



**Downtown Carpark Site
Development**

**Preliminary Detailed Site Investigation
Report**

Prepared for
Precinct Properties NZ Limited

Prepared by
Tonkin & Taylor Ltd

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1 Introduction

Tonkin & Taylor Ltd. (T+T) has been engaged by Precinct Properties New Zealand Limited (Precinct) to undertake a desktop review for its proposed development, located at 2 Lower Hobson Street, Auckland (herein referred to as “the site”). The site location is presented in Figure 1.1.

Following the completion of the desktop review, Precinct engaged T+T to undertake preliminary ground investigation work towards the completion of a Detailed Site Investigation (DSI). The investigations were in support of the development proposal and a fast-track resource consent application. Given site access constraints, the completion of a full DSI is proposed as a consent condition prior to development commencing and once the site is unoccupied.

This report relies on the data collected from within the site and uses off-site data to interpolate anticipated conditions at the site.

This report has been prepared in general accordance with the requirements for a Preliminary and Detailed Site Investigation (PSI / DSI) referred to in the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS), and as outlined in the Ministry for the Environment (MfE) Contaminated Land Management Guidelines¹ (MfE CLMG). The persons undertaking, managing, reviewing and certifying this investigation are suitably qualified and experienced practitioners (SQEP), as required by the NESCS and defined in the NESCS Users' Guide (April 2012).

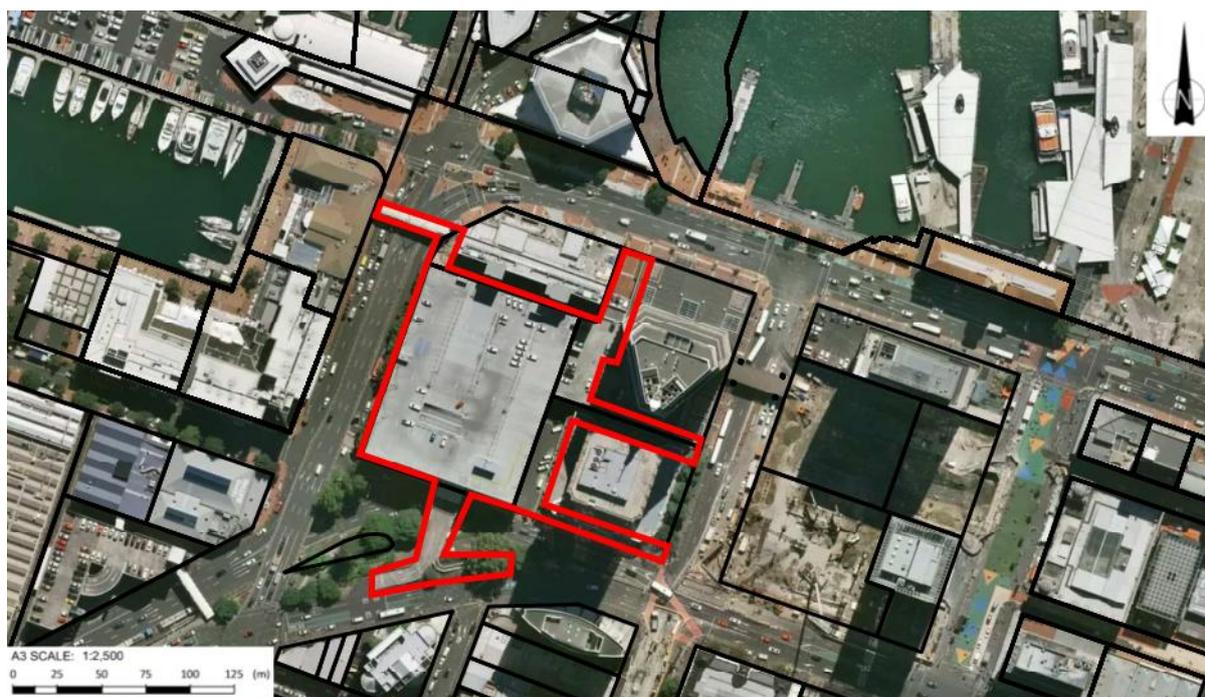


Figure 1.1: Site location shown in red outline (Basemap Source: LINZ Creative Commons Attribution 3.0 New Zealand)

1.1 Background

The site is on land reclaimed in stages between 1860s through to the 1920s by the Auckland Harbour Board. The reclamation fill comprises both materials cut from nearby (e.g. Point Britomart), materials dumped from unknown imported sources and dredged materials. Old harbour records

¹ Ministry for the Environment, updated 2011, Contaminated land management guidelines No. 1: *Reporting on Contaminated Sites in New Zealand*.

identify the location of the graving dock that extended over the north eastern to south western corners of the site. According to council records, the graving dock was infilled in 1923, prior to the reclamation of Quay Street (between Princess Wharf and the site). Since the 1940's the site has been used for commercial purposes and since the 1970's the site has been used as a carpark.

The proposed development includes the demolition of the existing Downtown Carpark building (together with the Lower Hobson Street pedestrian bridge and Customs Street West vehicle and pedestrian ramp located within part of the road reserve) and development of the site to provide for a mixed-use precinct providing for commercial, residential, retail, food and beverage and civic uses. The development involves three podium buildings, two towers and four levels of shared basement, including new public spaces and a new laneway network to provide connectivity within the city centre. In addition, the proposed development involves modifications to the podia of existing adjacent buildings (HSBC and Aon) to facilitate the new laneway network.

A copy of the current development plans is presented in Appendix A.

1.2 Objective and scope

To achieve the objective of this Preliminary DSI, the scope of work comprised the following:

- Review of Auckland Council property file for the site obtained in 2015 for the site;
- Review of the Auckland Councils' contamination records obtained in May 2023;
- Review of historical aerial photography from Auckland Council GeoMaps, Retrolens and Google Earth Pro;
- Review of available archaeological information for the area to understand reclamation of the city centre in the late 19th Century;
- Review of readily available databases undertaken on this and adjacent sites, and readily available published geological information;
- Undertake soil sampling from one environmental borehole and one round of groundwater monitoring from the environmental borehole; and
- Preparation of this report, which documents our findings and comments on the potential for contamination at the site and results from limited soil and groundwater testing, in context of the proposed development including potential resource consent implications regarding contamination. This report has been prepared in general accordance with the requirements of a preliminary site investigation under the NESCS.

2 Site description

2.1 Site identification

The site is located at 2 Lower Hobson Street and occupies the corner of Lower Hobson Street and Customs Street West. The site is relatively flat and fully occupied by the Downtown Carpark building. Directly to the north of the site boundary is the M Social Hotel (M Social) which has a sub-lease for the basement of the Downtown Carpark. Directly to the east are the Aon building and the HSBC tower building, both sites owned by Precinct. The wider block of land incorporating the MCH, the Aon building and HSBC tower and the site are bound by Lower Hobson Street to the west, Quay Street to the north, Custom Street West to the south and Lower Albert Street to the east.

Information about the property is included in Table 2.1 and the site area is presented in Figure 2.1.

Table 2.1: Site identification

Street address	2 Lower Hobson Street, Auckland Central
Legal description	Lot 9 DP 60151 (Downtown Carpark) Shared access areas with Lot 7 DP 77037, Lot 5 DP 63972 and Lot 1 DP 78340, and Lot 8 DP 60151
Site owner	Auckland Council Leaseholds held at the site: <ul style="list-style-type: none"> • Auckland Council (above ground level) and sub-tenancies (Monsoon Poon, Pointers and Commercial Bay valet services) • M Social Hotel (Basement DP 73049) Shared access areas: <ul style="list-style-type: none"> • Precinct (Lot 7 DP 77037, Lot 5 DP 63972 and Lot 1 DP 78340) • M Social Hotel (Lot 8 DP 60151)
Site area (Hectares)	Lot 9 DP 60151: 0.6442 Ha (6,442 m ²) Orange dashed and solid lines: Approximately 0.93 Ha (9,300 m ²)
Zoning	Business – City Centre Zone

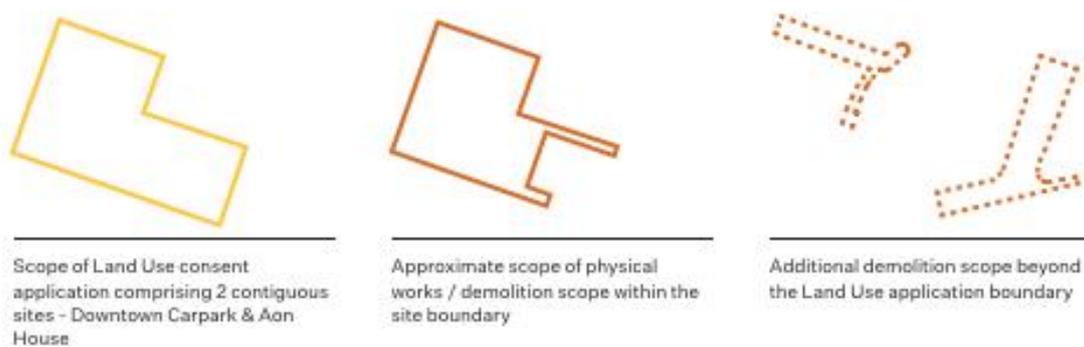


Figure 2.1: Site location and extent of physical works shown in solid orange outline (Source: Downtown Carpark Site Development Architecture & Landscape Report, 3 October 2025)

2.2 Geology

2.2.1 Published geology

The old relict sea cliffs of the Waitemata Harbour are located immediately on the south side of Custom Street West. A wave cut platform extended over much of the site and the area has been subject to reclamation in the period 1860 – 1920. The reclamation fill has multiple sources including material excavated from local ridges, dredging and demolition materials. The reclamation fill is underlain by a thin layer of recent marine sediments and Pleistocene sediments of the Tauranga Group². The recent marine sediments consist predominantly of firm to stiff sandy silt with significant amount of organic matter. The Pleistocene sediments consist predominantly of stiff silts with some organic matter.

Beneath the sediments, East Coast Bays Formation (ECBF), part of the local basement Waitemata Group rocks, underlies much of the Urban Auckland area and consists predominantly of an alternating sequence of siltstone and lithic sandstone. A relatively thin layer (< 2 m) of extremely weathered material mantles the unweathered rock. The total thickness of this group is inferred to be greater than 300 m.

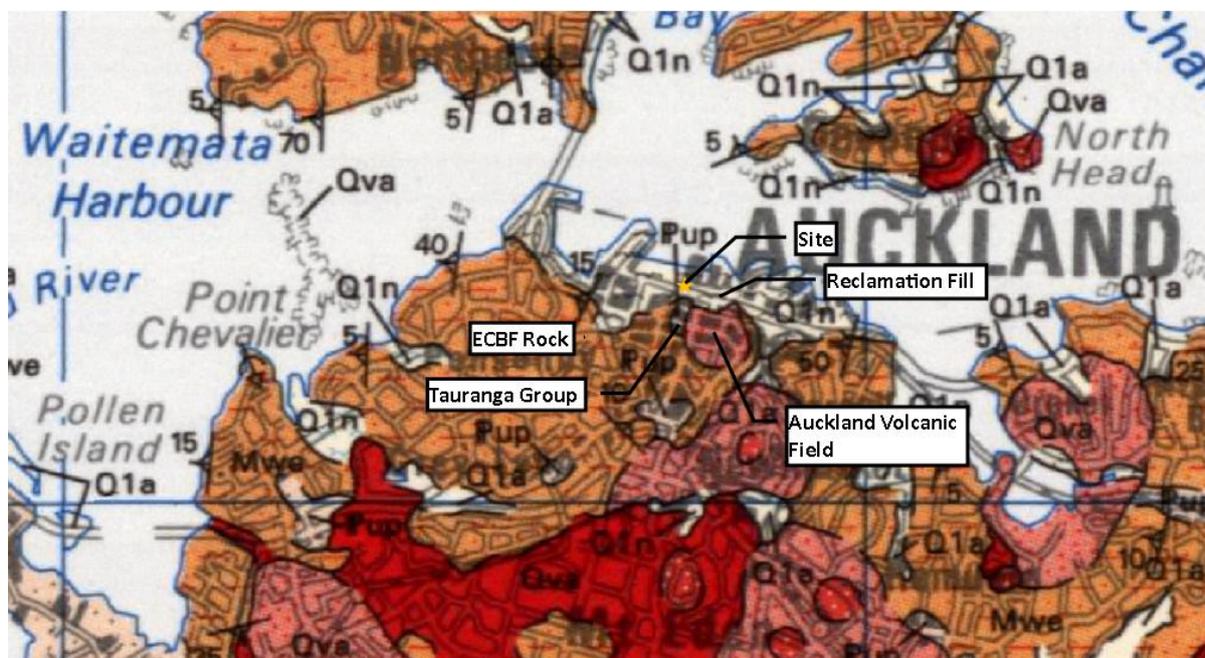


Figure 2.2: Published Geological Map (Source: Edbrooke, 2001)

2.2.2 Site specific geological model

Based on a review of historical geotechnical data³, the interpreted ground conditions underlying the site are anticipated to typically comprise:

- **Reclamation Fill:**
 - Reclamation filling was undertaken in stages over the period 1878-1925, see Section 3.1 below for further detail. Materials are likely to comprise both locally sourced and imported fill materials, dredged materials and hydraulic fill together with debris from

² Edbrooke, S.W. (compiler), 2001. Geology of the Auckland Area, Institute of Geological & Nuclear Sciences 1:250,000 Map 3.

³ T+T, June 2020, Downtown Carpark Site Development – Geotechnical Concept Design Report, prepared for Precinct Properties Ltd, T+T ref. 1016043.1000

earlier construction of seawalls and structures. The available records from boreholes within the site indicate that variable gravels, sands and soft to very stiff silts and clays will be encountered within the fill layers, with occasional basalt boulders, organics, timber, brick, porcelain, and other rubble.

- Tauranga Group sediments (Takanini Formation):
 - Tauranga Group sediments include recent marine “muds” typically comprising soft to stiff sandy silts and clays with significant organic content; and underlying Pleistocene-era alluvial sediments typically comprising soft to stiff pumiceous clays, silts and sands with some organic layers.
- Waitemata Group rock (East Coast Bays Formation):
 - Within the Auckland CBD, typically comprises interbedded very weak to weak siltstone and sandstone. This unit often shows a well-developed weathering profile consisting of sands, silts and clays depending on the original parent lithology. The weathering profile in the top of the rock at the site has been affected by the historic coastal erosion processes in this area. The pre-European shoreline at the Downtown site is more or less along the boundary with Customs Street, and as a result the rock in this area is highly variable, because of the presence of wave cut platforms, and possible caves and small cliffs or other steep rock interfaces.

The subsurface conditions have largely been inferred from ground investigation data that are available in databases (T+T and New Zealand Geotechnical Database (NZGD))³ for the site and the areas immediately adjacent to the site. The subsoil conditions at the site are planned to be confirmed via geotechnical site investigations during detailed design and/or post demolition of the current car park structure.

Table 2.2 summarises the anticipated geological units below the site based on T+T’s geotechnical reporting to date.

Table 2.2: Summary of subsurface conditions at Downtown Carpark site

Unit no.	Geological unit	Typical depth to top of unit (m below existing ground level)	Layer Thickness (m)
1	Reclamation Fill	0 m	4 – 9 m
2	Recent marine sediments (Takanini Formation)	4 – 9 m	0 – 4 m
	Pleistocene Alluvium (Takanini Formation)	7 – 9 m	0 – 8 m
3	Waitemata Group (East Coast Bays Formation)	5 – 11 m	undefined

2.3 Hydrogeology and hydrology

Groundwater is expected to be between 2.5 and 4 m below ground level and within the reclamation fill. The groundwater level is expected to rise slightly above sea level towards Customs Street West, with levels rising to approximately 1.4 m RL³. The groundwater in this area is governed by the presence of the Waitemata Harbour and fluctuates with tidal changes. However, tidal fluctuations based on previous monitoring in the surrounding area indicate negligible fluctuations (100-200 mm).

Due to site paving, rainfall events are likely to have a negligible effect on the groundwater level but flows within fill material and stormwater pipes may locally affect groundwater levels.

3 Historical review

Historical information relating to the site has been collected from a variety of sources including the Auckland Council property file, site contamination enquiry, historic aerial photographs, archaeological assessments, and T+T project archives. This history focuses on on-site activities, except for the aerial photograph review where comments are also provided on readily observable surrounding land use. The information reviewed is summarised in the following sections.

3.1 Archaeological information

Reclamation to provide additional land, in addition to deeper harbours, was a central part of the early vision for Auckland. Figure 3.1 shows the original coastline relative to the subject site.

