	-0.02
78.00	7.25	7.27	-0.03
80.00	7.21	7.25	-0.05
82.00	7.22	7.23	-0.01
84.00	7.27	7.28	-0.01
86.00	7.33	7.39	-0.06
88.00	7.39	7.54	-0.15
90.00	7.45	7.68	-0.22
92.00	7.52	7.79	-0.27
94.00	7.58	7.87	-0.29
96.00	7.65	7.94	-0.29
98.00	7.74	8.04	-0.30
100.00	7.78	8.15	-0.36
102.00	7.95	8.26	-0.31
104.00	8.29	8.42	-0.13
106.00		8.58	0.00
108.00		8.89	
110.00		9.26	
112.00		9.34	
114.00		9.32	
116.00		9.44	
118.00		9.68	
119.29		9.68	

Section J longsection

FOR INFO
FOR INFORMATION PURPOSES ONLY

DRAFT

Client: MINISTRY OF JUSTICE, Tāhū o te Ture

Contractor

BCD GROUP

Sheet
SITE SECTIONS SHEET 3

Project Title
PAPAKURA INTERIM COURTHOUSE
40 ELLIOT STREET, PAPAKURA

Rev	Date	by	Reason
1	22-03-2024	JGB	FOR INFORMATION

Drawn: JGB Scale: 1:200 at A1
Engineer: JGB

Job No:	Sheet No:	Revision
23-1920	C-252	1

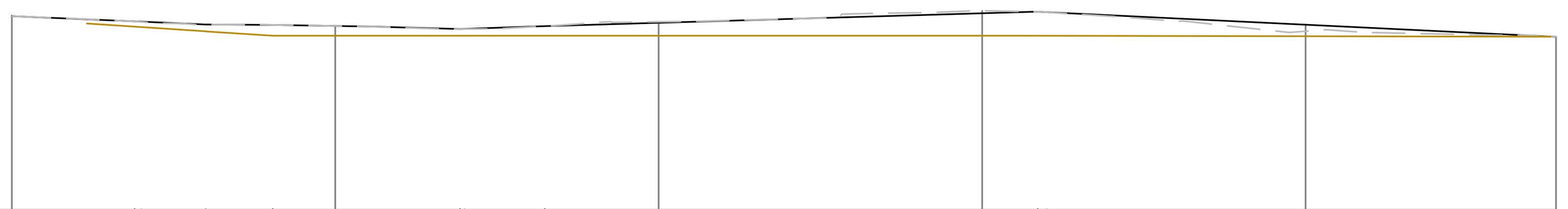
all dimensions to be verified on site before making any shop drawings or commencing any work.

VERT EXAG 1:1
Datum 3.000

	top of wall	bottom of wall	retained height	distance
				0.00
	8.33	7.65	0.68	2.00
	9.01	7.65	1.36	4.00
	9.68	7.65	2.03	6.00
	10.35	7.65	2.70	8.00
	10.35	7.65	2.70	
	10.35	7.65	2.70	10.00
	10.35	7.65	2.70	12.00
	10.35	7.65	2.70	14.00
	10.35	7.65	2.70	16.00
	10.35	7.65	2.70	18.00
	10.35	7.65	2.70	20.00
	10.35	7.65	2.70	22.00
	10.35	7.65	2.70	24.00
	10.35	7.65	2.70	
	10.35	7.65	2.70	26.00
	10.35	7.65	2.70	28.00
	10.35	7.65	2.70	30.00
	10.35	7.65	2.70	32.00
	10.35	7.65	2.70	
	10.35	7.65	2.70	34.00
	10.35	7.65	2.70	36.00
	10.35	7.65	2.70	
	10.35	7.65	2.70	38.00
	10.35	7.65	2.70	40.00
	10.35	7.65	2.70	42.00
	10.35	7.65	2.70	
	10.35	7.65	2.70	44.00
	10.35	7.65	2.70	46.00
	10.35	7.65	2.70	
	10.35	7.65	2.70	48.00
	10.35	7.65	2.70	50.00
	10.35	7.65	2.70	52.00
	10.35	7.65	2.70	54.00
	10.35	7.65	2.70	56.00
	10.35	7.65	2.70	
	10.35	7.65	2.70	58.00
	10.35	7.65	2.70	60.00
	10.35	7.65	2.70	62.00
	10.35	7.65	2.70	64.00
	10.35	7.65	2.70	66.00
	10.35	7.65	2.70	68.00
	10.35	7.65	2.70	
	10.47	8.40	2.07	70.00
	10.60	9.27	1.33	72.00
	10.74	10.16	0.58	74.00
				75.69

Basement TOW longsection

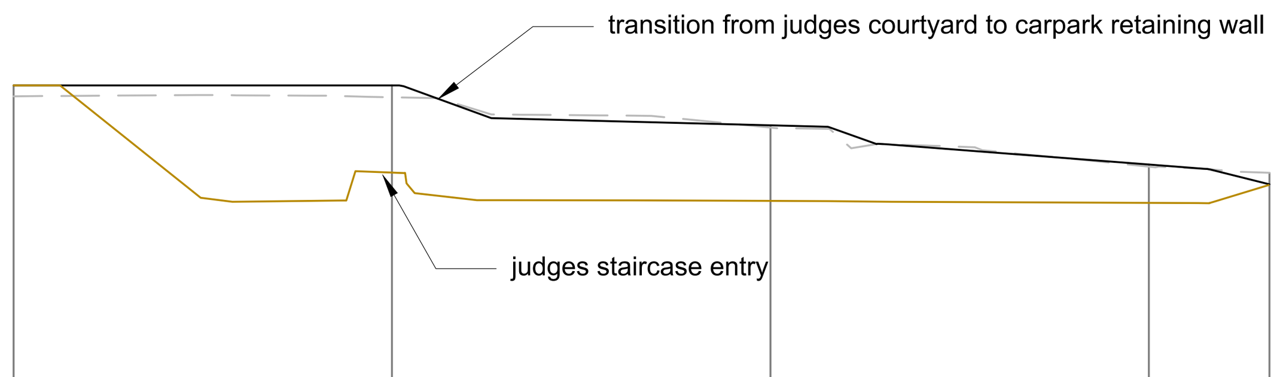
VERT EXAG 1:1
Datum 5.000



	top of wall	bottom of wall	retained height	distance
				0.00
	10.90			2.00
	10.82	10.66	0.16	4.00
	10.82	10.65	0.17	
	10.73	10.51	0.21	6.00
	10.73	10.51	0.21	
	10.72	10.38	0.33	8.00
	10.72	10.38	0.34	
	10.68	10.38	0.30	10.00
	10.66	10.38	0.28	
	10.64	10.38	0.26	12.00
	10.59	10.38	0.21	14.00
	10.59	10.38	0.21	
	10.66	10.38	0.28	16.00
	10.68	10.38	0.30	
	10.72	10.38	0.34	18.00
	10.78	10.38	0.40	20.00
	10.84	10.38	0.46	22.00
	10.90	10.38	0.52	24.00
	10.96	10.38	0.58	26.00
	11.02	10.38	0.63	28.00
	11.07	10.38	0.69	30.00
	11.12	10.38	0.74	32.00
	11.11	10.38	0.73	
	11.01	10.38	0.64	34.00
	10.92	10.37	0.54	36.00
	10.82	10.37	0.45	38.00
	10.72	10.36	0.36	40.00
	10.62	10.36	0.26	42.00
	10.53	10.36	0.17	44.00
	10.43	10.35	0.08	46.00
				47.74

Northern TOW longsection

VERT EXAG 1:1
Datum 3.000



	top of wall	bottom of wall	retained height	distance
				0.00
	10.85	10.23	0.62	2.00
	10.85	8.64	2.21	4.00
	10.85	7.88	2.97	
	10.85	7.78	3.07	6.00
	10.85	7.80	3.05	8.00
	10.85	8.55	2.30	10.00
	10.21	7.85	2.37	12.00
	9.99	7.82	2.17	
	9.95	7.82	2.13	14.00
	9.90	7.82	2.08	16.00
	9.85	7.81	2.04	18.00
	9.80	7.80	1.99	20.00
	9.75	7.80	1.96	22.00
	9.59	7.79	1.80	
	9.31	7.78	1.53	24.00
	9.23	7.77	1.45	
	9.07	7.77	1.31	26.00
	8.92	7.76	1.16	28.00
	8.76	7.75	1.01	30.00
	8.64	7.74	0.90	32.00
	8.54	7.86	0.67	
				33.19

Eastern TOW longsection

Notes:

- Assumed groundwater RL: 5.6m based on auger results from Soil & Rock
- Levels in terms of Auckland Vertical Datum 1946

FOR INFO
FOR INFORMATION PURPOSES ONLY

DRAFT

Client: Ministry of Justice – Tāhū o te Ture

Contractor: BCD GROUP

Sheet: RETAINING WALL ELEVATIONS

Project Title: PAPAKURA INTERIM COURTHOUSE
40 ELLIOT STREET, PAPAKURA

Rev	Date	by	Reason
1	22-03-2024	JGB	FOR INFORMATION

Drawn: JGB | Scale: 1:200 at A1
Engineer: JGB

Job No:	Sheet No:	Revision
23-1920	C-260	1

all dimensions to be verified on site before making any shop drawings or commencing any work.

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Report Number: AC24004 – 02 – R1

Papakura District Courthouse - New Auckland

Assessment of Operational and Construction Noise Effects

Prepared for:
Ministry of Justice
C/O –The Building Intelligence Group
PO BOX 830
WELLINGTON

Issued:
12 April 2024

Revision History

Reference	Status	Date
AC24004 – 02 – R1	Revision 1	12 April 2024

Document Acceptance

Author	Signature
Mr Robin Chen *BE Hons (Mech)* Acoustic Engineer	
Reviewer	**Signature**
Mr William Reeve *BE Hons (Mech) MASNZ* Senior Associate Acoustic Engineer	
Approver	**Signature**
Tracy Hilliker *BE Hons (Mech) MASNZ* Associate Acoustic Engineer	

Table of Contents

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1.0 BACKGROUND

Acoustic Engineering Services Ltd (AES) has been engaged to provide acoustic engineering advice relating to a Resource Consent application for a proposed courthouse to be located at 40 Elliot Street, Papakura, Auckland. The Applicant requires an Assessment of Environmental Noise Effects (AENE) for the activity with regard to section 104 (1) of the Resource Management Act (RMA), which requires the actual and potential effects of the activity to be considered.

We have based our analysis on our correspondence to date, along with the following documentation:

- Site plan titled *Papakura District Courthouse – New,* Draft Issue, as prepared by Architectus and dated the 13th of March 2024.
- Civil drawing set titled *Papakura Interim Courthouse,* For Info Issue, as prepared by BCD Group and dated the 22nd of March 2024.
- Spreadsheet titled *Papakura Courthouse – Usage Information,* received via email from Olivia Heaslip (The Building Intelligence Group) on the 7th of March 2024.

1.1 Site and proposal

The proposal is to construct a new Papakura District Courthouse at 40 Elliot Street, Papakura, in Auckland. The facility will use a modular building construction, and has a total gross floor area of 1,825m^2, which includes the courtrooms, registry, judges chambers and facilities, public areas (i.e. waiting rooms, customer service), circulation routes and custodian areas (i.e. holding areas). The facility will operate to the public from 9 am – 5 pm Monday to Friday during the daytime period, with no activity over the weekends or on Public Holidays. The building will not be occupied during any night-time period.

The site is zoned Residential – Mixed Housing Urban under the Auckland Unitary Plan, as well as nearby residential sites to the east and south. Multi-storey residential units at 11 Ray Small Drive are located to the north-east and south-east and overlook the rear of the site. The site to the south containing the Hawkins Performing Arts Theatre is zoned Open Space – Community. The sites to the west include the Papakura Skatepark and Ray Small Park and associated carpark which are zoned Open Space – Recreational. Across to road to the north are a variety of established commercial facilities zoned Business – Light Industry with a badminton facility further to the northwest along Elliot Road. The site and surrounding areas are shown in figure 1.1 below.

Figure 1.1 – Subject site and surrounding area

Public entry to the building will be from the north, and staff entry on the western side of the building. The site will be serviced by carparks to the west and south of the building for public and staff use respectively, all accessed via a driveway from Elliot Street. An external plant area will be located to the south of the building.

There is an existing 1.8 metre high timber paling fencing along the north-east and south-east boundary of the site. This timber fence is in poor condition, with some overlapping palings damaged and warped, which results in gaps along the fence line. The Applicant intends to remediate the boundary fencing condition, which provides the opportunity to upgrade the existing fencing to provide additional acoustic attenuation. To ensure the fencing is acoustically effective, fencing should be continuous, with no gaps or cracks, and well maintained. Sections of existing palings which are warped or damaged are to be removed and replaced with minimum surface mass of 10 kg/m^2, 25 mm thick timber palings, with gaps sealed. Timber palings should have a minimum 25 mm overlap, and can be board-and batten style, or angled overlapping. A sleeper rail (horizontal paling) embedded at ground level will also be required such that there is no gap under the fence line. Alternatively, the existing fence may be completely replaced, conforming to the same standards described above. Figure 1.2 below shows the site plan, and extent of acoustic fencing to be established. The multistorey residential dwellings at 11 Ray Small Drive are located to the east and overlook the site.

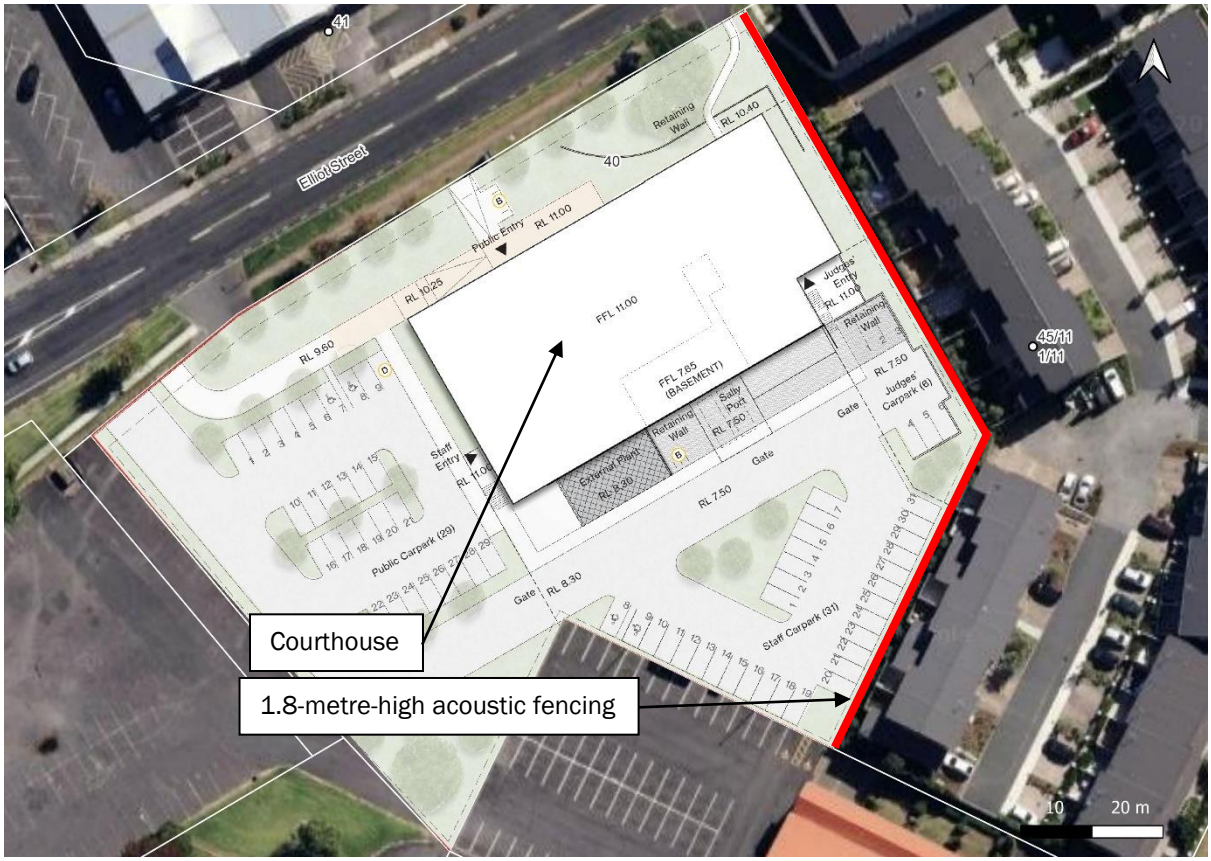

Figure 1.2 – Site layout

2.0 ACOUSTIC CRITERIA FOR OPERATIONAL NOISE

The Resource Management Act 1991 requires consideration of the significance of any adverse effects associated with the proposal. Guidance as to the significance of any adverse noise effects may be obtained from several sources.