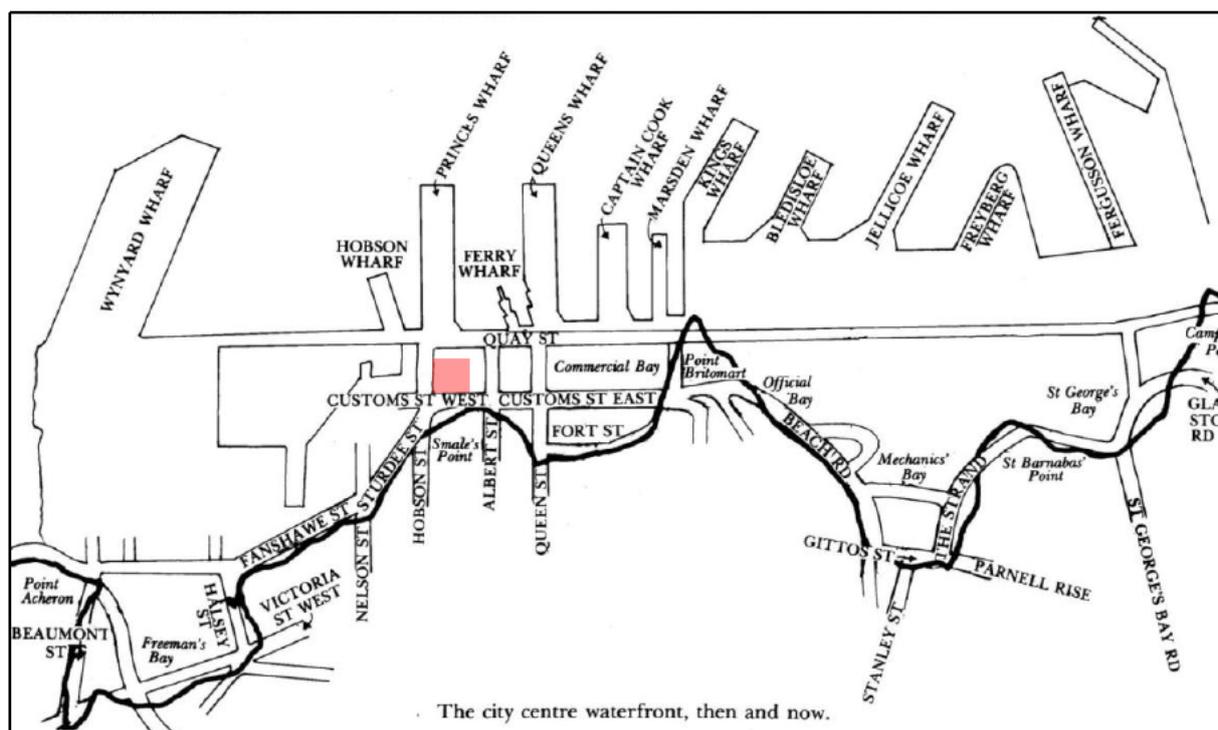


Figure 3.1: Reclamation and historic features in project area (from Barnett, 1981⁴)

Archaeological assessments completed by Clough & Associates^{5,6,7} provide detailed accounts of the history of Auckland CBD, including the process of reclamation. The key findings, where relevant to ground contamination issues, are summarised below:

- Reclamation has been carried out in minor ways since the 1850s, with the first major reclamation to infill the area between Fort Street and Custom Street East starting in 1859. The process of construction involved creation of a seawall along what is now Customs Street East, with the use of material from Smales Point (the western headland) to provide fill.

⁴ Barnett, S. 1981. A Picture Book of Old Auckland. Auckland: Benton Ross Ltd.

⁵ Clough & Associates Ltd (2012), Key Historical Themes in the Development of the CBD Waterfront. Report prepared for Auckland Council.

⁶ Clough & Associates Ltd (2014), Proposed Redevelopment, Downtown Shopping Centre, Queen Street, Auckland Central: Archaeological Assessment. Report prepared for RCP and Precinct Properties Ltd, dated October 2014.

⁷ Clough & Associates Ltd (2018), Quay Street Seawall Upgrade Princes Wharf Section: Archaeological Assessment. Report prepared for Auckland Transport, dated April 2018.

- Throughout the 1870s, and early 1880s, a basalt sea wall along present day Quay Street was constructed. Point Britomart was demolished, with manual labour (including horse drawn carts) used to move the excess materials to points of ongoing reclamation. Dredging waste and rubbish were also noted to be used as infill.
- Throughout the 1870s - 1900 existing wharves were removed, and drains constructed throughout the reclamations. Commercial/industrial buildings were constructed once the infill had stabilised, and the reclamation was complete. The site extends over an old graving dock which was backfilled and the area above developed in the early 1900's.
- The site itself was reclaimed in stages, starting with the graving dock. The north-western area of the site was infilled secondly and then finally the dock. Figure 3.2 provides an overview of the Port of Auckland's Reclamation Plan, a 1890 photograph of the site and an annotated close up of the sites filling history.

3.2 Historical aerial photographs

Historical aerial photographs from the Auckland Council GeoMaps and Retrolens (as shown in Appendix B Table 1) have been reviewed. Relevant features of the site and surrounding land are summarised from each aerial photograph in Appendix B Table 1. A high-level summary of the key features and/or site changes are summarised below:

- The site was largely vacant in the 1940s, with grass or gravel coverage. Sturdee Street divides the site in a south-west to north-east alignment forming two triangular land parcels. The south-eastern triangular corner is occupied by a commercial building.
- A large warehouse occupies the majority of the site in the 1950s and this remains unchanged until the early 1970s.
- The existing structure has been removed/demolished and a new multi-storey structure with visible car park spaces on the roof occupies the site. Sturdee Street no longer exists, and the wider block of land is being developed/redeveloped in 1972.
- The site remains unchanged from the 1970s. The surrounding land has undergone development including the PwC building, the AMP tower and the MCH.

3.3 Council property file review

The Auckland Council property file for the site was obtained on 26 March 2015. Since 2015, the site has consistently been used for car parking and commercial buildings, and no other significant changes are expected to have occurred since 2015. The following information, relevant to potential ground contamination, was identified during review of the property file, excerpts are provided as Appendix C:

- A hand annotated plan (date of annotations is unknown) with dates from 1911 and 1912 show a "dock" covers most of the site. This is consistent with Ports of Auckland records and early photographs of Auckland City T+T has obtained for other projects which indicate that a boat graving dock was originally constructed at the site in the 1870s. The graving dock was subsequently infilled, prior to the reclamation of Quay Street (between Princess Wharf and the site) in 1923;
- Plans dated from 1911 through 1947 show that a 3 level "warehousing" building occupied the south-eastern corner of the site, to the south of the graving dock and Sturdee Street, during this period;
- Plans dated 1968 show the proposed development of a "Car Parking Station" for Auckland City Council. The building includes 8 levels of parking, including the basement and roof levels, with a "service station" show to occupy the south-western corner of the ground floor;

- Plans dated 1970 prepared for Shell Oil New Zealand Limited show the general layout of the “Downtown Service Station” within the “Downtown Parking Building”;
- Correspondence dated 1973 and 1975 refer to the transfer of the service station operations from “Dock Site Service Centre Ltd.” to “Paine Services Ltd.” with the addition of a rental vehicle operation, including “a limited amount of servicing of rental vehicles”;
- A dangerous goods license dated 1996 refers to the removal of two (2) underground tanks, of 13,000 and 18,000 litre capacities, from a site occupied by “Downtown Auto Services”. The site is noted as being used as “Service station” with the future use proposed to be a “Garage”;
- Subsequent records relate to:
 - Alterations to the former service station/garage area for occupation by various restaurant and bars;
 - A barbers shop is noted as occupying a tenancy within the wider site; and
 - Various alterations and improvements, including the addition of two floors, to the car parking facilities.

3.4 Contamination enquiry

The contamination enquiry was received from Auckland Council on the 19 May 2023. The information provided is included in Appendix D and summarised below:

- Auckland Council have identified three potential Hazardous Activities and Industries List (HAIL) activities:
 - F4 Motor Vehicle Workshop. A consent was issued in 2001 for a workshop within the carpark facility.
 - F7 Service stations including retail or commercial refuelling facilities. Plans from 1973 indicate a service station on site with underground fuel tanks and a car wash service. Further Council record show that three underground tanks were removed in 1996.
 - G3 Landfill sites. Plans from 1908 on record indicate the site was used for port docking and was subject to landfilling as part of reclamation.
- Within a 300 m radius of the site, there are:
 - 22 HAIL activities. The HAIL sites are shown in the plan provided by Auckland Council in Appendix D, however, the classification of HAIL is not known.
 - There are ten bores, with an additional five proposed on Customs Steet West. The bores constructed are predominantly for groundwater level monitoring and geochemistry investigations.
 - 34 pollution incidents have occurred, these largely relate to spills, sewage issues and discharges to the stormwater network. Eight of these incidents where above 10 litres. No spill incidents were tagged for the site.
 - There are 39 issued resource consents these predominantly relate the nearby developments for the City Rail Link (CRL), PwC Tower, Quay Street and wharf activities, Britomart Station for diversion and discharge of groundwater and discharges to air for the CRL project.

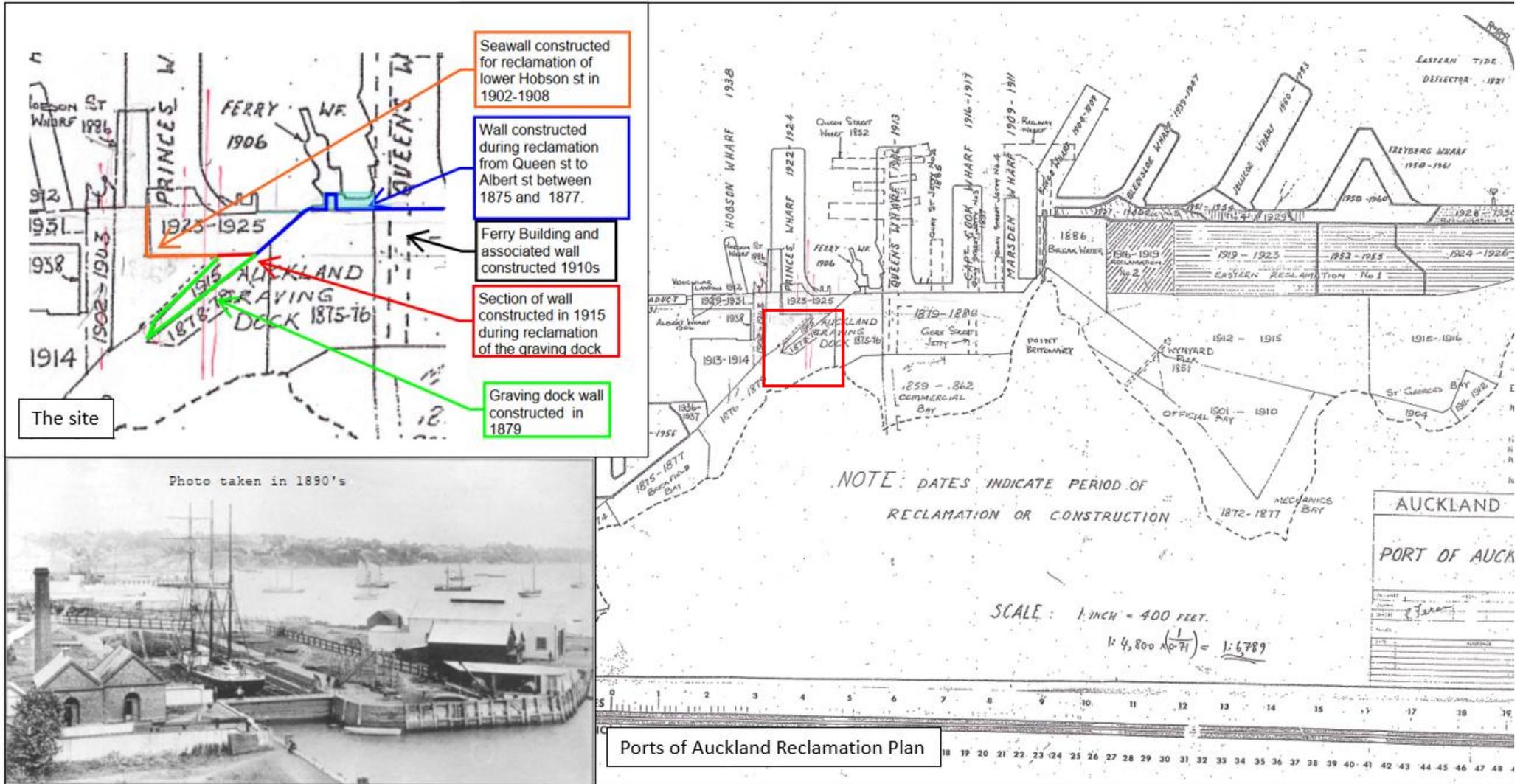


Figure 3.2: Ports of Auckland Reclamation Plan and photograph of the site in the 1890's (source: Cloughs Associates Archeological Assessment)

4 Review of surrounding data

4.1 Summary of contamination in the surrounding area

T+T has undertaken numerous geotechnical and ground contamination related projects in the vicinity of the subject site since the late 1990s. Sites which ground contamination investigations have been undertaken include the PwC Tower redevelopment, Quay Street seawall and street enhancement projects, M Social Hotel, Tepid Baths, City Rail Link project and the former Precinct Downtown shopping centre in Commercial Bay.

In summary the previous assessments identified the presence of reclamation fill, including demolition fill, and occasionally gasworks wastes in the wider reclamation area, as the potential sources of contamination common to the majority of the above-mentioned sites. In addition, activities including the operation of transformers in various buildings, storage of fuels (typically for backup electricity generation purposes), vehicle maintenance and vehicle parking operations (including the bus depot/transport centre) were identified as being potential sources of contamination associated with activities conducted in specific sites surrounding the current site.

Quantitative ground contamination related information from T+T site investigations on Precinct's surrounding sites are summarised in Table 4.1.

Table 4.1: Summary of quantitative information derived from previous investigations

Project	Potential contaminants tested	No. of locations sampled	Summary of analytical results
PwC Tower (188 Quay Street)	Metals, total petroleum hydrocarbons (TPH)	6 (14 samples)	<ul style="list-style-type: none"> Reclamation fill sampled reported low to non-detect concentrations of TPH and metals; Minor TPH contamination was found to be associated with site activities; and No environmental or human health issues were raised by review against relevant acceptance criteria.
Commercial Bay (5 and 7 Queen Street and immediate surrounds)	Metals, PAHs, TPH and asbestos	20 (32 samples)	<ul style="list-style-type: none"> Reclamation fill sampled generally reported low concentrations of metals and PAHs; Minor asbestos contamination was found to be associated with a localised area of brick/rubble; ECBF materials were generally found to be uncontaminated; and Two (2) samples reported concentrations of lead and exceeding the environmental acceptance criteria but no significant environmental or human health issues were raised by review against relevant acceptance criteria.

4.2 Overall summary of findings

Based on the contamination site investigations undertaken by T+T in the surrounding area, the following contamination relationships are expected to exist in the project area:

- Reclamation fill was generally found to contain low concentrations of metals and PAHs which, typically comply with the relevant acceptance criteria for the protection of both human health and the environment.
- Fill containing industrial and demolition wastes, when encountered, has been found to contain elevated concentrations of metals and PAHs, and in some cases included TPH and/or the presence of asbestos. However, excluding localised impacts are only rarely reported to exceed the relevant acceptance criteria for the protection of human health.
- Asbestos was only detected occasionally in superficial fill and was generally associated with demolition materials and/or current or previous underground structures (formwork, services lines etc.).
- Where tested the underlying natural soils derived from Tauranga Group and ECBF rocks are generally found to yield concentrations within natural background ranges, i.e. were uncontaminated.
- Groundwater samples collected recently (circa 2019) to west of the current site typically reported concentrations of contaminants that complied with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC) Guidelines for the protection of aquatic ecosystems, at the 80% level of protection. The occasional exceedances of these criteria were considered unlikely to present a significant risk to the environment given the dilution available within the receiving environment (harbour).

5 Potential for contamination

The historical review indicates that the site surrounds were reclaimed from the harbour in the late 1800s and have since been used for a wide range of commercial purposes. A graving dock continued to operate at the site until the 1920s, when it was infilled. During the operation of the graving dock, the site and surrounding area largely had workshops and dock pump houses without associated piping system present. It is unclear whether all the below ground structures have been removed as part of the old dockyard activities. The area occupied by the graving dock (northern portion of the site) appears to have remained vacant until a large commercial building was constructed on it in the 1940s. Generally, in recent history, the site and surrounding area have been used for retail and office site uses.

This assessment has identified that activities included on the Ministry for the Environment's HAIL were undertaken (or are likely to have been) at several locations within the site. The activities, potential contaminants and an assessment of the likelihood, potential magnitude and possible extent of contamination are presented in Table 5.1.

Table 5.1: Potential for contamination

Land use/activity	Potential contaminants	MfE HAIL category Magnitude and possible extent of contamination
Reclamation fill containing industrial wastes (i.e. incinerator ash, gasworks wastes) placed in the late 19 th century	Dependant on the source of the fill but metals, PAHs, cyanide and asbestos are common	Activity I – Intentional or accidental release of a hazardous substances in sufficient quantity that it could be a risk to human health or the environment Reclamation fill is likely to be present beneath the entire site, but the occurrence of industrial wastes is likely to be more localised and limited to the upper 5 m or so.
Motor vehicle refuelling (service station) and repairs (garage)	Fuel and oil range hydrocarbons, including TPH, benzene, ethylbenzene, toluene, xylenes (BTEX) and PAHs, and metals (leaded fuels and as contaminants in waste oil)	Activity F4 - Motor vehicle workshops; and Activity F7 - Service stations If leaks from the fuel storage or waste handling systems have occurred there is a potential for petroleum hydrocarbon contamination of both soil and groundwater to occur. The fuel storage systems were removed at a time when sampling was not routinely conducted so the extent of any residual contamination cannot be confirmed. The potential presence of volatile contamination may mean that vapour controls are required for any new structures proposed at the site. Given the source was removed some 20 years ago, the likelihood of significant volatile contamination being present is low. Additionally, contaminated soil is expected to be excavated and removed for the basement construction.