2.1 Auckland Unitary Plan

Based on the zoning of the site and nearby sites the following Auckland Unitary Plan (AUP) noise provisions apply to this activity.

> *E25.6.2. Maximum noise levels in residential zones*
>
> *(1) The noise (rating) levels and maximum noise level arising from any activity in the Residential – Large Lot Zone, Residential – Rural and Coastal Settlement Zone, Residential – Single House Zone, Residential – Mixed Housing Suburban Zone, Residential – Mixed Housing Urban Zone and the Residential – Terrace Housing and Apartment Buildings Zone measured within the boundary of an adjacent site in these residential zones must not exceed the levels in Table E25.6.2.1 Noise levels in residential zones below:*

Table 2.1 – AUP Table E25.6.2.1 Noise levels in residential zones

Time	Noise level
Monday to Saturday 7am-10pm	50 dB L_{Aeq}
Sunday 9am-6pm	
All other times	40 dB L_{Aeq} 75 dB L_{AFmax}

E.25.6.22 of the AUP states the following:

> *Except as provided for in Standards E25.6.14 to E25.6.21 above, where noise generated by any activity on a site in one zone is received by any activity on a site in a different zone, the activity generating the noise must comply with the noise limits and standards of the zone at the receiving site.*

Based on this the following noise limit also applies which is relevant to this assessment:

Table 2.2 – Noise limit for Business – Light Industry Zone reproduced from AUP E25

Zone	Noise limit
Business – Light Industry Zone	All times – 65 dB L_{Aeq}

There are no receiving noise limits applicable for the nearby sites classified under the Open Space – Informal Recreation, Open Space – Sport and Active Recreation, and Open Space - Community zones.

The AUP also describes the following general assessment standards:

- Noise levels arising from activities must be measured and assessed in accordance with the New Zealand Standard NZS 6801:2008 Measurement of environmental sound and the New Zealand Standard NZS 6802:2008 Acoustics - Environmental noise except where more specific requirements apply.

- The noise limits of the Plan do not apply to emergency service sirens and callout sirens during emergency situations.

2.2 New Zealand Standard NZS 6802:2008

NZS 6802:2008 *Acoustics – Environmental noise* outlines a guideline daytime limit of 55 dB $L_{Aeq\ (15\ min)}$ and night-time noise limits of 45 dB $L_{Aeq\ (15\ min)}$ / 75 dB L_{AFmax} for "the reasonable protection of health and amenity associated with the use of land for residential purposes".

For town centres and mixed-use areas NZS 6802:2008 offers a guideline daytime and night-time limit of 60 dB L_{Aeq} for non-residential receivers.

The Standard also describes how a -3 dB adjustment may be applied to sound received for less than 50% of the daytime period, and a -5 dB adjustment may be applied to sound received for less than 30% of the daytime period.

Where the level of sound reduces significantly for large periods of time but does not stop completely, an energy average can be calculated across the whole daytime period to determine an overall noise rating level, with a reduction of up to 5 dB permitted. No such adjustment is permitted for the night-time period.

The Standard also describes how a +5 dB penalty should be applied to sound with a special character (SAC). This would not typically be applied to people and vehicle noise sources.

2.3 World Health Organisation

Guidelines for Community Noise[1], a document produced by the World Health Organisation (WHO) based on extensive international research recommends a guideline limit of 55 dB L_{Aeq} to ensure few people are seriously annoyed in residential situations. A guideline limit of 50 dB L_{Aeq} is recommended to prevent moderate annoyance.

Guideline night-time limits of 45 dB L_{Aeq} / 60 dB L_{AFmax} are recommended to allow occupants to sleep with windows open and meet internal limits of 30 dB L_{Aeq} / 45 dB L_{AFmax} within bedrooms to avoid sleep disturbance.

The WHO also recommends a 24 hour noise limit of 70 dB L_{Aeq} for industrial, commercial, shopping and traffic areas.

These guideline noise levels are measured at the façade of dwellings and other noise sensitive locations and the L_{Aeq} limits apply for 16 hours in the daytime, and 8 hours for the night-time.

2.4 Existing noise environment

Robin Chen of AES visited the site on the 4th of March 2024 (a Monday) to observe the ambient environment between 1130 and 1230 hours which is at a time relevant to the operation of the courthouse. Noise measurements were taken in general accordance with NZS 6801:2008 *Acoustics – Measurement of Environmental Sound.*

Noise measurements were taken in the locations shown in figure 2.1 below.

[1] Edited by Berglund, B et al. *Guidelines for community noise.* World Health Organization 1999.

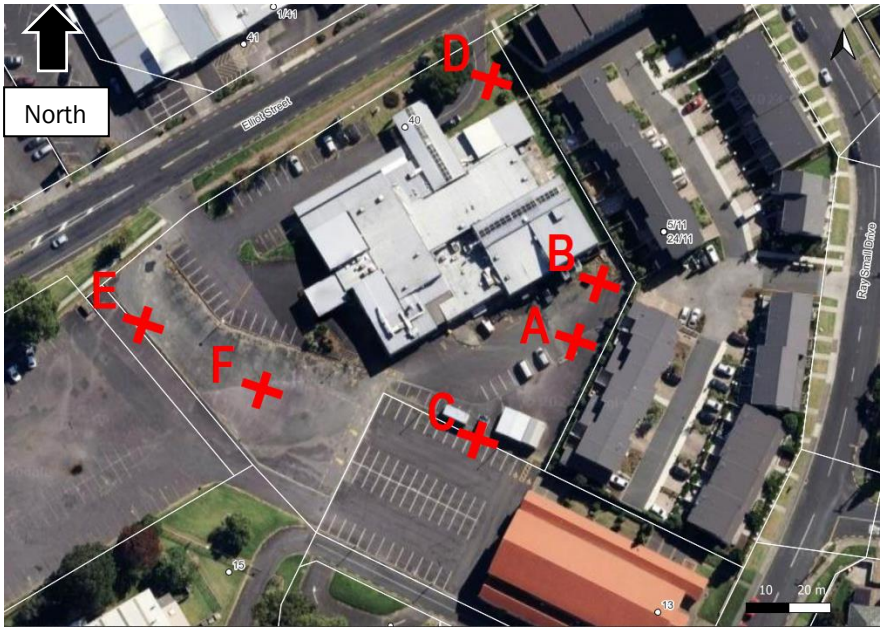

Figure 2.1 – Noise measurement locations

The noise level measured at locations A – C, close to the boundary and the residential units at 11 Ray Small Drive was in the order of 45 – 49 dB L_{Aeq} / 43 – 47 dB L_{AF90} / 54 – 57 dB L_{AFmax}. The dominant noise source in the ambient environment was transient traffic movements on Elliot Street. Insect and bird noise in the nearby foliage was also evident. There was less shielding from traffic noise at measurement locations D – F, and noise levels of 56 – 61 dB L_{Aeq} / 51 – 55 dB L_{AF90} / 64 – 73 dB L_{AFmax} were measured at these locations. During the time of the measurements there was a negligible level of audible commercial activity occurring across the road in the Business – Light Industry Zone.

Measured ambient noise levels are consistent with a suburban area close to a moderately busy road, with locations screened from the road receiving lower noise levels.

2.5 Discussion regarding appropriate noise levels

For nearby residentially zoned sites, we note that the applicable AUP noise limits are 5 dB more stringent than the upper guideline limits outlined in national and international guidance for the protection of residential amenity. The daytime AUP noise limit for residential zones is consistent with the lower guideline limit outlined in the WHO guidance.

We consider that where noise from the activity complies with the AUP residential daytime limit of 50 dB L_{Aeq} and night-time limit of 40 dB L_{Aeq} at the site boundary of any residentially zoned site, noise effects will be minimal.

Likewise, we consider that where noise from the activity complies with the AUP noise limit of 65 dB L_{Aeq} at the site boundary of any site zoned Business – Light Industry, noise effects will be minimal. While the AUP has no noise limits for noise received in Open Space zones, we consider that a limit of 65 dB L_{Aeq} would also be appropriate for noise received at the boundary of adjoining sites with this zoning, given they are primarily carparking areas.

3.0 OPERATIONAL NOISE GENERATED BY THE ACTIVITY

We have assessed noise from the types of activities that are likely to be associated with the operation of the courthouse. Key noise sources are expected to be as follows:

- Noise associated with the use of carparks on site (engine noise, exhaust noise, road/tyre noise and the like).
- Noise associated with prison trucks / vans on site.
- Mechanical plant noise associated with HVAC systems for the building including outdoor condensers and extract systems.
- Breakout noise from the building, in particular voice amplification systems that may be used within the courthouse.
- Noise from use of outdoor areas around the building such as people conversing.

Based on the above noise sources, we have now considered the noise emissions associated with the operational activity on site.

3.1 Noise sources

SoundPlan computational noise modelling based on ISO 9613 *Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation* has been used to calculate the propagation of noise from the site, accounting for screening from buildings and site fencing, worst-case downwind conditions, and sound power levels for each of the noise sources (including acoustic fencing as shown in figure 1.2).

3.1.1 Carpark

The public carpark will be located on the eastern side of the site fronting and accessed from Elliot Street. The staff and judges carparks will be located to the rear of the building on the southern side of the site behind a gated entry, also accessed from Elliot Street via a driveway. The site plans indicate 29 public parks, 31 staff parks and 6 judges parks.

The predominant noise associated with the carpark will be from vehicle movements. Calculations of vehicle movements in the carpark have been based on the method described in *Parking Area Noise, 6th Edition* produced by the Bavarian State Agency for Environment (2007), implemented into SoundPlan. We have used separated driving lanes, assuming each vehicle movement generates a sound power of 87 dB L_{WA} when travelling at 20 km/hr.

Based on correspondence with the Traffic Engineer we understand that the public carpark may generate up to 487 vehicle movements per day, of which 92 vehicle movements in a peak hour. This equates to about 56 vehicle movements in a typical hour. Where a single vehicle movement is a vehicle either entering or exiting the carpark.

The staff and judge's carpark may generate up to 111 total vehicle movements per day, and 37 vehicle movements in each of the peak hours (during the morning arrival or evening departure period). This traffic estimate assumes that half of the staff and judges will arrive and depart once during the day, resulting in a negligible level of activity for the majority of the day (around 5 – 6 movements per hour).

3.1.2 Building breakout

Judges offices and the registry will be located on the southern side of the building. Police, witness, probation facilities and the like will be located on the eastern side of the building, and bathrooms / waiting areas on

the northern side. The courtrooms (custodial and non-custodial) will be located centrally within the building, along with hearing rooms and interview room.

Based on the anticipated activities we expect that breakout noise from the building will be minimal. In this case we have conservatively modelled an internal reverberant noise level of 80 dB L_{Aeq} within the three courtrooms and hearing room, representative of a high level of occupancy, voice amplification system usage and raised conversation. We have assumed that this noise level will be constant throughout the day which we expect to be conservative.

Given the court-rooms and hearing rooms are mostly centralized within the overall building, we have assumed breakout through the roof, with the roof a minimum reduction of 20 dB on the internal reverberant level based on our experience with the Interlink Modular construction build-up.

3.1.3 Loading zone

A loading zone associated with the sally port is provided to the south of the building with larger parks to cater for police vans and larger delivery trucks. We have modelled a vehicle with a sound power of 97 dB L_{wA} travelling at 20 km/hr, and have assumed that it will enter the site via Elliot Street, drive down the driveway, and then back out of the site in a 15 minute period. We expect this to be the loudest activity associated with the loading space. We have conservatively assumed that there might be 4 truck movements per hour and that this activity may occur continuously throughout the daytime operational hours of the facility.

3.1.4 Mechanical Plant

As indicated in figure 1.2 an external plant area will be located on the southern side of the site adjacent to the rear of the building. External plant is likely to include outdoor condenser units associated with heating and cooling of the facility. These may also need to operate during the night-time period (early morning) for building preheat before occupation. We understand that there will be no emergency generator on the site.

The placement of the external mechanical plant is removed from the boundary and is generally a suitable location to reduce noise exposure to neighbouring sites. It is reasonable to expect that these systems can be designed, installed and operated using standard good practice to emit acceptable levels of noise at all times.

We recommend that a Condition of Consent is proffered requiring all mechanical plant systems to be designed to comply with 40 dB L_{Aeq} when received at the site boundary of nearby sites containing residential activity at all times. This will ensure that the mechanical plant noise emissions do not meaningfully contribute to the cumulative daytime noise levels, and that compliance with the night-time noise limits can be realistically achieved.

A combination of the following acoustic mitigation measures may need to be considered in order to achieve acceptable noise levels:

- Use of solid screens, enclosures, and / or acoustic louvres to interrupt line of sight of noise emitting equipment to nearby noise sensitive receivers
- Selection of low noise generating units
- Oversizing units and running on lower operating modes
- Inclusion of vibration isolating mounts
- Attenuators on extract fan discharges
- Controls/BMS design with night set-back mode, run-on timers and the like.

3.1.5 Outdoor areas

We expect there may be noise in outdoor areas around the courthouse associated with court attendees or general public congregating and conversing before and after visiting the facility.

It is difficult to quantify the scale or frequency this could occur throughout any one day. We have conservatively assumed that up to 20 people will be in the outdoor area in front of the building, with half of these conversing in a raised voice effort, and that this will occur continuously throughout the day.

Expected noise levels due to people conversing in outdoor areas have been based on the American National Standards Institute Standard ANSI S3.5 – 1997 *Methods for calculation of the Speech Intelligibility Index*, which contains information on the typical speech levels for both male and female speakers. Based on average values, for a raised voice effort, the sound power of a speaker may be deduced to be 75 dB L_{wA} for a raised voice level effort.

3.2 Expected noise levels

3.2.1 Daytime period

We note that although activity on the subject site will be constant throughout the day, the level of activity will vary. For example, while we have conservatively assumed that building breakout, truck movements, and noise in outdoor areas will occur constantly throughout the day, the staff carpark will only experience a peak number of vehicle movements during the morning and evening periods. The public carpark has a significantly higher number of movements during any peak hour. During the rest of the daytime period there is expected to be minimal activity on the site apart from mechanical plant.

Based on the anticipated activity, a calculated energy average in accordance with Section 6.4.6 of NZS 6802:2008 is appropriate and will provide some reduction in noise level for some receiver positions (such as those that predominantly receive noise from the carparks). The calculated worse-case noise rating levels at ground level during the daytime period are provided in table 3.1 below, with the loudest noise rating level at any point within the receiving site shown.

Table 3.1 – Daytime noise rating levels at ground level

Site	Zoning	Noise rating level with duration adjustment applied (dB L_{Aeq})	Duration adjustment (dB L_{Aeq})
39 Elliot Street	Business – Light Industry	43	-2
41 Elliot Street		45	-2
41A Elliot Street		43	-2
11 Ray Small Drive	Residential – Mixed Housing Urban	43	-3
15 Ray Small Drive		47	-3
19 Ray Small Drive		42	-1
13 Ray Small Drive	Open Space – Community	52	-2
17 Ray Small Drive		44	-2

We have the following comments:

- Noise levels are compliant with the AUP noise provisions during the daytime period at all nearby residential and business zoned sites. Noise generated by the activity will predominantly be due to carpark and truck activity (vehicle movements), which is consistent with the character of noise already observed in the area. Noise contribution from general public conversation in outdoor areas

around the building, and breakout from the building, are predicted to be much lower than vehicle noise.

- A noise level of up to 52 dB L_{Aeq} may be received at the boundary of the carpark of 13 Ray Small Drive, which is zoned Open Space – Community, mainly due to vehicle movements on the site. As noted above there are no applicable receiving noise limits in the AUP for sites zoned Open Space – Community. The nature of the noise generated by the proposed activity when received at this site will be predominantly vehicular, which will be of similar character to the carpark activity on the receiving site. For further context, the noise level received at the building façade on 13 Ray Small Drive (Papakura Theatre) will be in the order of 40 dB L_{Aeq} which is lower than the current background noise levels in the area and therefore expected to provide more-than-adequate protection for the theatre use.