Land use/activity	Potential contaminants	MfE HAIL category Magnitude and possible extent of contamination
Former port activities	Metals, hydrocarbons associated with fuels	<p>Activity F5 – Port activities including graving docks or marine vessel maintenance facilities</p> <p>Wharf operations have been in place adjacent to the site since the start of the 20th Century. Some of these operations, including a former graving dock and dock yard pump house, extended into the site prior to reclamation occurring. However, impacts, if any, are now unlikely to be indistinguishable from subsequent reclamation filling. During pre-works investigations the area around the old pump house and former graving dock is proposed to be targeted to confirm contamination assumptions.</p>
Asbestos containing materials (ACM)	The various forms of asbestos as free fibres	<p>Potential Activity I - Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment</p> <p>Buildings were constructed at the site during the period when use of ACM was common. However, asbestos is unlikely to have entered the ground as the ACM is most likely to have been contained within the building envelope. Potential ground contamination effects should be able to be mitigated by appropriate handling and removal during future building works.</p>

6 Preliminary detailed site investigations

6.1 Scope and methodology

Preliminary soil and groundwater investigations have been completed at the site. Due to site access constraints and the extent of basement structures coverage, complete intrusive site investigations could not be carried out. The preliminary investigations comprised the following scope of work:

- The advancement of one environmental borehole (ENV-BH01) to a total depth of eight (8) m below ground level (bgl). The area within the former service station was not accessible by a drilling rig. The borehole was placed on the downgradient side of the service station within the carpark building (refer Figure 6.1) to establish whether activities from the former service station had caused significant hydrocarbon contamination and were impacting groundwater.. The borehole was drilled from Level 1 of the carpark building and is about 2 m above Lower Hobson Street road level.
- Soil samples were collected from various depths during drilling.
- Following completion of the borehole, a groundwater monitoring well was installed to a depth of 6.5 m below the Level 1 car park level. The well was subsequently “developed” and the well allowed to equilibrate for a minimum of one week before one (1) sample was collected from the well.

The location of the preliminary investigation locations is presented on Figure 6.1.

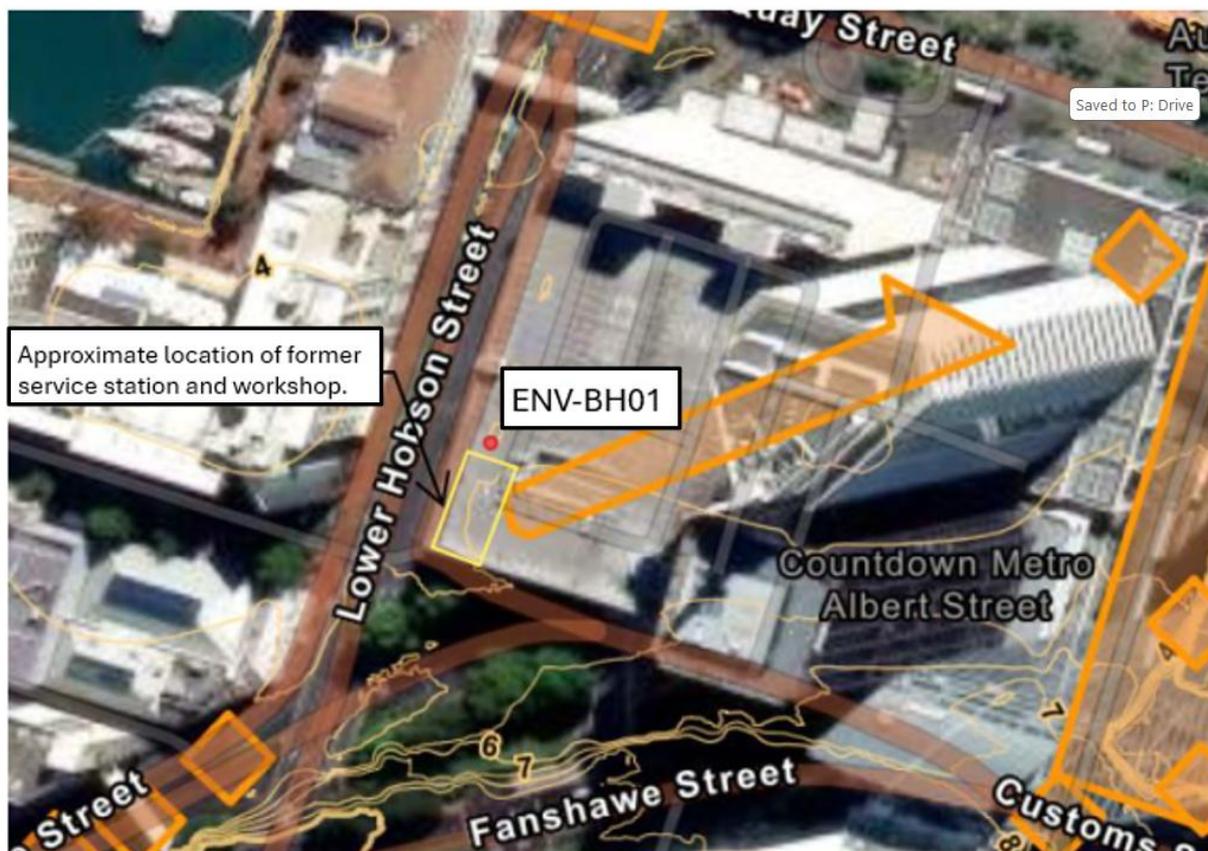


Figure 6.1: Preliminary Environmental borehole (ENV-BH01) shown as red point and approximate location of former service station outlined in yellow.

6.2 Soil sampling procedures

Soil samples were collected during drilling on 30 June 2025 in accordance with the following procedures:

- All samples were collected with freshly gloved hands and placed into laboratory-provided sample jars. The samples were placed on ice and shipped to the laboratory with chain of custody documentation.
- Soil samples were collected from various depths correlating to changes in lithology, at the groundwater interface and if evidence of staining, odours or building debris (bricks fragments) were observed.
- Sample tools, where used (e.g.: hand auger) were decontaminated between sampling locations using clean water and Decon90 (a phosphate free detergent).
- Soil samples were submitted to Hills Laboratories Ltd, an internationally accredited laboratory (IANZ), for selected analysis, including:
 - Total cyanide⁸.
 - Metals (arsenic, cadmium, chromium, copper, lead, nickel and zinc).
 - Total petroleum hydrocarbons (TPH).
 - Polycyclic aromatic hydrocarbons (PAH).
 - Benzene, toluene, ethylbenzene and xylene (BTEX).
 - Asbestos from inferred fill.

6.3 Groundwater sampling procedures

Groundwater samples were collected on 16 July 2025 in accordance with the following procedures:

- Depth to water and base of well was measured using a clean interphase probe.
- Groundwater sampling using a low-flow sampling method. Water quality parameters (turbidity, electric conductivity and pH) were recorded during the purging of the well.
- Following the stabilisation of groundwater parameters and once approximately three well volumes had been purged, a groundwater sample was collected. The sample was collected directly into laboratory provided containers, filled to the top with no headspace and placed in an insulated container prior to transportation to the laboratory.
- The one (1) groundwater sample, from ENV-BH01, was submitted to Hill Laboratories Ltd for the following analysis, including:
 - Total cyanide⁸.
 - Dissolved metals (arsenic, cadmium, chromium, copper, lead, nickel and zinc).
 - TPH, PAH and BTEX.

A copy of the water quality parameters and groundwater level measures during sampling are presented in Appendix E.

⁸ Total cyanide testing methods performed by Hill Laboratories is not accredited under the IANZ International Laboratory Accreditation Cooperation (ILAC) procedures.

7 Data quality and field procedures

A quality assurance and quality control (QA/QC) programme was implemented as part of field procedures and included:

- Decontamination of sampling equipment between sampling locations.
- Preservation of samples with ice during transport from the field to the laboratory.
- Transportation of samples with accompanying chain of custody documentation.
- Compliance with sample holding times.

7.1 Investigation observations

The bore encountered multiple layers of fill (although significant core loss was encountered between 3 and 7 m below the Level 1 car park level). Where core was able to be recovered, the fill consisted of layers of silt/clay with gravels and layers of gravel cobbles. Natural marine sediments were encountered at about 7.3 m below the Level 1 car park level.

Slight petroleum hydrocarbon odours were detected in two layers as follows:

- Carpark building construction fill material between 1 and 1.5 m below the Level 1 carpark level.
- Reclamation fill between 3.3 and 3.5 m below the Level 1 carpark level.

Groundwater table was measured at about 4.7 m below the Level 1 carpark level. No separate phase hydrocarbons were observed at the groundwater surface. Groundwater was initially observed to be cloudy and coloured brown. As the well was purged, the groundwater became clear and colourless in appearance. No odours were observed from groundwater at the time of sampling.

A copy of the borehole log for ENV-BH01 is presented in Appendix F.

8 Assessment of site contamination

8.1 Laboratory results

Three (3) soil samples and one (1) groundwater samples were collected and selected for laboratory analysis for a selection of parameters outlined in Section 6.1.

The laboratory transcripts are provided in Appendix G.

8.2 Evaluation criteria

The investigation data have been evaluated against criteria selected according to the requirements of the applicable regulatory framework as set out below.

8.2.1 Soil

For the protection of human health:

- The NESCS Soil Contaminant Standards (SCS) for commercial/industrial use.
- Where NESCS SCS values have not been derived, guidance from the below documents were used, as per MfE's CLMG No. 2, Hierarchy and Application in New Zealand of Environmental Guideline Values (Revised 2011). The applicable commercial/industrial land uses have been used.
 - Ministry for the Environment's "Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011)".
 - Australian National Environment Protection (Assessment of Site Contamination) Measure 1999, updated 2013.
- For asbestos in soil contamination, the criteria defined in the NZ Asbestos in Soil Guidelines⁹.
- For protection of the environment:
 - Auckland Unitary Plan Permitted Activity Criteria¹⁰.
- Published background concentrations for non-volcanic soils in the Auckland region¹¹.

8.2.2 Groundwater

For groundwater, relevant criteria for the site in accordance with requirements under Chapter E30 of the AUP include:

- ANZECC Guidelines¹² for 80% level of protection for marine species except benzene where the 95% level of protection applies; and
- MfE Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (2011).

⁹ BRANZ Ltd, 2024. New Zealand Guidelines for Assessing and Managing Asbestos in Soil.

¹⁰ Auckland Unitary Plan (AUP) Table E30.6.1.4.1.

¹¹ Auckland Regional Council, 2001. Technical Publication 153 - Background concentrations of inorganic elements in soil from the Auckland region. Auckland Council (formerly Auckland Regional Council), dated October 2001 (reprinted April 2002).

¹² Australian and New Zealand Environment and Conservation Council (ANZECC) and Agricultural and Resource Management Council of Australia and New Zealand (ARMCANZ), 2000 publication: Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2000

8.3 Discussion of soil results

The soil laboratory results have been tabulated together with the relevant evaluation criteria and provided in Appendix G. Key findings are summarised below:

- No significant soil contamination was encountered at the bore.
- Heavy metals (copper, lead and nickel) were reported above background limits in near surface fill soils from a depth on 1.1 - 1.5 m bgl from the carpark construction fill. Deeper samples from this borehole (both fill and natural soils) did not report metals above background limits.
- PAHs and TPH were also reported in near surface fill material collected at 1.1 - 1.5 m bgl, and to a lesser extent from deeper samples.
- BTEX compounds were not reported above laboratory limits of detection.
- Asbestos was not reported in the samples tested.

The findings are consistent with observations during drilling and the location of the borehole with respect to the former service station activities.

8.4 Discussion of groundwater results

The results from groundwater testing did not report the parameters tested (dissolved metals, BTEX, PAH and TPH) above laboratory limits of reporting. It should be noted that laboratory detection limits for dissolved arsenic (<0.02 mg/L) are above the low reliability limit default guideline value (0.0023 mg/L) to achieve 80% species protection in a marine environment. Given the guideline value for arsenic is low-reliability, we do not consider the results in groundwater at the site will affect the overall groundwater assessment.

The remaining results are all below relevant evaluation criteria outlined in Section 8.2.2.

The results of this preliminary detailed site investigation indicate there is no widespread significant contamination from the former service station activities.

9 Preliminary conceptual site model

A conceptual model as defined by the Ministry for the Environment in the contaminated land management guidelines¹³, sets out known and potential sources of contamination, potential exposure pathways, and potential receptors. For there to be risk from contamination on the site there has to be a contamination **source** and a mechanism (**pathway**) for contamination to affect human health or the environment (**receptor**).

9.1 Source

Based on the desk study information supplemented with the preliminary soil and groundwater testing, we anticipate the underlying **reclamation fill** will be the main source of contamination. The fill varies in depth from 0 and 9 m below surface, with estimated thicknesses of 4 - 9 m.

Generally, previous testing of similar reclamation fill in the area show low levels of heavy metal and hydrocarbon contamination present which is below human health and environmental criteria. However, where demolition and/or construction fill is encountered, surrounding sites have detected isolated hotspots of elevated concentrations of metals and PAHs, and in some cases included TPH and/or the presence of asbestos above environmental criteria and in isolated instances above human health criteria. Cyanide is also typically encountered in fill at depth (> 3.0 m below ground level) above laboratory limits of detection but below relevant human health and environmental criteria.

Recent preliminary testing of soils and groundwater downgradient of the **former service station** indicate no significant widespread contamination from the former service station and workshop activities. There is still potential residual localised contamination around the former fuel tanks and associated equipment. However, as these materials will be removed to construct the proposed basement structures during site development, the pathway will be generally incomplete for end users. Further sampling is proposed to better delineate and quantify the risk.

There is also potential for the current building to include **asbestos containing building materials** (ACM). However, it is anticipated that these are not a current or potential source of ground contamination for the following reasons:

- The site is fully paved and sealed.
- Prior to demolition works, it is a requirement under the Health and Safety at Work (Asbestos) Regulations 2016 to conduct a hazardous materials survey to identify these materials. If ACM building materials are present, the ACM will be removed in a controlled manner by licenced contractors in accordance with the regulations and Approved Code of Practice: Management and Removal of Asbestos (ACoP)¹⁴.

The preliminary groundwater testing indicates metals and hydrocarbons in groundwater are below laboratory limits of detection and therefore discharges from the site are likely to comply with ANZECC 80% trigger levels for the protection of the marine environment. This is consistent with the limited groundwater sampling data for the downtown area, circa 2019, which indicates discharges are anticipated to meet with the ANZECC 80% trigger levels for the protection of the marine environment. Based on the historical information, the occasional exceedance is anticipated. The occasional exceedances of these criteria in 2019 were considered unlikely to present a significant risk to the environment given the dilution available within the receiving environment (harbour).

¹³ Ministry for the Environment, updated 2011, *Contaminated Land Management Guidelines No. 5 Site Investigation and Analysis of Soils*

¹⁴ Worksafe, September 2016, Approved Code of Practice: Management and Removal of Asbestos.

Construction management measures will be in place during the works to control and manage discharges.

9.2 Receptors

Receptors of contamination from the fill material and groundwater may include:

- i People – site workers, adjacent site workers, disposal site operators, the general public and users of the site post development (including residential and recreational users); and
- ii Environment – ecological receptors at stormwater and groundwater discharge points (Harbour), and those at disposal destinations if they are not appropriate for the type of material.

9.3 Pathways

The pathways by which low level contaminated fill and isolated hotspots can affect people include primarily contact and ingestion, including inhalation. These pathways are likely to be **generally incomplete for end users, however, may present a risk during development**. The pathway for unexpected, elevated concentrations of contaminants to enter the environment are from uncontrolled discharges during earthworks. A Contamination Site Management Plan (CSMP) will be in place to manage groundwater and/or surface runoff during works to prevent uncontrolled discharges.

9.4 Risk assessment

The conceptual site model indicates that the ground contamination related risks and aspects that need to be managed during the site development comprise:

- Worker exposure – the presence of low-level contamination with isolated hotspots will require management during development to protect workers.
- Spoil disposal - if removed offsite fill material needs to be disposed of to a facility appropriate to the contaminant content.
- Environmental effects – the presence of low-level contamination with isolated hotspots will require management during development to prevent discharges to the nearby Waitemata Harbour.
- Vapour - monitoring of vapour emissions particularly around the former service station during construction is expected to be required until further soil investigations can be undertaken to protect worker exposure.
- Contingency measures - to manage unexpected contamination, should be defined and implemented as necessary.

The implications for consenting and managing the identified potential contamination are discussed in further detail in Section 10.

10 Development implications

10.1 Regulatory implications

The rules and associated assessment criteria relating to the control of contaminated sites in the Auckland region are specified in the following documents:

- The NESCS.
- The Auckland Unitary Plan – Operative in part (AUP) Chapter E30.
- Health and Safety at Work (Asbestos) Regulation 2016 (Asbestos Regulations).

The NESCS considers issues relating to land use and the protection of human health while the AUP has regard to issues relating to the protection of the general environment. The management of asbestos in soils is regulated under Asbestos Regulations. As asbestos is principally considered to be a human health contaminant the Asbestos Regulations (like the NESCS) currently only considers issues relating to the protection of human health.

In order to help achieve compliance with the Asbestos Regulations, WorkSafe New Zealand has prepared an Approved Code of Practice (ACoP): Management and Removal of Asbestos (September 2016). The ACoP refers readers to the “*New Zealand Guidelines for Assessing and Managing Asbestos in Soil*” (herein referred to as the Asbestos-in-Soil Guidelines) which were published in November 2017 by BRANZ Ltd.

10.1.1 NESCS

Based on the site history, the results of preliminary investigations and the interpolation of these results across the site, the concentrations of contamination in soil are likely to be above background concentrations with some potential localised exceedances for commercial / industrial standards. Therefore, the NESCS applies to the development and proposed soil disturbance activities.

An assessment of the proposed soil disturbance activities against the NESCS permitted activity requirements under the NESCS is provided in Table 10.1. Based on the volume of soil likely to be disturbed for the basement excavation, volume require offsite disposal and the duration of the works, it is unlikely the proposed development activities will meet with the permitted activity requirements. Excavations are anticipated to be approximately 20 m deep with an approximate bulk excavation volume of 130,000 m³ proposed. Of the 130,000 m³, the estimated volume of reclamation fill and marine sediments is 54,000 m³ and 75,800 m³ of ECBF soil and rock.

Preliminary investigations to address some data gaps have been completed, however further investigation to assess the wider site are required. Due to access constraints and current building foundations, further investigations to support a preparation of a final Detailed Site Investigation (DSI) has not been completed.

On this basis, the development would require a resource consent as a **Discretionary Activity under Regulation 11 of the NESCS**. This Preliminary DSI and a Preliminary Contamination Site Management Plan (CSMP) will be provided in support of a consent under the NESCS.

As the site intrusive investigations (and final DSI) will be deferred until access is available, the CSMP will outline the level of pre-works testing requirements based on contaminants of concern associated with the HAIL activities. It is proposed that the findings of the final DSI will be provided on completion of the intrusive investigations, as a condition of consent.

Table 10.1: NESCS Permitted Activity assessment for land disturbance (Regulation 8(3))

Permitted Activity conditions	Assessment
(a) Implementation of controls to minimise exposure of humans to mobilised contaminants.	CAN COMPLY A CSMP can be provided which includes controls for managing the human health and environmental risks. AN updated CSMP will need to be provided prior to construction after site specific investigations can be completed.
(b) The soil must be reinstated to an erosion free state within one month of completing the land disturbance.	CAN COMPLY The area of land disturbance can be reinstated to a erosion free state on completion of works.
(c) The volume of the disturbance of the piece of land must be no more than 25 m ³ per 500 m ² .	DOES NOT COMPLY For a site of this size (some 6,442 m ²), the site-specific soil disturbance threshold is 322 m ³ . The basement excavation is expected to be up to 20 m in depth and the 465 m ³ will be exceeded during works. Approximate volumes including excavation of natural and reclamation fill equate to 130,000 m ³ for the site works.
(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.	DOES NOT COMPLY For a site of this size (some 6,442 m ²), the site-specific threshold for off-site disposal is 64 m ³ . The basement excavation is expected to be up to 20 m in depth and the material is expected to be carted offsite. As such, the offsite disposal is expected to exceed the site-specific threshold.
(e) Soil taken away must be disposed of at an appropriately licensed facility.	CAN COMPLY Soil removed from the site will be disposed to an approved facility.
(f) The duration of land disturbance must be no longer than two months.	DOES NOT COMPLY Given the extent of works, the development is assumed not to comply with this requirement as excavation will likely be more than 2 months.
(g) The integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.	NOT APPLICABLE There are no structures containing contamination within the area subject to land disturbance

10.1.2 AUP

The contaminated land rules are set out in Chapter E Environmental Risk Section E30 of the AUP. Table 10.2 provides an assessment against the E30 Permitted Activity Standards of the AUP.

Soil testing from land surrounding the site indicates contamination concentrations in some site soil can exceed the permitted activity soil acceptance criteria in Table E30.6.1.4.1 and the requirements of Standard E30.6.1.4 Discharges of contaminants into air, into water and into or onto land from land not used for rural production activities. Additionally, the volume of disturbance and duration of works are expected to exceed the requirements of Standard E30.6.1.2 Disturbance of Land. As discussed in Section 10.1.1, a final DSI is due to be undertaken following the granting of the resource consent and as a condition of consent. A preliminary Contamination Site Management Plan has been prepared to support the consent application.

On this basis, the proposed development will require a Discretionary Activity Consent under the AUP.

Table 10.2: AUP Permitted Activity Rules

Chapter E30 Contaminated Land Management Standards	
Standard E30.6.1.2 Disturbance of land – Permitted activities	
1 The volume of soil disturbed must not exceed (a) 200 m ³ per site; or (b) 200 m ³ per project.	DOES NOT COMPLY The proposed development includes excavation for a five level basement up to 20 m below ground level. The volume of soil disturbance will not comply with the permitted activity requirements of the AUP.
2 Prior to the activity commencing, Council must be advised of the activity in writing if the volume of soil disturbed on land containing elevated levels of contaminants exceeds 25 m ³ , including details of the measures and controls to be implemented to minimise discharges of contaminants to the environment, and such controls are to be effective for duration of the activity and until the soil is reinstated to an erosion-resistant state.	CAN COMPLY A Contamination Site Management Plan (CSMP) will be required to manage contamination on site as part of the NESCS consent. The CSMP can outline the information required for this rule.
3 Any discharge from land containing elevated levels of contaminants must not contain separate phase liquid contaminants including separate phase hydrocarbons.	LIKELY TO COMPLY Former underground tanks were removed in 1996. No separate phase liquid contaminants (SPL) are expected within the reclamation fill, and SPL was not observed in preliminary investigations.
4 The duration of soil disturbance on a site must not exceed two months.	DOES NOT COMPLY The duration of the earthworks is yet to be confirmed, however, based on the scale of the works they are not expected to be completed in two months.
5 Any contaminated material removed from the site must be disposed of at a facility or site authorised to accept such materials.	CAN COMPLY Soil removed from site will be disposed to a facility consented to accept the material.
Standard E30.6.1.4 discharges to the environment	
1 For in-situ soil and fill material, the concentrations of contaminants (relevant to the site's history) in soil or fill material, or the 95 per cent upper confidence limit (UCL) of the mean, determined in accordance with the MfE CLM Guidelines No.5 must not exceed the greater of the criteria specified in parts (a) through (c) of this standard.	UNABLE TO ASSESS Preliminary soil testing from surrounding sites indicates isolated hotspots of contaminants, especially heavy metals (lead, zinc and arsenic) will exceed the concentrations in Table E30.6.1.4.1, and it is possible site soils may comply based on 95% UCL of the mean, there is currently insufficient site information to confirm this.
2 Any discharge from land containing elevated levels of contaminants must not contain separate phase liquid contaminants including separate phase hydrocarbons.	LIKELY TO COMPLY Former underground tanks were removed in 1996. No SPL are expected within the reclamation fill, and preliminary investigations in the southwest corner of the site near the former service station and workshop do not indicate SPL.

10.1.3 Asbestos Regulations

The following sections outline the requirements under the Asbestos Regulations for the development.

10.1.3.1 Asbestos in structures

Given that the current structure was constructed between in the late 1960s early 1970s, there is the potential for ACM to be present in the building fabric. An asbestos building survey will be required prior to any demolition, refurbishment and/or relocation of existing structure. Should asbestos in buildings be identified, the Health and Safety at Work (Asbestos) Regulations 2016 and ACoP will apply to the construction and development works.

10.1.3.2 Asbestos in soil

The Asbestos-in-Soil guidelines define the level of oversight and controls (including personal protective equipment, decontamination, etc.) that is required to be implemented during earthworks and are dependent on the concentration of asbestos fibres/fines or fragments that are present in the soils.

At present, there is limited soil testing for asbestos (two samples from ENV-BH01) and while asbestos was not detected in these two samples, the level of testing is insufficient to confirm the appropriate level of asbestos controls. Surrounding soil sampling data indicates isolated pockets of asbestos in soil is encountered where construction and demolition fill is present. Based on the site history, a warehouse was built on the site in the 1950's and was subsequently removed/demolished in the late 1960's. The current car park structure was constructed in between 1968 and 1972 according to aerial photography and the property file information. It is possible asbestos was present in the former structure, and during demolition/removal the near surface soils/fill could have been impacted with fibres/fines and/or ACM. Additionally, based on T+T's experience with construction practises, there is possibility that fibre board could have been used in foundation form work.

Previously soil sampling undertaken on surrounding sites indicate a low level of asbestos (< 0.001% as fibres/fines) and this is largely associated with construction and demolition fill. In conjunction with the limited asbestos testing in the preliminary investigations, **Trace Asbestos Contamination controls** are considered suitable at this stage, to be adopted for the proposed works. Works should cease if construction/demolition fill and/or asbestos fragments are identified during surface removal. Further soil sampling on site is proposed after the existing structure are removed and prior to earthworks commencing, with controls confirmed in the final DSI Report proposed after intrusive investigations. As the site has a well-documented history of demolition, we expect a more rigorous contaminated land monitoring/inspection schedule would be indicated during earthworks.

Table 10.3 provides a summary of controls for Trace Asbestos Contamination and also includes Low Level Asbestos Contamination and Class B Contamination works for reference (which are the next level of control should escalation be required).

Should works require escalation to **Class B Work controls**, then an Asbestos Removal Control Plan will be required for the works, along with WorkSafe Notification and oversight by a Licensed Removalist.

As indicated in the table below, air monitoring is not required for Trace Asbestos Contamination. Air monitoring may be required during works, if asbestos in soil controls are increased.

If asbestos is present in the reclamation fill, then we anticipate the contamination will be removed during the site development for the construction of the basement.

Table 10.3: Summary of asbestos in soil earthwork controls

SCENARIO	CLASS B CONTAMINATION – NON-FRIABLE	LOW LEVEL ASBESTOS CONTAMINATION	TRACE ASBESTOS CONTAMINATION
	<u>> 0.01% w/w AF+FA in soil</u> <u>> 1% ACM</u>	<u>> 0.001% w/w AF+FA in soil</u> <u>> 0.01 % w/w ACM</u>	<u>≤ 0.001% w/w AF+FA in soil</u> <u>< 0.01% w/w ACM</u>
ADDITIONAL DOCUMENTATION/ NOTIFICATION REQUIREMENTS	Asbestos removal control plan and WorkSafe notification for asbestos removal.	No additional notification required.	No additional notification required.
OVERSIGHT BY A LICENSED REMOVALIST	Required.	Not required but recommended.	Not required.
PERSONAL PROTECTIVE EQUIPMENT	Disposable coveralls rated type 5, category 3, nitrile gloves, steel toe capped gumboots or safety footwear with disposable overshoes.	Disposable coveralls rated type 5, category 3, nitrile gloves, steel toe capped gumboots or safety footwear with disposable overshoes.	No asbestos-specific PPE as concentrations are unlikely to exceed trace levels in air.
RESPIRATORY PROTECTIVE EQUIPMENT	Half-face P3 respirator with particulate filter.	Disposable P2 dust mask.	No asbestos-specific requirements as concentrations are unlikely to exceed trace levels in air.
DUST/ASBESTOS FIBRE SUPPRESSION	Water and polymer spray via localised points before and during works.	Water spray via localised points.	Water spray via localised points.
AIR MONITORING	Air monitoring not required but recommended given setting and to confirm that concentrations are below 0.01 f/ml.	Air monitoring not required but recommended given setting and to confirm that concentrations are below 0.01 f/ml.	Air monitoring not required.
CLEANING FACILITIES	Dedicated cleaning area and foot wash. **	Dedicated cleaning area and foot wash.**	Foot wash and used PPE collection area.
VEHICLE (TRUCK) PROTECTION	200 µm heavy-gauge polythene wrapped soil/lined trays and truck covered.	Truck lining/soil wrapping depends on the receiving landfill. All trucks should be covered.	Truck lining/soil wrapping depends on the receiving landfill. All trucks should be covered.
	HEPA filter system fitted for all occupied vehicles where friable ACM on site (lagging, insulation, etc).	Standard air conditioning.	Standard air conditioning.
VEHICLE WASHING FACILITIES	Visual assessment plus swab (if friable) by an independent assessor or competent person* or SQEP following brush and or wash down.	Visual assessment by a competent person* or SQEP following brush and or wash down.	Visual assessment by a competent person* or SQEP following brush and or wash down.

* A competent person must meet the requirements of regulation 41(3) of the Asbestos Regulations. An independent person, who must not be otherwise involved in the physical removal works, is required to undertake air monitoring and clearance inspections (where required).

10.1.4 Contamination site management plan

A preliminary CSMP has been prepared to document the controls and procedures required during the proposed soil disturbance to support consent. An updated CSMP will be required after site investigations are complete and prior to construction commencement. Both the preliminary and final CSMP will include controls to minimise the discharge of contaminants during works and contain health and safety controls (including asbestos as outlined in Section 10.1.3).

11 Summary and conclusions

Tonkin & Taylor Ltd (T+T) has undertaken a preliminary detailed site investigation for Precinct, for the Downtown carpark site located at 2 Lower Hobson Street, Auckland. The preliminary DSI involved the review of historical information for the site and the surrounding area, discussion of the soil and groundwater results from preliminary investigations, assessment of potential contamination and likely implications for the redevelopment of the site.

The key findings are summarised as follows:

- Four confirmed and/or potential HAIL activities have occurred at the site. These included historic dockyard operations, reclamation and landfilling, a motor vehicle workshop, and due to the age of previous development and prior demolition activities there is potential for asbestos to be present both within the structure and in underlying reclamation fill.
- Site investigation data from the surrounding area and sampled within the reclamation fill extents indicate:
 - Reclamation fill was generally found to contain low concentrations of metals and PAHs which, typically comply with the relevant acceptance criteria for the protection of both human health and the environment. Fill containing industrial and demolition wastes, when encountered, has been found to contain elevated concentrations of metals and PAHs, and in some cases included TPH and/or the presence of asbestos. However, excluding localised impacts are only rarely reported to exceed the relevant acceptance criteria for the protection of human health.
 - Asbestos was only detected in isolated pockets and was generally associated with demolition materials and/or current or previous underground structures (formwork, services lines etc.).
 - Underlying natural soils are expected to yield concentrations within natural background ranges, i.e. uncontaminated.
 - Groundwater samples collected recently (circa 2019) to west of the current site typically reported concentrations of contaminants that complied with the ANZECC Guidelines for the protection of aquatic ecosystems, at the 80% level of protection. The occasional exceedances of these criteria were considered unlikely to present a significant risk to the environment given the dilution available within the receiving environment (harbour).
- Preliminary soil investigations from one borehole and groundwater monitoring well confirm the presence of metal and hydrocarbon impacts in fill. Groundwater results do not indicate a significant widespread contamination risk from previous service station and workshop activities.
- Based on the preliminary results from soil and groundwater and proposed basement development, a vapour intrusion risk is anticipated to be low. However, this is based on limited testing data and further investigation of soil is needed to confirm this risk remains low.
- The NESCS and AUP applies to the site redevelopment activities in relation to contaminated land based on the potential for contamination. Due to constraints accessing the site, site investigations across the entire site have been deferred until access is available, to be completed as a condition of consent. Therefore, the following consents are sought:
 - **Discretionary Activity Consent** for soil disturbance under the NESCS.
 - **Discretionary Activity Consent** for discharges into air, or into water or onto or into land under Chapter E30 **of the AUP(OP)**.

- **A preliminary contaminated site management plan has been prepared for the consent application which outlines the procedures for undertaking the site redevelopment works to minimise effects to the environment and includes the requirements for pre-works sampling and testing prior to construction commencing.**

12 Applicability

This report has been prepared for the exclusive use of our client Precinct Properties NZ Limited, with respect to the particular brief¹⁵ given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that our client will submit this report as part of an application under the Fast-track Approvals Act 2024 and that an Expert Panel as the consenting authority will use this report for the purpose of assessing that application. We understand and agree that this report will be used by the Expert Panel in undertaking its regulatory functions.

Compliance with the Environment Court Practice Note 2023

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

I am a Principal Environmental Engineer at Tonkin & Taylor Ltd (T+T), where I specialise in environmental assessments, including contaminated land. I have worked at T+T since August 2002.

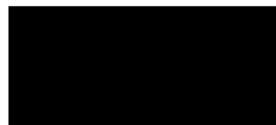
I have more than 30 years' experience in the environmental field. I am a Chartered Member of Engineering NZ and a Chartered Environmental Professional in Site Contamination. I hold a Bachelor of Civil Engineering from University of Canterbury.

Examples of recent relevant projects and services that I have been involved with include the remediation of a few hundred residential properties owned by Kainga Ora in the Mt Roskill, Owairaka neighbourhoods including the former Hobsonville Air Base, remediation and contaminated soil management for a number of developments at Wynyard Quarter and University of Auckland, investigations and assessment of potentially contaminated soils for the Central Interceptor and Herne Bay Collector projects.