- We expect a worse-case noise rating level of 48 dB L_{Aeq} (including a duration adjustment of -3 dB) at the boundary of the site to Ray Small Park to the west, in the carpark. This is lower than the existing ambient noise level and expected to result in minimal adverse noise effects.

Based on the above we expect general operation of the proposed activity to result in minimal adverse noise effects.

Expected noise level at upper façades of residential properties

Multi-storey residential units at 11 Ray Small Drive will overlook the subject site and proposed activity. The 1.8-metre-high acoustic fencing on the norht-east and south-east boundary will be mostly ineffectual above ground level. We have therefore considered the noise emissions that may be received at the upper façades of the units overlooking the site.

The predominant source of noise received at the adjacent site is expected to be from vehicle movements on site associated with the staff & judges carparks, as well as prison truck movements to the loading zone / sally port at the rear of the site.

Our modelling indicates that a worse-case noise rating level of 46 dB L_{Aeq} will be received at the upper façades of units at 11 Ray Small Drive. This includes an energy adjustment of –5 dB. This level is compliant with the AUP noise provisions and the nature of the noise is expected to be consistent with that already experienced in this area due to the proximity of the road. We therefore expect adverse noise effects to be minimal.

We also expect noise from door slams and engine starts to comply with the AUP night-time limit of 70 dB L_{AFmax} at all nearby properties and we would expect minimal adverse effect at any property from door slams and engine starts.

3.2.2 Night-time period

During the night-time period (2200 – 0700 hours) the building is unoccupied, and therefore the only noise sources expected from the proposed activity will be mechanical plant associated with building preheat. Provided the recommendations outlined in section 3.1.4 above are adopted we expect noise from mechanical plant to be appropriately mitigated and result in minimal noise effects if operating during the night-time period.

4.0 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

Noise and vibration associated with the demolition of existing structures on site, and construction of the new courthouse facilities has the potential to adversely affect adjoining properties, especially if carried out during the early morning or evening hours.

4.1 Construction noise criteria

The site is located within a Residential – Mixed Housing Urban zone as defined within the AUP. Therefore, the construction noise provisions outlined in Chapter E25.6.7 *Construction noise levels in all zones except the Business – City Centre Zone and the Business – Metropolitan Centre Zone,* apply.

The relevant noise limits are reproduced in table 4.1 below, including a 5 dB reduction to the limits in line with AUP Rule E25.6.27.4 as the total duration of the construction activity is expected to exceed 20 weeks.

E25.6.27.4 of the AUP is provided below:

- *For a project involving a total duration of construction work that is more than 20 weeks the noise limits in Table E25.6.27.1 Construction noise levels for activities sensitive to noise in all zones except the Business – City Centre Zone and the Business – Metropolitan Centre Zone and Table E25.6.27.2 Construction noise levels for noise affecting any other activity above shall be decreased by 5 dB in all cases.*

E25.6.7 *Construction noise levels in all zones except the Business – City Centre Zone and the Business – Metropolitan Centre Zone* is provided below:

- *Noise from construction activities in all zones except the Business – City Centre Zone and the Business – Metropolitan Centre Zone must not exceed the levels in Table E25.6.27.1 Construction noise levels for activities sensitive to noise in all zones except the Business – City Centre Zone and the Business – Metropolitan Centre Zone when measured 1m from the façade of any building that contains an activity sensitive to noise that is occupied during the works.*

Table 4.1 – Noise limits from the AUP Rule E25.6.27.1 adjusted according to Rule E25.6.27.4

Day of the week	Time period (hours)	Maximum noise level (dB)	
		L_{Aeq}	L_{AFmax}
Weekdays	0630 – 0730	55	70
	0730 – 1800	70	85
	1800 – 2000	65	80
	2000 – 0630	40	70
Saturdays	0630 – 0730	40	70
	0730 – 1800	70	85
	1800 – 2000	40	70
	2000 – 0630	40	70
Sundays and Public Holidays	0630 – 0730	40	70
	0730 – 1800	50	80
	1800 – 2000	40	70
	2000 – 0630	40	70

E25.6 of the AUP also states the following:

- *The noise from any construction work activity must be measured and assessed in accordance with the requirements of New Zealand Standard NZS6803:1999 Acoustics – Construction noise. Construction work is defined in New Zealand Standard NZS6803:1999 Acoustics – Construction noise.*

We note that NZS 6803:1999 states that best practicable options for noise avoidance or mitigation should be applied to construction activities on the site; however, if the best practicable options are applied and the noise limits are still not met, discretion is able to be applied. Nevertheless, we consider that compliance with the long-term construction noise limit as far as practicable would be in line with good practice and would result in reasonable and acceptable noise effects.

Noise from construction activity can consist of a combination of steady state and transient type noise events. A 15-minute averaging time-period for the L_{Aeq} noise descriptor is generally appropriate for the application of the construction noise limits as directed by NZS 6803.

For noise sources that may include transient periods of elevated noise level, or percussive noise sources, the relevant performance standard is the L_{Amax} noise descriptor. While most noise from construction equipment will be reasonably steady-state, we expect there could be instantaneous maximum noise events that cause levels in the order of 10 – 15 dB higher than predicted L_{Aeq} noise levels. Since the L_{Amax} noise limits are 15 dB higher than the L_{Aeq} noise limits during the daytime, the L_{Aeq} levels will generally be the limiting factor for construction noise compliance, and we have focussed on this in our subsequent assessment.

Unless stated otherwise we have assumed that demolition and construction activity will be limited to between 0730 and 1800 hours Monday to Saturday.

4.2 Noise generating activities

There are existing buildings on the site that will need to be demolished, along with sections of driveway that will be removed. We expect that it is likely that this can be carried out by an excavator with a standard bucket attachment and will not require specialist breaking attachments for removing the existing foundations or driveway. If a breaker will be required to remove existing sections of concrete foundation, further localized screening will be required if this is required to occur within 20 meters of the site boundary to keep noise levels consistent with what we've assessed.

Based on the Geotechnical Engineering Report we do not anticipate that traditional rock breaking, or blasting is going to be required anywhere on site. Excavation for the building platform of the site (up to minus 3 meters from current ground level in the centre of the site where the building will sit) where required will be performed by an excavator with a standard bucket attachment. If rock breaking ends is required due to eventual site conditions, further acoustic assessment will be required.

Shallow foundations are the recommended option in the preliminary geotechnical assessment. We have therefore assumed that this will be the foundation methodology adopted. Should piling or alternate foundation methodologies be required due to site conditions, specific acoustic assessment will be required. We note that the preliminary geotechnical assessment recommends that piled foundations are avoided.

We understand that the modular components of the building will be prefabricated off-site and then transported to site with heavy vehicles, where they will be then erected through cranage.

The main sources of noise associated with the demolition and construction of the proposed facility are therefore expected to be:

- Noise from excavator operation
- Noise from compactor and vibratory roller operation

- Noise associated with concrete pumping, pouring and floating for foundations
- Noise from heavy vehicle movements
- Cranage

There will be several additional noise sources that will be present on site, such as noise from tradespeople talking on site, small utility and trade vehicles, and small handheld tools such as concrete needle vibrator, and small handheld tools such as nail guns and drills. However, we would expect the noise levels from these sources to be lower than those identified above and that this noise will be able to be adequately controlled through good practice and the adoption of a Construction Noise and Vibration Management Plan.

SoundPlan computational noise modelling based on ISO 9613 *Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation* was used to determine the noise levels when received 1.0 metre away from the façade of the closest neighbouring dwellings accounting for façade reflections in line with NZS 6803:1999, taking into account the topography and ground absorption of the nearby environment.

Where nearby dwellings have multiple floors, we have reviewed the noise level at each floor and presented the worst-case noise levels incident on the building.

4.2.1 Site mitigation measures

Site mitigation measures have not yet been confirmed. However, we have assumed that at minimum, 1.8-metre-high solid site hoardings will be installed along the perimeter of the site (legal boundaries) for the duration of the construction activities, completely enclosing the site, except where existing acoustically-effective fencing exists (see section 1.1). Any gate used to access the site would be required to be of solid construction and would need to be kept closed when high noise activities are being undertaken within the site.

The site hoardings and gate must be continuous and maintained with no gaps or cracks and should also comply with the following minimum specifications.