Tonkin & Taylor Ltd
Environmental and Engineering Consultants

Report prepared by:

Authorised for Tonkin & Taylor Ltd by:



Lean Phuah
Principal Environmental Engineer



Peter Millar
Project Director

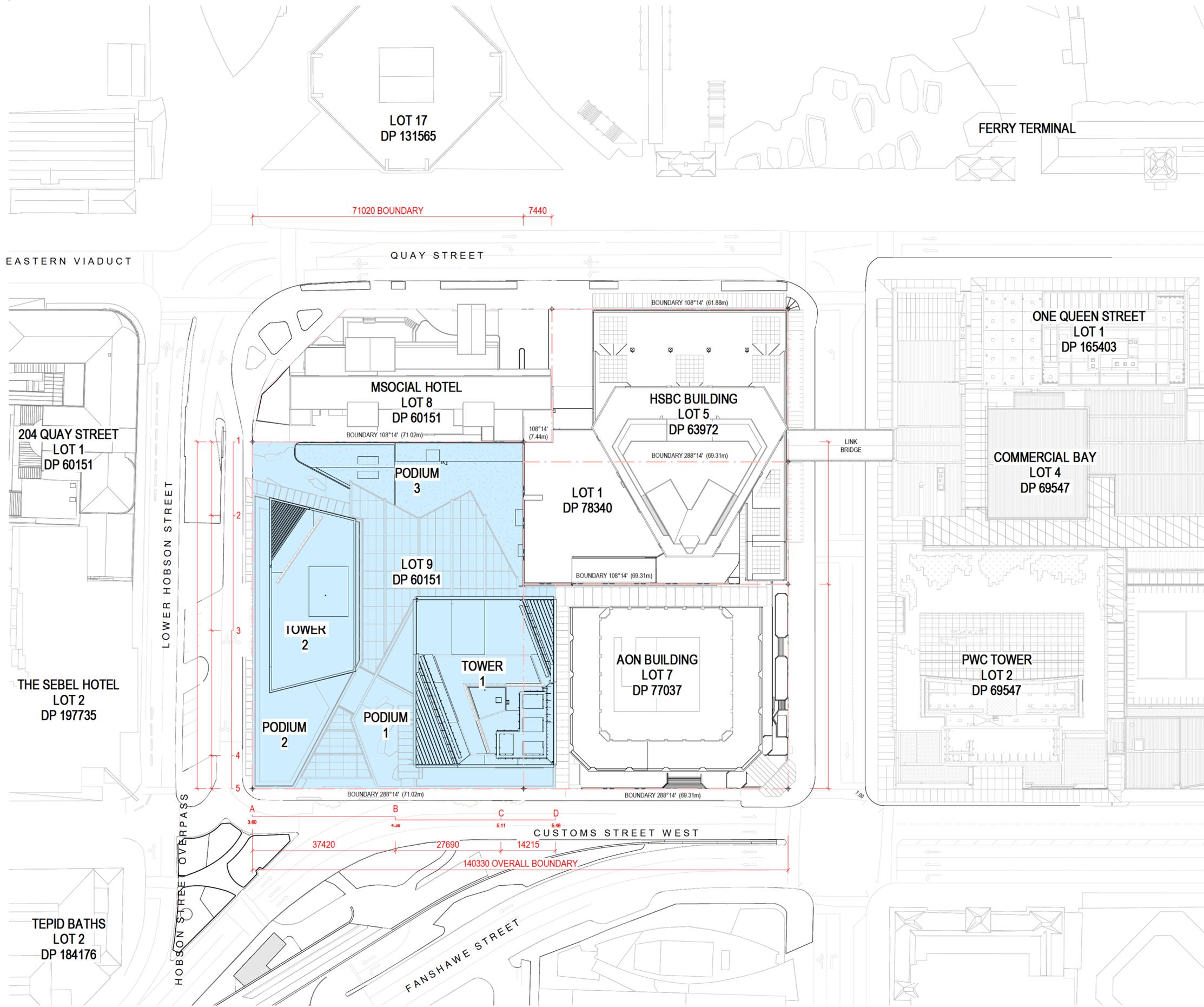
Cara Di Vitto
Senior Environmental Engineer

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¹⁵ T+T Variation Order, 8 August 2025. "Downtown West Development – FTAA Update and Preliminary Design Fee Review (VO-08 and VO-09)", Job number 1016043.

Appendix A Development plans



LOWER HOBSON STREET LEVELS
 SURVEYED SPOT HEIGHTS MEASURED AT THE CENTRE LINE OF THE STREET PARALLEL TO THE SITE BOUNDARY (SUBSEQUENCED IN EASTERLY DIRECTION STARTING AT INTERSECTION LOWER HOBSON/LOWER ALBERT ST):

- 1 - 3.32m
- 2 - 3.28m
- 3 - 3.25m
- 4 - 3.28m
- 5 - 3.45m

DISTANCE BETWEEN SPOT HEIGHTS:

- 1-2 = 19.226m
- 2-3 = 30.100m
- 3-4 = 32.700m
- 4-5 = 8.700

TOTAL = 90.710m

CALCULATIONS:

- MSL 1-2 (3.32 + 3.28) / 2 x 19.226 = 63.45
- MSL 2-3 (3.28 + 3.25) / 2 x 30.100 = 98.28
- MSL 3-4 (3.25 + 3.28) / 2 x 32.700 = 106.77
- MSL 4-5 (3.28 + 3.45) / 2 x 8.700 = 29.28

TOTAL = 63.45 + 98.28 + 106.77 + 29.28 = 297.78

MEAN STREET LEVEL - LOWER HOBSON STREET:
 297.78 / 90.710m = 3.283m

CUSTOMS STREET WEST LEVELS
 SURVEYED SPOT HEIGHTS MEASURED AT THE CENTRELINE OF THE STREET PARALLEL TO THE SITE BOUNDARY (SUBSEQUENCED IN EASTERLY DIRECTION STARTING AT INTERSECTION LOWER HOBSON/LOWER ALBERT ST):

- A - 3.60m
- B - 4.38m
- C - 5.11m
- D - 5.48m

DISTANCE BETWEEN SPOT HEIGHTS:

- A-B = 37.420m
- B-C = 27.690m
- C-D = 14.215m

TOTAL = 79.325m

CALCULATIONS:

- MSL A-B (3.60 + 4.38) / 2 x 37.420 = 149.31
- MSL B-C (4.38 + 5.11) / 2 x 27.690 = 131.39
- MSL C-D (5.11 + 5.48) / 2 x 14.215 = 75.13

TOTAL = 149.31 + 131.39 + 75.13 = 355.83

MEAN STREET LEVEL - CUSTOMS STREET:
 355.83 / 79.325 = 4.486m

All dimension to be verified on site before producing shop drawings or commencing any work. Do not scale. The copyright of this drawing remains with Warren and Mahoney Architects New Zealand Ltd.

Revisions

- A 05/09/25 Draft FTA Issue
- B 26/09/25 FTA Issue
- C 03/10/25 FTA Issue

Notes

COMMERCIAL IN CONFIDENCE

SURVEY INFORMATION NOTES:

ALL SURVEY INFORMATION AND EXISTING BUILDING PLANS ARE PROVIDED BY EXTERNAL SOURCES AND MUST BE CHECKED/VERIFIED ON SITE

■ DENOTES PROJECT SITE

LEGAL DESCRIPTIONS:

LOT 7, DP77037, AREA= 4704 SQM NA33C/37 - AON HOUSE (29 CUSTOMS ST W)

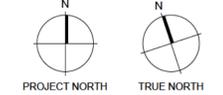
LOT 9, DP60151, AREA= 6442 SQM NA15A/424 - DT CARPARK (31 CUSTOMS ST W)

LOTS BELOW NOT INCLUDED IN THIS CONSENT:

LOT 1, DP78340, AREA= 2218 SQM NA128C/787 - HSBC HOUSE (188 QUAY ST)

LOTS 5, DP63972, AREA= 2512 SQM NA128C/787 - HSBC HOUSE (188 QUAY ST)

LOT 8, DP60151, AREA= 2408 SQM NA15A/423 - MSOCIAL (196/200 QUAY ST)



Consultants

- RCP Project Manager
- RLB Quantity Surveyor
- HOLMES Structural Engineer
- NDY Services Engineer
- JENSEN HUGHES Fire Engineer
- TONKIN + TAYLOR Civil Engineer
- FLOW Traffic Engineer
- MOTT MACDONALD Facade Engineer

Client

Precinct

Warren and Mahoney Architects New Zealand Ltd

Ground Floor, Mason Bros. 139 Pakenham Street West Wynyard Quarter Auckland 1010 New Zealand Phone + 64 9 309 4894

Registered Architects and Designers www.warrenandmahoney.com

Project Title

DOWNTOWN CARPARK DEVELOPMENT

2 LOWER HOBSON STREET, AUCKLAND CBD, AUCKLAND 1010

Drawing Title

MEAN STREET LEVEL PLAN

Drawing Status

FTA ISSUE

Drawing Details

Scale	1 : 500 @ A1
Date	03/10/25
Job No	9234
Drawn	WAM
Checked	WAM

Drawing No

FTA-05-005

Revision

C

Appendix B Historical aerial photography

Appendix B Table 1: Historical aerial photographs and reviews

Insert heading



1940, Auckland Council GeoMaps

Site: Sturdee Street divides the site in a south-west to north-east alignment. The larger northern section of the site is vacant and appears to be either grass or gravel covered. Parts of it is being used for materials lay down / parking purposes. The smaller, triangular shaped southern section of the site is occupied by a single commercial building.

Surrounding land features: General port activities occupy the surrounds to the north. Commercial buildings occupy the immediate surrounds to the west, east and south.



1950, Retrolens

Site: A large commercial building has been established on the northern part of site.

Surrounding land features: No significant changes are evident.



1958, Retrolens

Site: No significant changes are evident.

Surrounding land features: No significant changes are evident.



1963 to 1968, Retrolens

Site: No significant changes are evident.

Surrounding land features: No significant changes are evident.



1972, Retrolens

Site: Sturdee Street no longer divides the site. The buildings that formerly occupied the northern and southern sections of the site have been removed and replaced by a single structure built over the entire site footprint including the former Sturdee Street road reserve.

Surrounding land features: A high rise building has been constructed immediately to the north between the site and Quay Street, and further development and construction of buildings has occurred in areas east of the site.



1980, Retrolens

Site: No significant changes are evident.

Surrounding land features: A large high-rise has been constructed immediately east of the site, replacing the smaller buildings that were established sometime between 1940 and 1950.



1987, Retrolens

Site: For the first time vehicles are visible parked on the roof of the building but no significant changes are evident.

Surrounding land features: Some redevelopment of buildings to the north and west, but no other significant changes are evident.



1996, Auckland Council GeoMaps

Site: No significant changes are evident.

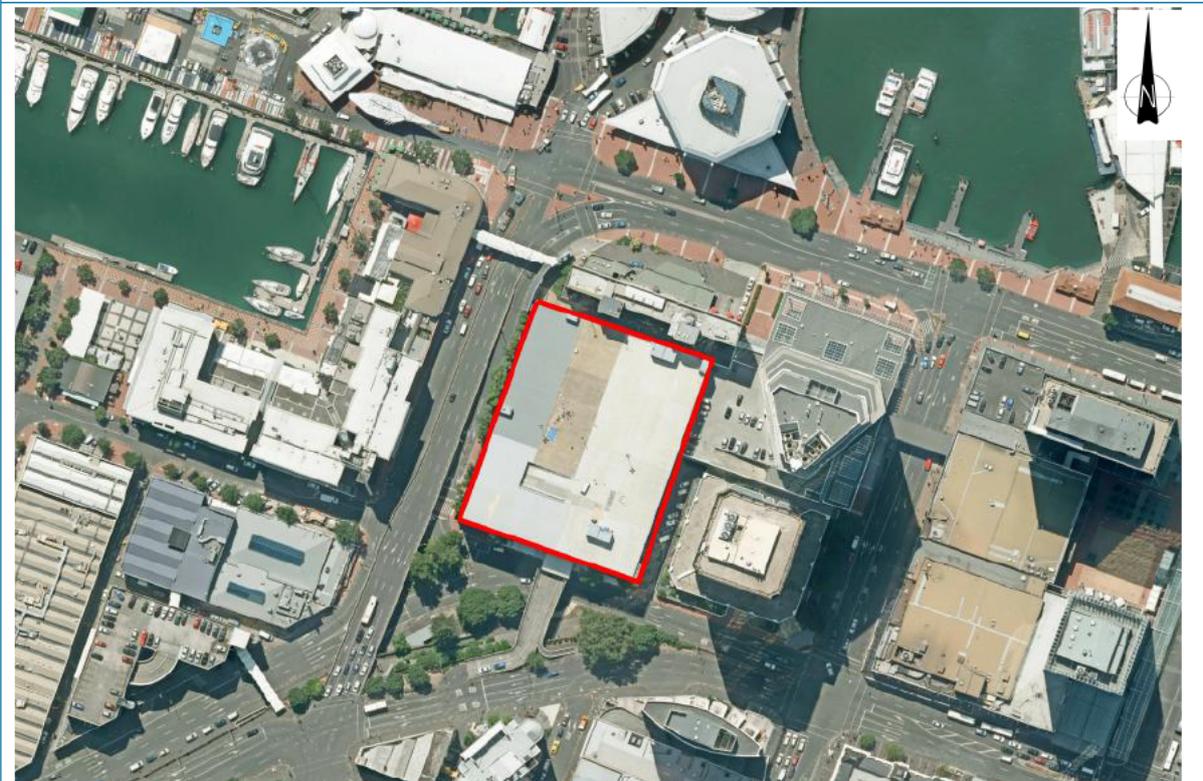
Surrounding land features: Some redevelopment of buildings to the west, but no other significant changes are evident.



2001, Auckland Council GeoMaps

Site: No significant changes are evident.

Surrounding land features: PWC tower, adjoining the sites north-eastern corner, is under construction



2003-2016, Auckland Council GeoMaps (2012 aerial shown above)

Site: No significant changes are evident.

Surrounding land features: No significant changes are evident.

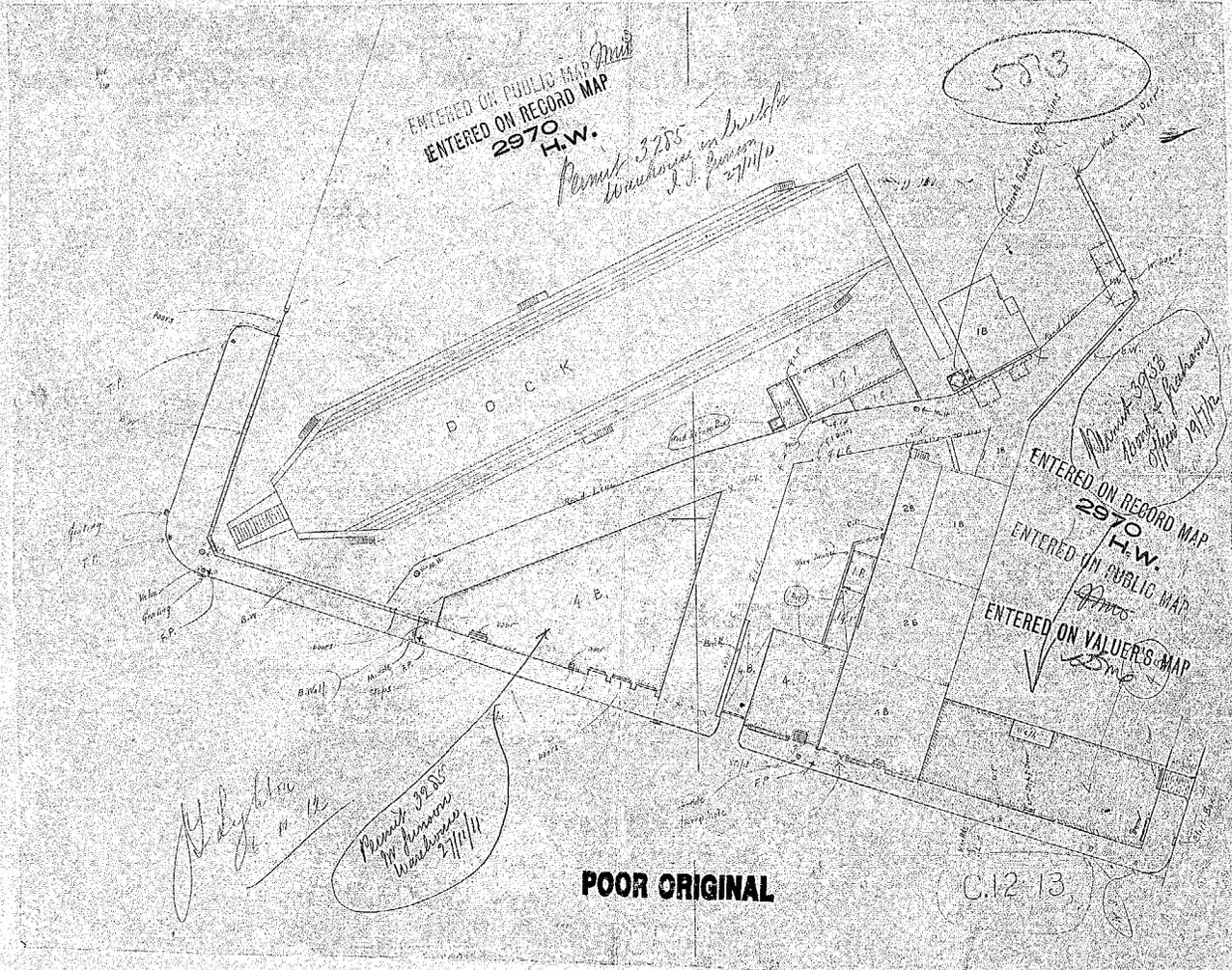


2017, Auckland Council GeoMaps

Site: No significant changes are evident.