- Height – 1.8 metres
- Surface mass – at least 8.0 kg/m^2 (such as 18 mm plywood). Proprietary flexible noise barriers such as Duraflex Hushtec barriers may be suitable, however these would need further review to confirm acceptability of use.

4.2.2 Receivers

With regard to 11 Ray Small Drive, the analysis below relates to the units immediately adjacent to the site, shown in red in figure 4.1 below, at ground floor level (GFL) and first and second floor level ('upper floor levels'). Noise levels received at other units in the residential development would be significantly lower due to the noise shielding provided by the units on the western side of the site in addition to increased distance from the demolition and construction activity. Key items of construction machinery will be required in some capacity over most of the site (i.e., excavation and compaction). Therefore, we have not assessed each individual residential unit at 11 Ray Small Drive as the worse-case received noise level is expected to be approximately equivalent and representative for each of the units highlighted in red. Where the construction activity is expected to be localized on a certain part of the site (for example, concreting activities on the foundation slab, or crane usage around the building footprint) we have provided some additional commentary.

Figure 4.1 – Closest residential receivers at 11 Ray Small Drive

4.2.3 Noise from excavation

Excavator use is expected for the demolition of the existing building on the site and cuts to accommodate building platforms. We have assumed that an excavator will also be used to rip up any existing sections of the asphalt carpark where required. If a rock hammer or similar machinery will be used to cut the carpark, additional mitigation such as localized hoardings will be required.

As the exact plant to be used for excavation and demolition is yet to be confirmed, we have conservatively assumed the use of a 25 tonne tracked excavator in the first instance. Based on the range of values presented in British Standard BS 5228-1:2009 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise,* this has a worst-case sound power of 105 dB L_{wA}.

From the cut and fill plan we infer that some level of cut or fill will be required over the majority of the site. Based on this we have modelled the excavator operating at existing ground level at several worst-case positions when considering the locations of the neighbouring dwellings.

The resulting expected worst-case noise levels from excavator use received at 1.0 metre from the façade of neighbouring dwellings are given in table 4.2 below.

Table 4.2 – Expected noise levels from excavator activity received at neighbouring properties

Neighbouring property	Noise level from excavation (dB L_{Aeq})
11 Ray Small Drive – ground level	74
11 Ray Small Drive – upper levels	80
13 Ray Small Drive (Hawkins Theatre)	73
15 Ray Small Drive (IDEA Services – Counties)	62
17 Ray Small Drive (Papakura Girl Guides)	63
19 Ray Small Drive (Papakura Ambulance Station)	62
37 Elliot Steet	57
39 Elliot Street	67
41 Elliot Street	66
41A Elliot Street	62

Based on the above analysis we have the following comments:

- Compliance with the construction noise limits is realistically expected at all nearby sites except for those immediately adjacent to the subject site to the north-east and south-east.
- Our analysis indicates that during a worst case scenario where a 25-tonne excavator is operating in close proximity to neighbouring dwellings, exceedances of up to 10 dB may be expected at upper floor levels for the terraced units at 11 Ray Small Drive, and 4 dB at GFL.
- When the excavator is operating on the southern extremity of the site a 3 dB exceedance may be expected at 13 Ray Small Drive (Hawkins Theatre).
- The larger exceedance at the 11 Ray Small Drive units at upper floor levels is expected and mostly unavoidable due to the proximity, and the units being multi-storey, meaning the 1.8-metre-high site hoardings are mostly ineffective at blocking any noise.

Based on the above we would expect the following mitigation measures below to be required in order to reduce noise levels and result in acceptable noise effects at noise sensitive dwellings:

- Selection of a smaller excavator where practical (i.e., a 14-tonne excavator, which may have a sound power of 98 dB L_{wA} or lower)
- Restricting the timeframe of excavator activity for example not before 0830 hours, or after 1700 hours Monday to Friday.

We note the following:

- With the selection of a smaller excavator, the highest noise levels at the closest neighbouring building façades (i.e., 11 Ray Small Drive terraced units at upper floor levels) are expected to be in the order of 71 – 75 dB L_{Aeq} or less. The internal noise level within a typical dwelling would be 51 – 55 dB L_{Aeq} with windows closed. Although the nature of construction noise will be audible and

identifiable as part of the background noise, for a typical dwelling with windows closed, conversations are likely to still be able to be undertaken at a normal voice effort and day to day activities are still expected to be undertaken with minimal modification or disruption. For most occupants, construction noise levels at 11 Ray Small Drive GFL and 13 Ray Small Drive would be expected to marginally comply with the daytime construction noise limits with a smaller excavator.

- The predicted noise levels received at adjacent dwellings are only expected when the excavator operates at the eastern or southern extremity of the site. In reality the excavator would only be in either location for a short period of time relative to the overall activity. Noise levels would therefore be lower than those predicted for the majority of the works.

- We note that the noise limit for short term construction works defined as up to 15 days is 80 dB L_{Aeq}. While this limit doesn't apply in this situation as the overall duration of the works is expected to be much longer, it does indicate that higher noise levels of this order are typically tolerable where limited in duration.

If the above mitigation measures are adopted and the operating hours of the excavator are restricted, we would consider that the best practicable option has been applied and that the noise effects will be acceptable. A Construction Noise and Vibration Management Plan (CNVMP) should be prepared to ensure that mitigation measures are implemented in due course.

4.2.4 Noise from compactor and vibratory roller

Compactors will be used as part of the earthworks process to compress fill and establish the building footprint. We have considered a worse-case scenario with a vibratory roller on the site, which based on NZS 6803:1999 could have a sound power of 108 dB L_{wA}. This is also expected to be the loudest noise source associated with the compacting activity, with a plate compactor expected to have a sound power level of 100 dB L_{wA} or less.

Compaction works are expected to be required over most of the site in some capacity. Therefore, noise levels received from the compaction activity are expected to be similar, or slightly higher (up to 3 dB), to those predicted for the excavation works.

Exceedances therefore are also predicted at the same neighbouring properties – 11 Ray Small Drive and 13 Ray Small Drive.

We expect the following mitigation measures to be required to reduce noise levels and result in acceptable noise effects:

- Limit the use of a vibratory roller as far as practical and/or prohibit use of a vibratory roller 10 meters from the eastern site boundary, and instead require compacting activities to be performed by a smaller plate compactor only, or by track rolling with a smaller excavator.

- Restricting the timeframe of compacting activity to between 0830 and 1700 hours Monday to Friday.

Similar to that described for excavation, if a smaller plate compactor is used close to the boundaries we expect minimal modification and disruption to day to day activities. Noise effects would be expected to be acceptable. Similar to excavation activities these mitigation measures should be outlined and adopted in a Construction Noise and Vibration Management Plan (CNVMP).

4.2.5 Noise from mobile crane usage

At times a small mobile crane may be required to unload large deliveries, or to erect prefabricated modular elements. We have therefore considered a scenario where the crane is parked at several points around the building footprint.

Based on the range of values presented in British Standard BS 5228-1:2009 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*, we have assumed a worst-case sound power of 105 dB L_{wA} for the anticipated activity.

Based on this, we expect the following worse-case noise levels shown in table 4.3 below to be received at 1.0 metre from the façade of neighbouring properties from the usage of the mobile crane:

Table 4.3 – Expected noise levels from mobile crane usage received at neighbouring properties

Neighbouring property	Noise level from mobile crane (dB L_{Aeq})
11 Ray Small Drive – ground level	72
11 Ray Small Drive – upper levels	74
13 Ray Small Drive (Hawkins Theatre)	61
15 Ray Small Drive (IDEA Services – Counties)	57
17 Ray Small Drive (Papakura Girl Guides)	57
19 Ray Small Drive (Papakura Ambulance Station)	57
37 Elliot Steet	56
39 Elliot Street	62
41 Elliot Street	62
41A Elliot Street	55

Based on this analysis we expect a 2 dB exceedance at GFL and 4 dB exceedance at FFL for the terraced units at 11 Ray Small Drive due to crane usage.

When in operation, noise from a crane will be an obvious new component of the background noise. However, similar to the above we expect minimal modification and disruption to day to day activities.

We note the following:

- The highest noise levels will only be recorded when the crane operates on the eastern side of the site, which is expected to be for a short period of time relative to the overall activity.
- A 2 dB change in noise level is typically imperceptible, and 4 dB is only a just subjectively noticeable difference, when compared to the 70 dB L_{Aeq} noise limit.

We therefore expect that adverse noise effects associated with cranage will be acceptable.

4.2.6 Noise from concrete activities

We expect that the main noise generating concrete activities on site will be the pumping and pouring of concrete associated with the establishment of the foundation, and the use of power floats.

We understand from correspondence that existing asphalt will be used as far as practical for fill in the carpark area, although some additional fill may be required. Concreting works in the carpark areas will be limited to localised sections of pipe and curbing.

Concrete pumping and pouring

Access to the site will be from the north. Based on the location of the building footprint we anticipate that the pump will be set up somewhere along the northern / north-western to central part of the site.

An assumed sound power level of 105 dB L_{wA} has been sourced from BS 5228-1:2009.

The noise levels emitted by the equipment will vary throughout the process as different tasks are undertaken. For example, we expect the concrete pump will steadily idle most of the time, with higher noise emissions when the engine increases in speed to move the nozzle over the site. Similarly, the concrete trucks will be idling most of the time but will generate higher noise emissions when their engine speed is increased before transferring the concrete to the pump.

The resulting expected noise levels received at neighbouring properties from concrete pump activity are given in table 4.4 below.

Table 4.4 – Expected noise levels from concrete pump activity received at neighbouring properties

Neighbouring property	Noise level from concrete pump (dB L_{Aeq})
11 Ray Small Drive – ground level	53
11 Ray Small Drive – upper levels	59
13 Ray Small Drive (Hawkins Theatre)	57
15 Ray Small Drive (IDEA Services – Counties)	57
17 Ray Small Drive (Papakura Girl Guides)	57
19 Ray Small Drive (Papakura Ambulance Station)	56
37 Elliot Steet	49
39 Elliot Street	59
41 Elliot Street	62
41A Elliot Street	55

Our analysis shows that provided the concrete pump is located within the northern / north-western to central portion of the site, it is realistic for the concrete pump activity to comply with the construction noise provisions at all nearby sites, and we would generally expect this activity to result in minimal effects. We note that units at 11 Ray Small Drive on the southern side of the site would receive significantly lower noise levels (up to 10 dB) due to these units being located further away from the concreting works.

If an early morning pour was required between 0630 and 0730 hours, a more stringent noise limit of 55 dB L_{Aeq} would apply as per the construction noise provisions. Based on the above, exceedances of up to 7 dB would be expected at a number of nearby properties. If earlier than 0630 hours, the 40 dB L_{Aeq} noise limit would be significantly exceeded. If an early morning pour is required, we recommend that all residents at 11 Ray Small Drive shown in figure 4.1 are notified beforehand via letter drop and/or face-to-face meeting, and this procedure is outlined in the CNVMP.

Concrete float

A concrete float might be used on site. While the overall noise levels of the specific equipment on site will vary (due to the noise of the concrete floats available), we have based our analysis on a handheld power float, with a sound power of 100 dB L_{wA}.

We have considered float operation at ground floor level only, at the worst case (closest) locations with regards to neighbouring residential dwellings.

The resulting expected noise levels received at 1.0 metre from the façade of residential dwellings on neighbouring sites from concrete float activity are given in table 4.5 below.

Table 4.5 – Expected noise levels from concrete float activity received at neighbouring properties

Neighbouring property	Noise level from concrete float (dB L_{Aeq})
11 Ray Small Drive – GFL	58
11 Ray Small Drive – FFL	67
13 Ray Small Drive (Hawkins Theatre)	55
15 Ray Small Drive (IDEA Services – Counties)	52
17 Ray Small Drive (Papakura Girl Guides)	51
19 Ray Small Drive (Papakura Ambulance Station)	52
37 Elliot Steet	49
39 Elliot Street	57
41 Elliot Street	56
41A Elliot Street	49

Based on the above we expect concrete floating activities to comply with the construction noise limits at all nearby properties and noise effects to therefore be acceptable.

4.2.7 Noise from heavy vehicle movements

Heavy vehicles associated with the construction activity will generate noise on site when arriving and departing, and when idling on site. Heavy vehicles may also be required to bring in prefabricated modular elements. Vans, utes, and trucks may be used.

It is difficult to quantify the expected noise levels arising from construction vehicles on site due to the intermittent nature of the activity, and the large variance in the vehicle noise characteristics. In this situation, we consider that the best approach to reducing the noise levels from construction vehicles both on and off site would be through operational measures outlined within the Construction Noise and Vibration Management Plan, such as the following measures:

- Limitations on the arrival and departure times of heavy vehicles to between 0730 – 1800 hours Monday to Saturday whenever practical.
- Prohibit the use of engine braking within the vicinity of the site.

- Limit the sound level and frequency of use of vehicle reversing beepers as far as practicable.
- Limit the amount of time vehicles spend idling on site.
- Prohibit the use of vehicle horns on site except for safety purposes.

4.3 Construction vibration criteria

The machinery used throughout the construction works is expected to produce varying levels of vibration. Key vibration sources include the use of an excavator, compactor or vibratory roller, and trucks entering and leaving the site. Vibration effects are typically considered in two ways – with regard to possible structural or cosmetic damage to buildings, and human response. We note that individuals can detect levels of building vibration that are well below those required to cause any risk of damage to the building or its contents.

We expect the above construction works will generate continuous vibration for short periods of time. This vibration may potentially result in two main effects for occupants within the neighbouring buildings – perceptible (structure-borne) vibration, i.e., vibration of walls, floors etc. which is perceived by occupants through tactile sensation or audible motion such as rattling of windows; and low frequency noise, where sound waves radiated by the vibrating surfaces inside buildings are perceived by the human ear as noise – often referred to as ground-borne noise.

Chapter E25.6.30 of the AUP states that construction and demolition activities must be controlled to ensure any resulting vibration does not exceed:

a) The limits set out in German Industrial Standard DIN 4150-3 (1999): *Structural vibration – Part 3 Effects of vibration on structures* when measured in accordance with that Standard on any structure not on the same site; and

b) The limits in Table E25.6.30.1 Vibration limits in buildings in any axis when measured in the corner of the floor of the storey of interest for multi-storey buildings, or within 500 mm of ground level at the foundation of a single storey building.

Vibration levels in the referenced DIN 4150-3 Structural Vibration – Part 3: *Effects of vibration on structures* can be found in table 1 of that standard and are reproduced in table 4.6 below. Compliance with these criteria will ensure that there will not be an adverse effect on the serviceability of a structure. In this case, lines 1 and 2 are most relevant.

Table E25.6.30.1 of the Auckland Unitary Plan as referenced above is provided in table 4.7 below.

Table 4.6 – Guideline values for vibration velocity to be used when evaluating the effects of short-term vibration on structures (reproduced from DIN 4150-3:1999)

Line	Type of Structure	Guideline values for velocity, v_i, *in mm/s*			
		Vibration at the foundation at the frequency of			Vibration at horizontal plan of highest floor at all frequencies
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz*	
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 to 8	8 to 10	8
*At frequencies above 100 Hz, the values given in this column may be used as minimum values.					

Table 4.7 – Vibration limits in buildings (Table E25.6.30.1 of the Auckland Unitary Plan)

Receiver	Period	Peak Particle Velocity Limit (millimetres/second)
Occupied activity sensitive to noise	Night-time 10 pm to 7 am	0.3
	Daytime 7 am to 10 pm	2
Other occupied buildings	At all times	2

4.4 Vibration generating activities

There are many factors, including soil condition and structural design, which will influence the vibration level experienced in the foundation of any adjacent buildings. However, we would expect that the following vibration levels may be generated by the construction activities:

- Vibration generated by a plate compactor will depend on the specific size and model. A small handheld compactor (typically less than 500 kg) may generate around 0.2 mm/s at a distance of 8 metres. Manufacturer data suggests that this will be predominantly within a frequency range of 60 – 100 Hz.
- A vibratory roller may generate in the order of 1 – 12 mm/s at a distance of 10 metres.
- Excavators and trucks travelling over irregular surfaces could generate 1 – 2 mm/s at distances of 5 metres, reducing to less than 0.1 mm/s at 20 metres.
- A wheeled mobile crane or tracked mobile crane might be expected to generate 2 mm/s at a distance of 8 meters.