Surrounding land features: Former Downtown Shopping Centre has been removed and redevelopment of the site, located to the east, is underway.

Appendix C Property file excerpts



ENTERED ON PUBLIC MAP
 ENTERED ON RECORD MAP
 2970
 H.W.

Permit 3285
 Warehouse on bridge
 J. J. Jensen
 2/11/11

573

ENTERED ON RECORD MAP
 2970
 H.W.
 ENTERED ON PUBLIC MAP
 25me
 ENTERED ON VALUER'S MAP
 25me

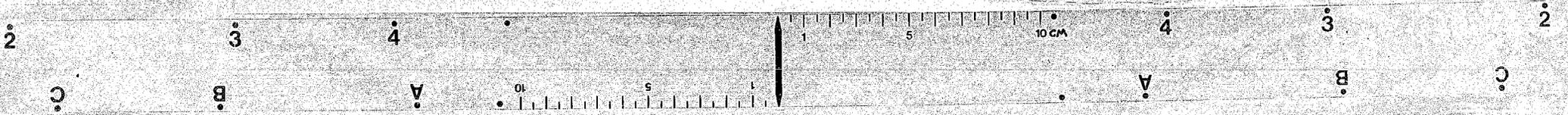
Permit 3285
 Warehouse
 J. J. Jensen
 2/11/11

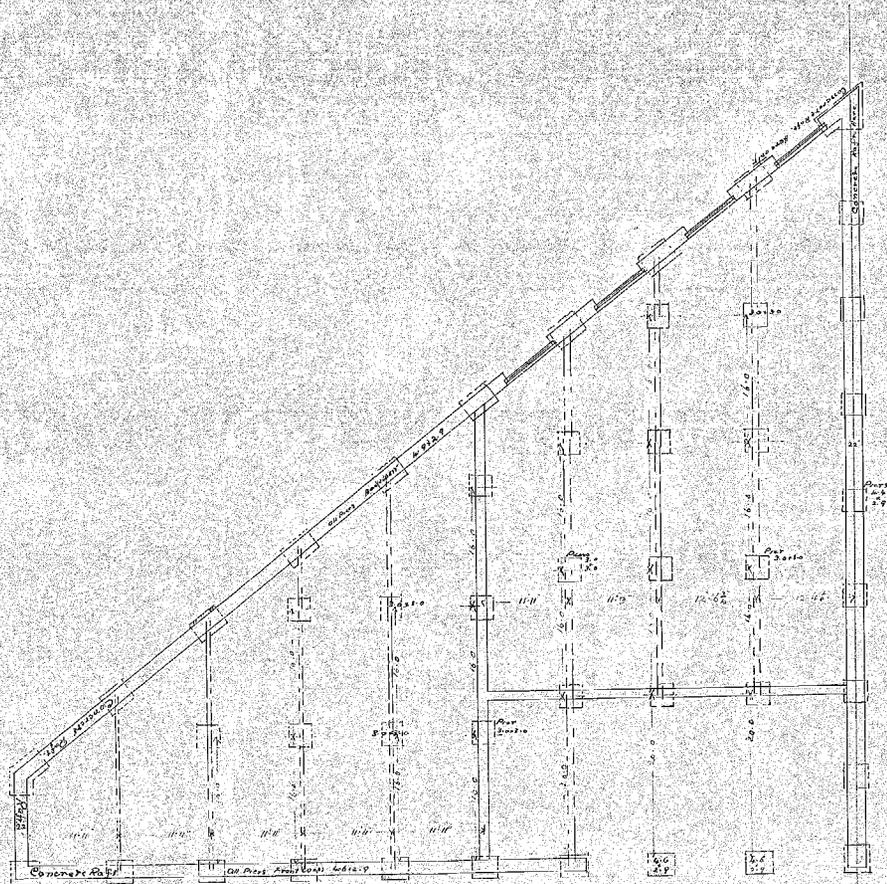
POOR ORIGINAL

C.12-13

(A3)
 67 Customs
 Street
 West
 P. NO
 3285

8098



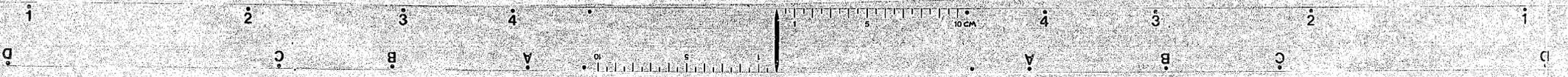


Coomer Co. Inc.

(A1)
 67 Customs Street
 West
 P. No. 3285
 3 of 8

Co. S. H. Robinson, Co. Proctor

Basement & Foundation Plan
 Scale 1/8" = 1'-0"



V 5/47

RUSSELL McVEAGH McKENZIE BARTLEET & CO.

BARRISTERS, SOLICITORS & NOTARIES PUBLIC

NEIL LLOYD MACKY
JOHN DEVON LETHBRIDGE
ROBERT LLOYD MACKY
PETER ALAN MILLER
JOHN HARVEY MARSHALL
JOHN OLLIVER LUSK
DAVID ARTHUR RHODES WILLIAMS

EDGAR LLEWELLYN BARTLEET
JOHN WALLACE McKENZIE
EDMUND WALTER THOMAS
COLIN JOHN FERNYHOUGH
JOHN COLLINGWOOD KING
WARWICK MILES BROWN
FREDERICK WILLIAM MONTEITH McELREA

C.M.L. CENTRE
QUEEN & WYNDHAM STREETS
AUCKLAND 1. N.Z.
TELEPHONES 34-369, 34-069
P.O. BOX 8
CABLE ADDRESS "BARRISTER"

PLEASE REFER TO MR. J.C. King

CITY VALUER

DATE 27 APR 1973 REC'D

REFER [Signature] INCL.

19th April 1973.

The Town Clerk,
Auckland City Council,
Private Bag,
Auckland.

Dear Sir:

Re: Dock Site Service Centre Limited and Paine Services Limited

SECRETARIAL

REFER 24 APR 1973

[Signature: City Valuer]

We refer to our letter of the 30th March last and our subsequent telephone conversations with your Mr Morris.

We enclose for your information a copy of the plan of the service station showing in colour the rental reception area which is to be constructed. This is the only alteration to the service station.

//

We think it will be helpful if we explain in a little more detail our client's intentions. The service station will be run separately from the rental operation and will have its own manager who will be responsible for the profitable operation of the service station. Hence there will be no diminution in the activities of the service station and the services offered to the public, but on the contrary our client intends to expand the service station business. The addition of the rental car operation will not affect this intention. Paine's main facilities for its rental operation, including its head office and its storage and servicing facilities, are situated at Otara. The car park premises are principally to provide a downtown office. In addition the service station should be able to carry out a limited amount of servicing of rental vehicles. //

We trust that the foregoing is of some assistance. The matter is now of some urgency and hence we would appreciate any expedition that you can give. We have been in touch with Dock Site Service Centre Limited's solicitors and pointed out the need for the renewal effective from last June 1971 to be formally documented.

Yours faithfully,
RUSSELL McVEAGH McKENZIE BARTLEET & CO.

Per: [Signature]

enc.

AUCKLAND CITY COUNCIL



67/173

69/60

PLEASE QUOTE: V. 3/47: JRM:MM. 2nd May, 1973.

Valuation Department

Administration Building Civic Centre
 Telephone 74-650
 Private Bag, Wellesley Street,
 Auckland, New Zealand.
 City Valuer: Hugh M. Dodd

MEMORANDUM FOR:

THE DIRECTOR OF WORKS:

(Attention Mr. Leith.)

re: Service Station - Customs Street West Parking Building.
(Dock Site Service Centre Ltd. - Proposed Transfer of
Sublease to Paine Services Ltd.)

With reference to Paine Services Ltd.'s solicitors' letter dated 30th March, 1973, to the Town Clerk, and to your subsequent discussion with Mr. Morris of this Department, I attach copy of the solicitors' further letter dated 19th April, 1973, with plan.

I also attach copy of the Land Purchase Officer's report of even date.

I should be pleased if you would report further to the City Secretary as soon as possible, following consultation with the Superintendent of Traffic.

Please return the plan to me in due course.

Hugh M. Dodd
 Hugh M. Dodd,
 CITY VALUER.

Attachments.

REFERRED TO MR.	ACTION	DATE
Leith	Agd. P&S	7/5
Bellwood	rept	
Agm	rept MCA	18.4.73
ACTION COMPLETED RETURN FILED		

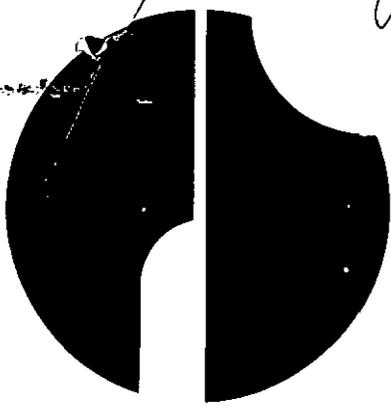
Brian

① The layout & dimensions of carparking spaces is considered to be OK for this kind of operation
 ② ~~normal~~ Originally, we would have asked for 8'-5" wide bays → 10 spaces around N & E walls.

By adopting capital standard & allowing for one space for each car
 2 cars to be 'booked' in - could you report on T.P. & R.E. aspects
 been lost?

Loss back Refer to V.D. Taylor - 10/11

136029



PAINES RENT-A-CAR LIMITED

745 Great South Road, Otahuhu.
Auckland. 6. New Zealand.
P.O. Box 22-432, Otahuhu, Auckland. 6.
Telephone: OH-64-099
After Hours: 379-929
Telegraphic 'PAINES'

RE: PAINE SERVICES, LTD. INITIALS 7th November 1975

The Auckland City Council,
Private Bag,
Wellesley St.,
AUCKLAND 1.

Bhana	ref	JFB	14/11
Taylor	noted	JFB	3/11

ATTENTION: H. F. Bhana - Principal Planner.

Dear Sir,

Thank you for your letter of October 28. ACTION COMPLETED RETURN REFERENCE Mr. Taylor TP8.

We feel that an explanation of our position will assist you in your agreeing to our application.

We are the tenants of the Auckland City Council, having purchased the business from Messrs. Docksite Service Centre (Mr. O. Durbin) in June 1973.

At the time of transfer we obtained permission from your Council to operate the business of a Service Station, which was just a continuation of the previous lessees business, plus the added service of hiring cars etc, which is an extension of our business in Otahuhu.

We have built up the business, particularly the Service Station business to the extent that the Labour Department require that it be registered as a factory.

There has been no change of use of the premises. These are, and will remain as agreed by a decision of your Town Planning Committee in 1973.

Therefore our application would conform with paragraph (b) in your letter.

We look forward to your approval.

Yours faithfully,
PAINE SERVICES LTD.

[Signature]
.....
O. L. Seabourne,
MANAGER.

THIS APPLICATION MUST BE ACCOMPANIED BY PLANS & ELEVATIONS IN DUPLICATE AS REQUIRED

324500

Prop Fill

73-83



AUCKLAND CITY Dangerous Goods Permit

(Not valid until signed by Dangerous Goods Inspector)

525911

Address of Property: B.P. Dawn Leon 83 CUSTOMS ST. A CITY Lot No.: n/a ACC DP No.: n/a ACC

Owner of Land: ACC Address: 7-9 Fanshawe St City

Owner of Building: ACC Address:

Name of Occupier: DOWNTOWN AUTO SERVICES Address:

Name of Builder: Address:

Name of Contractor: Fuel Quip Address: Box 176041

Name of Gasfitter: Reg'n No: Address: Manukau City

Present Use of Premises & Occupier: Service Station

Proposed Use of Premises & Occupier: Garage

DESCRIPTION OF PROPOSED WORK (see below: tick appropriate box)

OFFICE USE

Install Underground/Aboveground Tank D.G. Class Capacity* No.

Install Dispensing Pump D.G. Class Number

Remove Underground/Aboveground Tank D.G. Class 3 Capacity* 18000 No. 13000 * x 2 174.00

Remove Dispensing Pump D.G. Class Number

Repair Underground/Aboveground Tank Description of Work

D.G. Class Capacity* No.

Refix Dispensing Pump D.G. Class Number

Pipework Connection/Disconnection Description of Work

D.G. Class

Bulk Pipeline Installation/Repair Description of Work

No. tests required D.G. Class

Bulk Tank Installation/Repair Description of Work

D.G. Class Capacity* No.

Oilburning Equipment Installation/Repair Description of Work

CNG Installation: Cascades Dispensing Pump Cascade Capacity No. Pumps

CNG/LPG Repair or Addition: Pump/Pipework/Tank/Cascade/Equipment D.G. Class

Description of Work

Other Gas Installation/Repair Description of Work

D.G. Class No. Cylinders

Other Work Description

D.G. Class

CONDITION OF PERMIT ISSUE

TOTAL 174.00

Approved to Issue Date

- NOTES: 1. This application does not authorise work to be done until approved by a Dangerous Goods Inspector.
- 2. * Capacity of LPG tanks must be given as 'actual' water capacity.
- 3. All the preceding work requires notifiable inspections.

order 1/6 17 3 464

OFFICE USE ONLY

Refer B.P. No. Dated Receipt No. Permit No. Date

Appendix D Contamination enquiry

19/05/2023

Tonkin & Taylor Limited
105 Carlton Gore Road
Newmarket

Site Contamination Enquiry –2 Lower Hobson Street

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

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

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

1. Hazardous Activities and Industries List (HAIL) Information

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

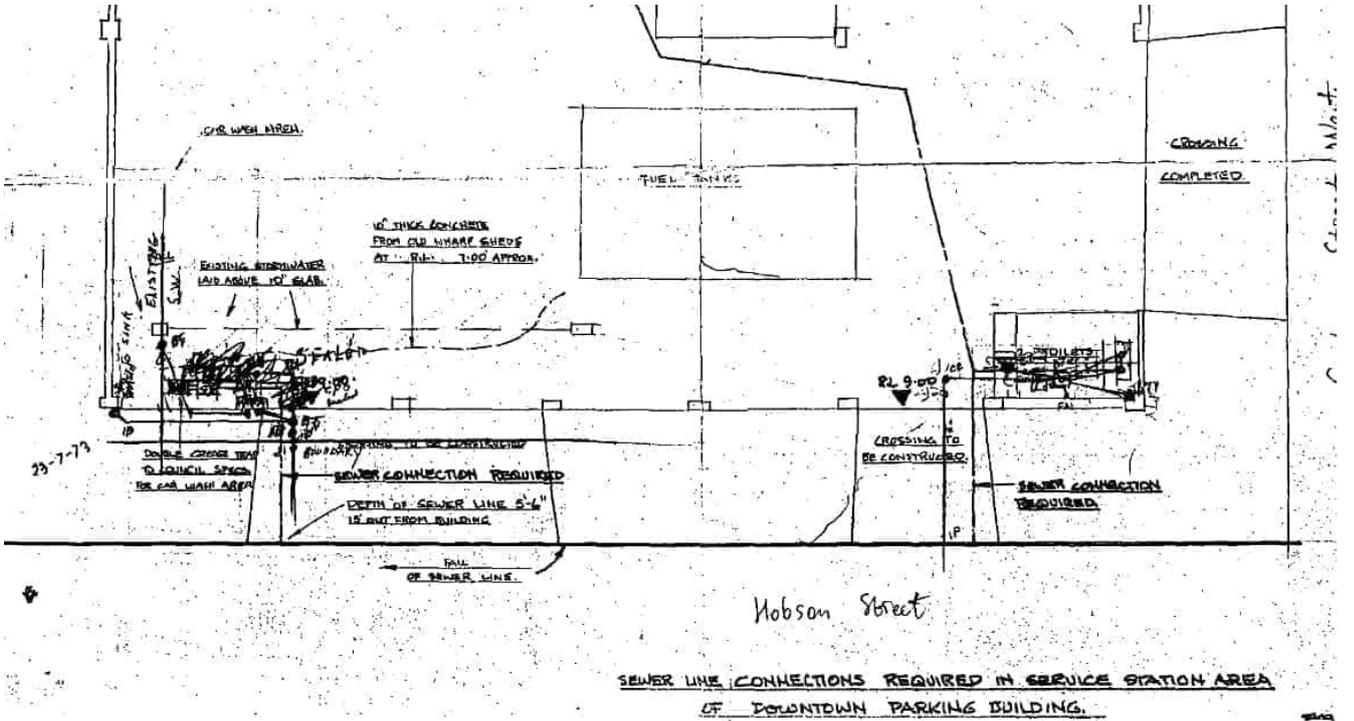
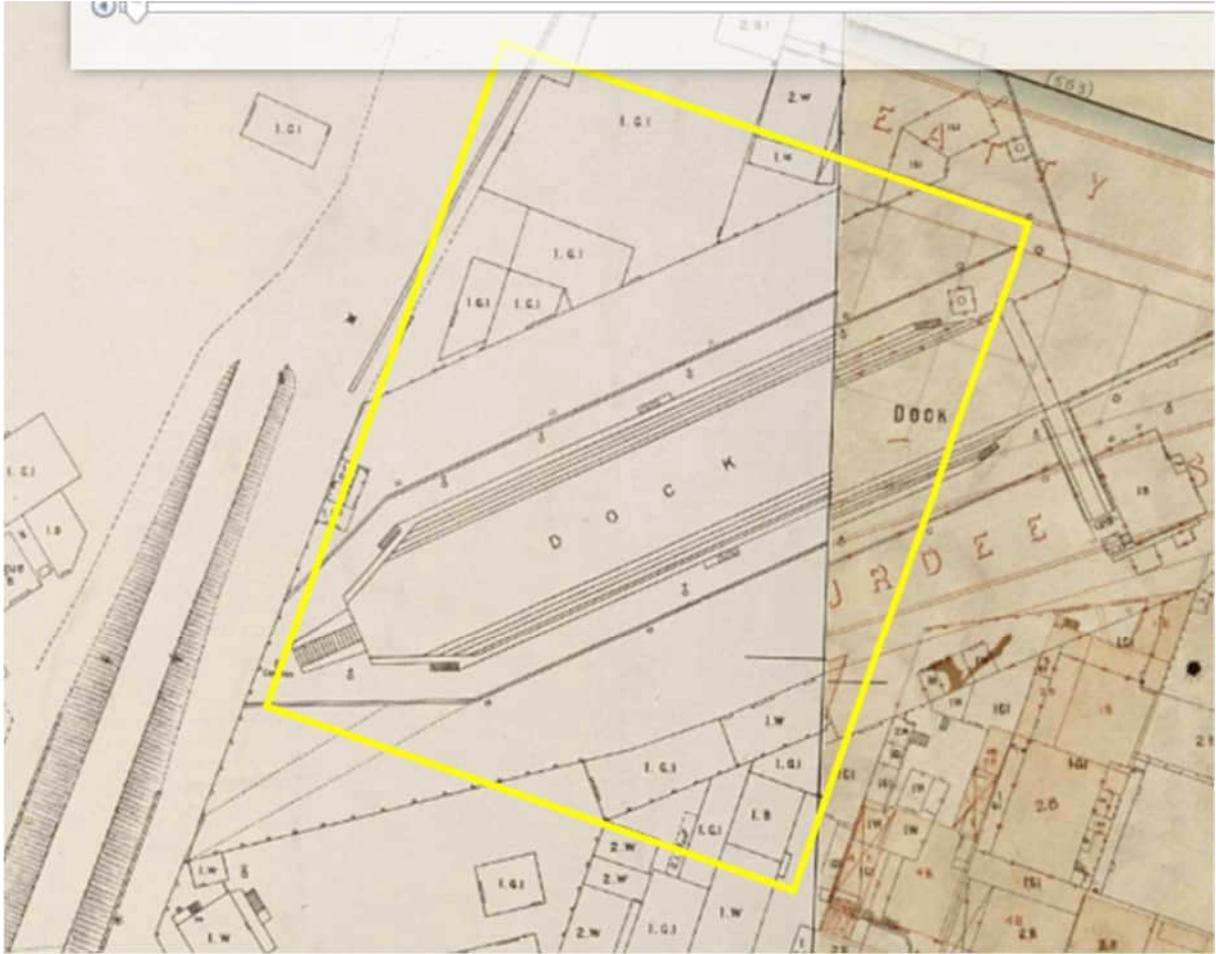
Council's records indicate this site has possibly been subject to the following activities that fall within the HAIL:

- HAIL Item (F4) - Motor vehicle workshops.
- HAIL Item (F7) - Service stations including retail or commercial refuelling facilities.
- HAIL Item (G3) - Landfill sites.

Plans from 1973 indicate a service station operated on site with fuel tanks and car wash services. In 1996 3 underground tanks were removed.

Consent was issued for a workshop within the carpark facility in 2001 and records indicate the site had since been subject to motor vehicle workshop activities.

Plans from 1908 indicate site was used for port docking and was subject to landfilling as part of reclamation.



Please note:

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

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

The Council database was searched for records of the following activities within approximately 200 metres of the site and results are displayed in Figure 1 below:

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

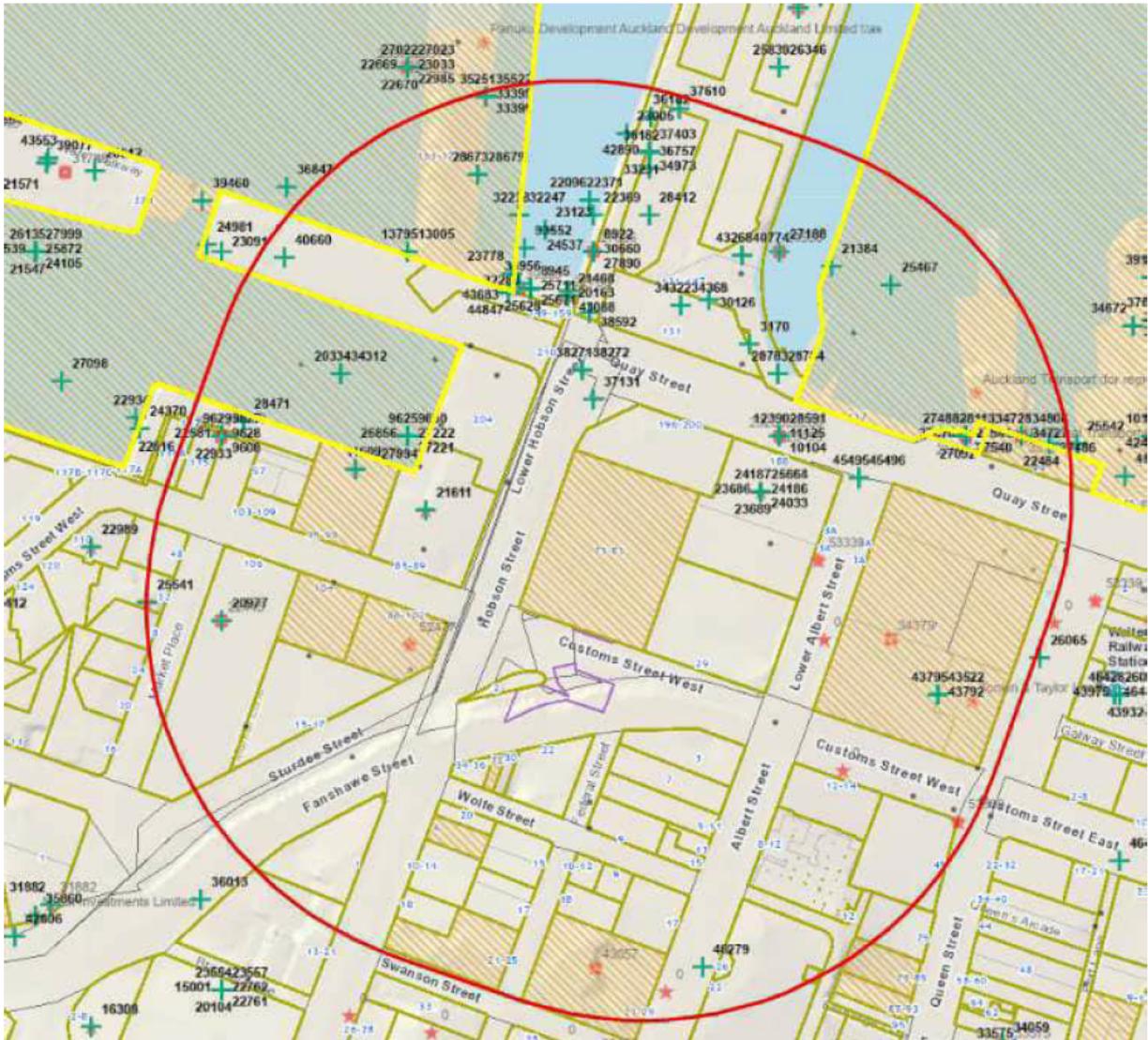


Figure 1: Selected Consents, Incidents and HAIL activities within approximately 200m of the subject site

Legend:

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

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

For any identified HAIL sites, please refer to the tab "HAIL activities" for more information (Column C and D include HAIL activity details where these are available).

Please note:

The HAIL activity hatching in Figure 1 only reflects whether a site has been identified as a HAIL site (both verified and non-verified) by the Council and the type of HAIL associated with the site. This does not confirm whether the site has been formally investigated or the contamination status of the property (e.g. contaminated, remediated etc.). Additionally, due to limitations within Council's records, the specific HAIL activity is not included in the data for all properties. For further information on any of these known HAIL sites, a subsequent site contamination enquiry can be lodged for the specific property (up to 5 adjacent properties can be covered in one request).

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

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

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

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

Yours Sincerely,

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

Appendix E Water Quality Parameters

Appendix E: Water Quality parameters, ENV-BH01.

ENV-BH01	16/07/2025	4.79	N/A	5.86	5.187	1	19.4	24430	6.88
						2	19.3	24463	6.86
						3	19.3	24391	6.89
						4	19.3	24529	6.84
						5	19.4	24419	6.83
						6	19.4	24420	6.83

Table Notes:

m bToC = meters below top of casing

L = litres

NTU = turbidity units

eC = electric conductivity, measures in microsiemens per centimeter.

Appendix F Borehole log



Tonkin+Taylor

BOREHOLE LOG

BOREHOLE No.:

BH1

SHEET: 1 OF 2

DRILLED BY: Pro-Drill

LOGGED BY: TIAI

PROJECT: Downtown West

JOB No.: 1016043.2000

LOCATION: Downtown Carpark, 31 Customs Street West, Auckland Central, Auckland 1010

CO-ORDINATES: 5921032 mN
(NZTM2000) 1131214 mE

DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 5.50m

R.L. COLLAR:

DATUM: NZVD2016

SURVEY: GISWeb map viewer

MATERIAL DESCRIPTION	ROCK MASS DISCONTINUITIES	
	Description & Additional Observations	
<p>SOIL: Classification, colour, consistency / density, moisture, plasticity</p> <p>ROCK: Weathering, colour, fabric, name, strength, cementation</p>		
<p>0.00m: NO RECOVERY - Hydrovac excavation.</p>		0.00 - 1.80m Carpark building construction fill
<p>1.10m: SILT, some gravel; dark brown mottled white, pink and orange. Soft, moist, non-plastic. Gravel, fine to medium, brick fragments, concrete fragments.</p> <p>1.60 - 1.70m Streaked black.</p>	Sample 01 @ 1.90m	1.10 - 1.80m Environmental sample (BH1 1.1-1.5)
<p>1.80m: Grey, CONCRETE. 200 mm thick.</p>		2.00 - 2.40m 0.00 - 0.40 m below ground level
<p>2.00m: GRAVEL and COBBLES, some silt; light brown with some orange brown. Loosely packed. Gravel and cobbles, angular, broken concrete.</p>		2.40 - 2.60m 0.40 - 0.60 m below ground level 2.60
<p>2.40m: Grey, CONCRETE. 200 mm thick.</p>		- 2.80m 0.60 - 0.80 m below ground level 2.80 - 3.
<p>2.60m: Medium to coarse GRAVEL; red, black and grey. Gravel, basalt and scoria.</p>		05m 0.80 - 1.05 m below ground level
<p>2.80m: Gravelly SILT; orange brown mottled dark grey. Very stiff, moist, non-plastic. Gravel, fine to medium, basalt.</p>		3.05 - 3.30m 1.05 - 1.30 m below ground level
<p>3.05m: CORE LOSS - Washed away.</p>		3.30 - 3.50m 1.30 - 1.5 m below ground level. Environmental sample (BH1 3.3-3.5)
<p>3.30m: Clayey SILT, some gravel; greyish brown mottled orange brown. Firm, moist, low plasticity. Gravel, medium to coarse. Very slight petroleum odour.</p>	Sample 02 @ 3.30m	3.50 - 4.00m 1.50 - 2.00 m below ground level
<p>3.50m: CORE LOSS - Washed out.</p>		
<p>4.00m: SILT, minor gravel; brown mottled orange and dark grey. Soft, wet, non-plastic. Gravel, brick fragments.</p>	Sample 03 @ 4.00m	4.00 - 4.50m 2.00 - 2.50 m below ground level. Environmental sample (BH1 4.0-4.5)
<p>4.50m: COBBLES and BOULDERS; greyish brown with red orange staining. Cobbles and boulders, extremely weak, siltstone.</p>	Sample 04 @ 4.50m	4.50 - 5.00m 2.50 - 3.00 m below ground level. Environmental sample (BH1 4.5-5.0)
<p>5.00m: CORE LOSS - Washed away.</p>		5.00 - 6.00m 3.00 - 4.00 m below ground level
<p>6.00m: PARTIAL CORE LOSS - Fines washed out BOULDERS; grey with red and orange staining. Boulders, highly weathered, very weak, sandstone and siltstone.</p>		6.00 - 7.30m 4.00 - 5.30 m below ground level
<p>7.30m: Clayey fine SAND, some gravel; dark grey. Loosely packed, wet, low plasticity. Gravel, fine to medium, shell fragments.</p>	Sample 05 @ 7.30m	7.30 - 7.50m 5.00 - 5.50 m below ground level. Environmental sample (BH1 7.3-7.5)
<p>7.50m: CORE LOSS - Washed away.</p>		7.50 - 8.00m 5.50 - 6.00 m below ground level
<p>8m: END OF BOREHOLE. Target depth.</p>		

COMMENTS: Borehole drilled in carpark between car park number 81 and 82 on level 2, 2m above road level. Piezometer installed on 01/07/2025. Groundwater recorded directly after piezometer installation.

Hole Depth 8m

Scale 1:41

Rev.: A

CORE PHOTOS

BOREHOLE No.: **BH1**
Hole Location: Downtown Carpark, 31 Customs Street West, Auckland Central, Auckland 1010
 SHEET: 1 OF 1

PROJECT: Downtown West		LOCATION: Downtown Carpark, 31 Customs Street West		JOB No.: 1016043.2000	
CO-ORDINATES: (NZTM2000)	5921032 mN 1757274 mE	DRILL TYPE:	HOLE STARTED: 30/06/2025		
R.L.:	5.50m	METHOD: Rotary drilled in common ground	HOLE FINISHED: 30/06/2025		
DATUM:	NZVD2016		DRILLED BY: Pro-Drill Ltd.		LOGGED BY: TIAL
			CHECKED: CWM		



0.00-8.00m

Appendix G Summary of soil results and laboratory transcripts

Sample ID					Analytical data				
	Depth	NESCS Commercial/Industrial ¹	AUP Permitted Activity Criteria ²	Published Auckland Background Levels (non-volcanic) ³	Maximum	ENV-BH1 1.1-1.5m	ENV-BH1 3.3-3.5m	ENV-BH1 4.5-5.0m	ENV-BH1 7.3-7.5m
1.1-1.5						3.3-3.5	4.5-5	7.3-7.5	
Geological unit						SILT (Construction Fill)	Clayey SILT (Reclamation Fill)	Cobbles and boulders (Reclamation Fill)	Clayey SAND (Natural)
Date	30/06/2025								
Asbestos									
Asbestos presence	>0.001% ⁴	-	ND	-	-	-	-	Asbestos NOT detected	Asbestos NOT detected
Asbestos form	-	-	ND	-	-	-	-	-	-
Asbestos as ACM (w/w%)	0.01% ⁴	-	ND	-	-	-	-	-	-
Asbestos Fibres/Fine (w/w %)	0.001% ⁴	-	ND	-	-	-	-	-	-
Total Cyanide*	2000 ⁵	-	ND	<LoR	<0.2	<0.2	<0.2	<0.2	<0.2
Metals									
Arsenic	70	100	12	7	4	4	4	7	
Cadmium	1,300	7.5	0.65	0.24	0.24	<0.10	<0.10	<0.10	
Chromium	6,300	400	55	42	42	14	19	12	
Copper	>10,000	325	45	83	83	17	33	7	
Lead	3,300	250	65	260	260	14.3	16.4	16.2	
Nickel	1,200 ⁶	105	35	90	90	9	19	10	
Zinc	60,000 ⁶	400	180	169	169	43	105	34	
BTEX									
Benzene	20 ⁷	0.0057 ⁹	<LoR	<LoR	<0.06	<0.06	<0.07	<0.06	
Toluene	3100 ⁷	1.1 ⁹	<LoR	<LoR	<0.06	<0.06	<0.07	<0.06	
Ethylbenzene	2600 ⁷	1.2 ⁹	<LoR	<LoR	<0.06	<0.06	<0.07	<0.06	
m&p-Xylene	-	-	<LoR	<LoR	<0.11	<0.12	<0.14	<0.12	
o-Xylene	-	-	<LoR	<LoR	<0.06	<0.06	<0.07	<0.06	
Total xylenes	2300 ⁷	0.67 ⁹	<LoR	<LoR	<0.17	<0.18	<0.21	<0.18	
Polycyclic Aromatic Hydrocarbons									
1-Methylnaphthalene	-	-	<LoR	0.036	0.036	<0.014	<0.015	<0.014	
2-Methylnaphthalene	-	-	<LoR	0.026	0.026	<0.014	<0.015	<0.02	
Acenaphthene	-	-	<LoR	0.104	0.104	<0.014	<0.015	<0.014	
Acenaphthylene	-	-	<LoR	0.380	0.38	<0.014	<0.015	<0.014	
Anthracene	refer BAPEq	refer BAPEq	<LoR	0.730	0.73	<0.014	<0.015	<0.014	
Benzo[a]anthracene	refer BAPEq	refer BAPEq	<LoR	2.200	2.2	<0.014	<0.015	0.029	
Benzo[a]pyrene (BAP)	refer BAPEq	refer BAPEq	<LoR	2.300	2.3	<0.014	<0.015	0.041	
BAp equivalent	25	20	<LoR	3.400	3.4	<0.014	<0.015	0.060	
Benzo[b]fluoranthene + Benzo[j]fluoranthene	refer BAPEq	refer BAPEq	<LoR	2.500	2.5	<0.014	<0.015	0.043	
Benzo[e]pyrene	-	-	<LoR	1.380	1.38	<0.014	<0.015	0.023	
Benzo[g,h,i]perylene	-	-	<LoR	1.580	1.58	<0.014	<0.015	0.024	
Benzo[k]fluoranthene	refer BAPEq	refer BAPEq	<LoR	0.920	0.92	<0.014	<0.015	0.029	
Chrysene	refer BAPEq	refer BAPEq	<LoR	1.810	1.81	<0.014	<0.015	0.022	
Dibenzo[a,h]anthracene	refer BAPEq	refer BAPEq	<LoR	0.310	0.31	<0.014	<0.015	<0.014	
Fluoranthene	refer BAPEq	refer BAPEq	<LoR	4.800	4.8	<0.014	<0.015	0.035	
Fluorene	-	-	<LoR	0.161	0.161	<0.014	<0.015	<0.014	
Indeno[1,2,3-c,d]pyrene	refer BAPEq	refer BAPEq	<LoR	1.600	1.6	<0.014	<0.015	0.025	
Naphthalene	1,100 ⁷	NA ⁹	<LoR	0.000	<0.07	<0.07	<0.08	<0.07	
Perylene	-	-	<LoR	0.510	0.51	<0.014	<0.015	<0.014	
Phenanthrene	-	-	<LoR	2.900	2.9	<0.014	<0.015	<0.014	
Pyrene	NA ⁷	NA ⁹	<LoR	5.100	5.1	0.017	<0.015	0.038	
Total Petroleum Hydrocarbons									
C7-C9	20000 ⁷	710 ⁹	<LoR	<LoR	<20	<20	<0.014	<20	
C10-C14	8900 ⁷	1500 ⁹	<LoR	<LoR	<20	<20	<0.014	<20	
C15-C36	NA ⁷	NA ⁹	<LoR	152	152	<40	70	<40	
Total hydrocarbons (C7-C36)	-	-	<LoR	155	155	<80	<0.014	<80	

Notes:

All values in mg/kg unless otherwise indicated (i.e. asbestos).