4.4.1 Expected vibration levels

The closest dwellings to the site are those at 11 Ray Small Drive. From aerial imagery the units on the north-eastern side of the site are 10 meters or more removed from the site boundary. The foundations of some parts of the units on the south-eastern side of the receiving site (the 'closest building platforms') may be within 5 metres of construction activity proposed in this Application.

Based on the above the closest building platforms of 11 Ray Small Drive may receive 1 – 2 mm/s from excavator and truck movements and 3 – 4 mm/s from use of a small plate compactor when these operate right up against the eastern boundary in a worse-case scenario. Crane usage is expected to be limited to around the building platform and therefore vibration levels are expected to be 2 mm/s or less at all nearby dwellings (since units on the northern side of 11 Ray Small Drive are further removed from the site boundary).

We therefore expect that it is realistic for construction activity on site to comply with the requirements outlined in the DIN Standard – provided the use of a vibratory roller is not permitted close to the boundary. With regard to the vibration limits for occupied buildings outlined in the Auckland Unitary Plan, the 2 mm/s PPV limit may be exceeded at times when a hand-held plate compactor is used in close proximity to the site boundaries.

In terms of adverse effects from construction vibration we have the following comments:

- At 1 mm/s it is possible that items sitting on hard surfaces may begin to rattle (NZTA guidance). At this level BS 5228 guidance states that vibration effects are likely tolerable provided prior warning and explanation is given to nearby residents.

- At levels of 1 – 2 mm/s (when an excavator or truck is right up against the eastern boundary), some people may notice the building vibrating, and a smaller number of people may notice furniture and fixtures rattling. People may also experience some disturbance of radio / TV use and conversation.

- At vibration levels of 3 – 4 mm/s (possible when a small hand-held compactor is used right up at the site boundary), an increased number of occupants may feel like there is disruption to normal activities like the use of radio of TV or may have conversations disturbed.

We therefore recommend the following mitigation measures are adopted for compaction activities:

- Vibratory rollers and hand-held plate compactors can have a large variability in vibration generation depending on a range of factors including the number of vibrating drums, vibration amplitude, drum length, and machine weight. The following should be observed:

    - If a vibratory roller is to be used on the site, we recommend that it is setback at least 10 meters from the eastern site boundary and selected to have a single drum with low amplitude as far as practical.

    - The hand-held plate compactor selected should be as small as practical (i.e., less than 500 kg), such that the more lenient DIN standard frequency band 50 – 100 Hz (outlined in table 4.6) would apply with a 15 mm/sec vibration limit, and we would expect this to be achieved at all nearby dwellings.

- As far as practical these activities should be scheduled to occur at times when the adjacent dwellings are unoccupied or least vibration sensitive, determined through liaison with neighbours or letter drop.

We recommend the above mitigation measures are outlined and adopted in the Construction Noise and Vibration Management Plan.

We also note the following:

- Our predictions are generally conservative as they do not allow for ground to building foundation coupling loss.

- As mentioned above the predicted vibration levels will only be expected when equipment is located right up against the eastern site boundary, which is only expected for short periods of time. For most of the time vibration levels will be lower and expected to be only just perceptible.

Therefore, provided the above mitigation measures are adopted we expect adverse vibration effects from the construction activity to be acceptable.

4.5 Construction noise and vibration management plan

As demonstrated above, managerial and operational strategies need to be adopted by the Applicant to control and reduce noise emissions and vibration from the construction activity. We therefore recommend that the Applicant establishes a Construction Noise and Vibration Management Plan (CNVMP) outlining the measures which will be employed to ensure that noise and vibration impacts on neighbouring properties are minimised as far as practical.

The CNVMP would typically include:

- Relevant noise and vibration limits as outlined in the AUP.

- Restrictions on the operational hours of construction works on site (i.e., 0800 – 1700 hours Monday to Friday for excavation and compaction activities).

- Machinery and equipment to be used and the selection of quieter equipment / methodologies wherever practical.

- Duration of work.

- The physical mitigation required to result in acceptable noise levels (i.e., acoustic fencing as discussed in section 4.2.1 and additional localized screening where required).

- Limitations on the arrival and departure times of heavy vehicles, and operating recommendations.

- Identification of neighbouring properties which may be affected.

- Procedures for liaising with the neighbouring properties prior to high noise/vibration activities being undertaken (i.e., excavation and compaction activities), to determine least noise-sensitive times for these activities. Outlining the process for letter drop if early morning concrete pours are anticipated.

- Details of complaints procedures and the need for and responsibilities of a Noise Liaison Officer for the community.

5.0 CONCLUSION

Noise from all sources expected to be associated with the proposed new District Courthouse at 40 Elliot Street, Papakura, has been assessed.

5.1 Operational noise

Based on our review of the relevant AUP noise limits, NZ Standards, WHO guidelines, and ambient noise measurements in the area, we consider that compliance with the AUP daytime noise limits of 50 dB L_{Aeq} when received at nearby residentially zoned sites and 65 dB L_{Aeq} at any nearby business zoned site would ensure adverse noise effects are minimal. Similarly, during the night-time period, compliance with the residential Auckland Unitary Plan noise limit of 40 dB L_{Aeq} will also ensure noise effects are minimal.

Based on our analysis, noise during the daytime period from vehicle movements, building noise break-out, and outdoor area occupation is expected to result in a maximum noise rating level of 47 dB L_{Aeq} at the closest residential site and 45 dB L_{Aeq} at the closest business zoned site. Predicted levels are consistent with the acoustic criteria we have defined in section 2.5, and we therefore expect adverse noise effects to be minimal. We also expect a noise level of 52 dB L_{Aeq} in the carpark of 13 Ray Small Drive (zoned Open Space – Community) and a noise level of 50 dB L_{Aeq} at the boundary to the carpark of Ray Small Park (zoned Open Space – Sport and Active Rec) to result in minimal adverse noise effects.

During the night-time period the only noise source expected to be associated with the proposed courthouse will be mechanical plant noise associated with building preheat. Given the location of the plant, we consider it practical for these sources to comply with the AUP night-time noise limits, and therefore result in minimal adverse noise effects. We have recommended an appropriate Condition of Consent below.

Overall, we expect that adverse noise effects associated with the day to day operation of the proposed courthouse will be minimal.

To ensure noise emissions from the development are appropriately managed, we recommend that the following conditions of consent or advice notes are adopted:

- *All external mechanical plant shall be designed to not exceed 40 dB L_{Aeq} noise limit at the site boundary of any site containing residential activity at all times.*

- *Acoustic Fencing will extend as per figure 1.2, confirming to the following specification. This can be achieved by remediation of the existing fence or installation of new fencing meeting the following minimum specifications:*

    - *Height – at least 1.8 meters*

    - *Surface mass – at least 10 kg/m²*

    - *The fence must be continuous and maintained with no gaps or cracks.*

5.2 Construction noise and vibration

Noise and vibration from demolition and construction activity associated with the establishment of the proposed courthouse has been considered.

Our analysis indicates that some activities such as excavation and compactor use close to the site boundaries may exceed the construction noise provisions of the AUP. This is mostly unavoidable due to the setback between the site and neighbouring properties, in particular the residential multi-storey units at 11 Ray Small Drive overlooking the subject site.

While the vibration limits for protection against structural damage can be met, the construction vibration provisions of the AUP relating to amenity may be exceeded when compaction works occur close to the eastern site boundary.

We expect that construction noise and vibration effects will be accepted provided the following mitigation measures are adopted:

- All construction activities on the site shall comply with the long term noise limits in Table 2 of NZS 6803:1999, or as far as is practicable provided all reasonable mitigation measures are adopted.
- A Construction Noise and Vibration Management Plan (CNVMP) shall be prepared and adopted for the development prior to the commencement of works, including at minimum the matters outlined in section 4.5 above.
- Site hoarding and acoustic boundary fencing is installed as discussed in section 4.2.1 above.
- For the excavation and compaction activities:
    - Operating hours are limited to between 0830 and 1700 hours Monday to Friday.
    - Minimizing the size of the plant as far as practical.
    - Where practical a hand-held plate compactor is used for any compaction works instead of a vibratory roller. If a vibratory roller is required, it is to be selected with a single drum and low vibration amplitude as far as practical, and setback at least 10 meters from the eastern site boundary.
    - As far as practical vibratory roller or hand-held compactor use would be scheduled to occur when adjacent dwellings are unoccupied or at times identified as being of lower sensitivity to residents.