‘-’ indicates not analysed or no relevant acceptance criteria

* indicates laboratory testing methods are not IANZ Laboratory Accreditation Cooperation (LAC) accredited. This is limited to total Cyanide only.

<LoR = less than laboratory limit of reporting

‘ND or Asbestos NOT detected’ = asbestos not identified to be present by the laboratory method.

NA indicates contaminant not limiting as based on estimated health-based criterion is significantly higher than likely to be encountered.

Yellow shading indicates that the results exceed NES Soil criteria: commercial/industrial

Green shading indicates that results exceed the AUP Permitted Activity Criteria

Blue shading indicates that results exceed the published background concentrations for volcanic soils in the Auckland Region

1 - MfE, June 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health: Commercial/Industrial, unless otherwise stated.

2 - Auckland Unitary Plan: Operative in Part Version (AUP). Permitted Activity Soil Criteria Table E30.6.1.4.1 (unless otherwise stated).

3 - Auckland Regional Council, Technical Publication 153, October 2001. Background Concentrations of inorganic elements in soils from the Auckland Region: volcanic soils

4 - BRANZ Ltd, 2017. New Zealand Guidelines

for Assessing and Managing Asbestos in Soil.

5 - Assessment of Site Contamination National Environment Protection Measures (ASC NEPM) Toolbox - <http://www.nepc.gov.au/nepms/assessment-site-contamination/toolbox>.

6 - USEPA Regional Screening Levels - <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>

7 - MfE 1999. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Revised 2011. Tier 1 Soil acceptance criteria for applicable pathway. Recreational use: Silty Clay soils at surface (<1 m).

8 - Total cyanide value adopted from National Environmental Protection Measures 1999 (updated 2013)- Schedule B1: Guideline on Investigation Levels for soil and groundwater

9 - MfE 1999. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Revised 2011. Soil acceptance criteria for protection of groundwater quality. Silty CLAY soil type with ground water at 2 m depth.

Appendix G, Table G2: Groundwater analytical results for Downtown Carpark

Parameters	ANZECC Guidelines (80% species protection, Marine environment) (mg/L)	ENV-BH01 (mg/L)
Dissolved Arsenic	0.0023*	<0.02
Dissolved Cadmium	0.036	<0.0010
Dissolved Chromium	0.085^	<0.010
Dissolved Copper	0.008	<0.010
Dissolved Lead	0.012	<0.002
Dissolved Nickel	0.56	<0.010
Dissolved Zinc	0.021	<0.02
Total Cyanide	400¹	< 0.0010
BTEX compounds		
Benzene	1.3	< 0.0010
Toluene	0.33	< 0.0010
Ethylbenzene	0.16	< 0.0010
m&p-Xylene	0.15*	< 0.002
o-Xylene	-	< 0.0010
Polycyclic Aromatic Hydrocarbons suite		
Acenaphthene	-	< 0.00010
Acenaphthylene	-	< 0.00010
Anthracene	0.007	< 0.00010
Benzo[a]anthracene	-	< 0.00010
Benzo[a]pyrene (BAP)	0.0007	< 0.00010
Benzo[b]fluoranthene + Benzo[j]fluoranthene	0.002	< 0.00010
Benzo[g,h,i]perylene	-	< 0.00010
Benzo[k]fluoranthene	-	< 0.00010
Chrysene	-	< 0.00010
Dibenzo[a,h]anthracene	-	< 0.00010
Fluoranthene	-	< 0.00010
Fluorene	-	< 0.0002
Indeno(1,2,3-c,d)pyrene	-	< 0.00010
Naphthalene	0.12	< 0.0005
Phenanthrene	0.008	< 0.0004
Pyrene	-	< 0.0002
Total Petroleum Hydrocarbons		
C7 - C9	-	< 0.10
C10 - C14	-	< 0.2
C15 - C36	-	< 0.4
Total hydrocarbons (C7 - C36)	-	< 0.7

Table notes:

* low reliability value

^Chromium IV (CrIV) trigger value adopted in the absence of a total chromium value. CrIV is the more conservative value of the two options for Chromium speciation (Cr IV and Cr III). Values for 80% species protection, in a marine environment have been adopted.

"-" denotes no guideline value

m-xylene default guideline value adopted in the absence of a combined m&p value or a value for p-xylene

¹ - Total cyanide value adopted from National Environmental Protection Measures 1999 (updated 2013) - Schedule B1: Guideline on Investigation Levels for soil and groundwater.

Certificate of Analysis

Page 1 of 4

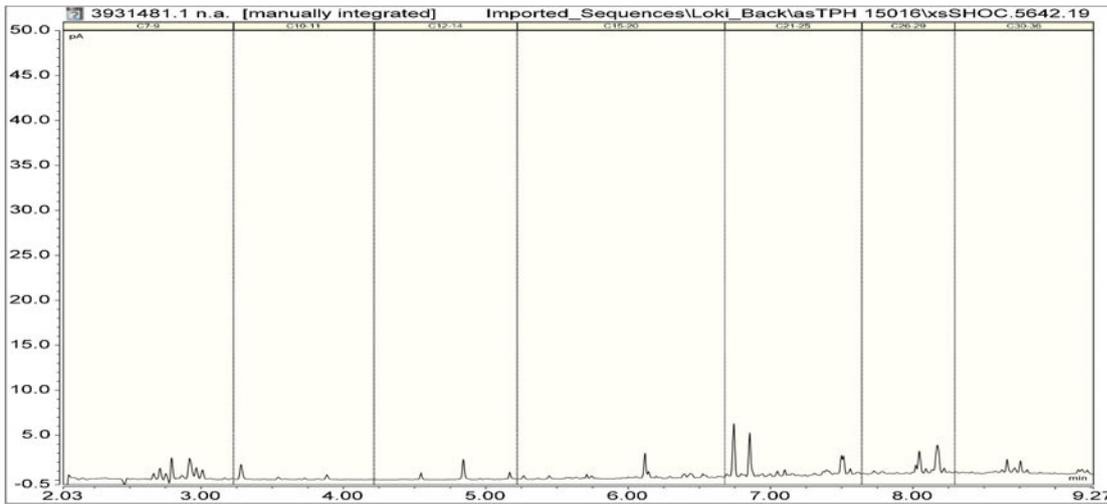
Client:	Tonkin & Taylor	Lab No:	3931481	SPV2
Contact:	Sami Myers-Hutchings C/- Tonkin & Taylor PO Box 5271 Auckland 1141	Date Received:	05-Jul-2025	
		Date Reported:	30-Jul-2025	
		Quote No:	80842	
		Order No:	1016043	
		Client Reference:	1016043	
		Submitted By:	Sami Myers-Hutchings	

Sample Type: Soil					
Sample Name:	BH1 1.1-1.5m 30-Jun-2025	BH1 3.3-3.5m 30-Jun-2025	BH1 4.5-5.0m 30-Jun-2025	BH1 7.3-7.5m 30-Jun-2025	
Lab Number:	3931481.1	3931481.2	3931481.3	3931481.4	
Individual Tests					
Dry Matter	g/100g as rcvd	80	73	67	73
Total Cyanide†	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2
Heavy Metals, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	4	4	4	7
Total Recoverable Cadmium	mg/kg dry wt	0.34	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	42	14	19	12
Total Recoverable Copper	mg/kg dry wt	83	17	33	7
Total Recoverable Lead	mg/kg dry wt	260	14.3	16.4	16.2
Total Recoverable Nickel	mg/kg dry wt	90	9	19	10
Total Recoverable Zinc	mg/kg dry wt	169	43	105	34
BTEX in Soil by Headspace GC-MS					
Benzene	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06
Toluene	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06
Ethylbenzene	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06
m&p-Xylene	mg/kg dry wt	< 0.11	< 0.12	< 0.14	< 0.12
o-Xylene	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06
Polycyclic Aromatic Hydrocarbons Screening in Soil*					
Total of Reported PAHs in Soil	mg/kg dry wt	29	< 0.4	< 0.4	0.3
1-Methylnaphthalene	mg/kg dry wt	0.036	< 0.014	< 0.015	< 0.014
2-Methylnaphthalene	mg/kg dry wt	0.026	< 0.014	< 0.015	< 0.02
Acenaphthylene	mg/kg dry wt	0.38	< 0.014	< 0.015	< 0.014
Acenaphthene	mg/kg dry wt	0.104	< 0.014	< 0.015	< 0.014
Anthracene	mg/kg dry wt	0.73	< 0.014	< 0.015	< 0.014
Benzo[a]anthracene	mg/kg dry wt	2.2	< 0.014	< 0.015	0.029
Benzo[a]pyrene (BAP)	mg/kg dry wt	2.3	< 0.014	< 0.015	0.041
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	3.4	< 0.032	< 0.035	0.060
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	3.4	< 0.032	< 0.035	0.060
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	2.5	< 0.014	< 0.015	0.043
Benzo[e]pyrene	mg/kg dry wt	1.38	< 0.014	< 0.015	0.023
Benzo[g,h,i]perylene	mg/kg dry wt	1.58	< 0.014	< 0.015	0.024
Benzo[k]fluoranthene	mg/kg dry wt	0.92	< 0.014	< 0.015	0.019
Chrysene	mg/kg dry wt	1.81	< 0.014	< 0.015	0.022
Dibenzo[a,h]anthracene	mg/kg dry wt	0.31	< 0.014	< 0.015	< 0.014
Fluoranthene	mg/kg dry wt	4.8	0.018	< 0.015	0.035
Fluorene	mg/kg dry wt	0.161	< 0.014	< 0.015	< 0.014

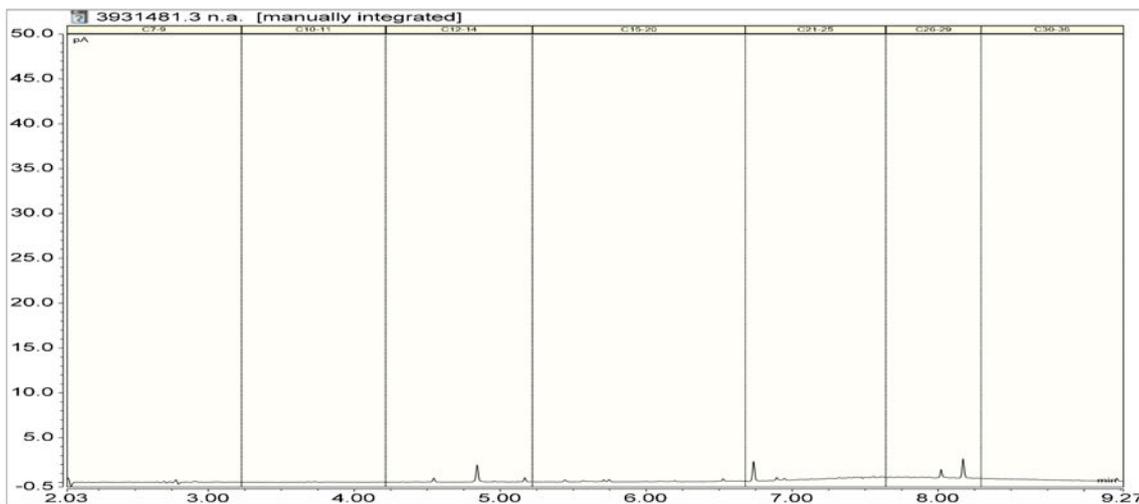
Sample Type: Soil

Sample Name:		BH1 1.1-1.5m 30-Jun-2025	BH1 3.3-3.5m 30-Jun-2025	BH1 4.5-5.0m 30-Jun-2025	BH1 7.3-7.5m 30-Jun-2025
Lab Number:		3931481.1	3931481.2	3931481.3	3931481.4
Polycyclic Aromatic Hydrocarbons Screening in Soil*					
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	1.60	< 0.014	< 0.015	0.025
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.08	< 0.07
Perylene	mg/kg dry wt	0.51	< 0.014	< 0.015	< 0.014
Phenanthrene	mg/kg dry wt	2.9	< 0.014	< 0.015	< 0.014
Pyrene	mg/kg dry wt	5.1	0.017	< 0.015	0.038
Total Petroleum Hydrocarbons in Soil					
C7 - C9	mg/kg dry wt	< 20	< 20	< 20	< 20
C10 - C14	mg/kg dry wt	< 20	< 20	< 20	< 20
C15 - C36	mg/kg dry wt	152	< 40	70	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	155	< 80	< 80	< 80

3931481.1
 BH1 1.1-1.5m 30-Jun-2025
 Client Chromatogram for TPH by FID



3931481.3
 BH1 4.5-5.0m 30-Jun-2025
 Client Chromatogram for TPH by FID



Analyst's Comments

It was observed that the containers for sample 3931481 3,4 were not completely filled. Volatile loss may have occurred due to the headspace created in the container.

‡ Analysis subcontracted to an external provider. Refer to the Summary of Methods section for more details.

Appendix No.1 - ALS Report

Summary of Methods

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

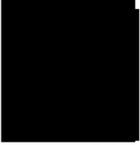
Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-4
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	1-4
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-4
Total Cyanide	Samples extracted in alkaline conditions prior to on-line distillation and colourmetric determination using Segmented Flow Analysis. Subcontracted test, Analytica Laboratories Limited, Hamilton. EPA Method 9013A Revision 2 (Modified) and ISO 14403:2012(E) (Modified).	0.2 mg/kg dry wt	1-4
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	1-4
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo [a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	1-4
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-4
BTEX in Soil by Headspace GC-MS	Solvent extraction, Headspace GC-MS analysis. Tested on as received sample. In-house based on US EPA 8260 and 5021.	0.05 - 0.10 mg/kg dry wt	1-4
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	1-4
Total Petroleum Hydrocarbons in Soil			
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	1, 3
C7 - C9	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1-4
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	1-4
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	1-4
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	1-4

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

Testing was completed between 07-Jul-2025 and 30-Jul-2025. For completion dates of individual analyses please contact the laboratory.

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

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



Ara Heron BSc (Tech)
Client Services Manager - Environmental



CERTIFICATE OF ANALYSIS

Work Order	: NH2500823	Laboratory	: Environmental Hamilton
Client	: R J Hill Laboratories Limited	Contact	: Customer Services NH
Contact	: Environmental Reports Officer	Address	: Ruakura Research Centre, 10 Bisley Rd Hamilton WKO New Zealand 3214
Address	: Private Bag 3205 Hamilton Waikato New Zealand 3204	Telephone	: +64 7 974 4740
Telephone	: 07 858 2000	Date Samples Received	: 21-Jul-2025 08:30
Project	: fbSubAnalytica 707	Date Analysis Commenced	: 23-Jul-2025
Order number	: PO104429	Issue Date	: 28-Jul-2025 11:32
C-O-C number	: ---		
Sampler	: ---		
Site	: ---		
Quote number	: EN/000		
No. of samples received	: 4		
No. of samples analysed	: 4		



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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

This document has been electronically signed by the authorized signatories below.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Astra Southerwood	Section Supervisor - Organics	Soil Prep, Hamilton, Waikato
Louise Coombridge	Chemist - Inorganics	Inorganics, Hamilton, Waikato



Page : 2 of 4
 Work Order : NH2500823
 Client : R J Hill Laboratories Limited
 Project : fbSubAnalytica 707

General Comments

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

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

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

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

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

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

LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
%	Percent
mg/kg dry weight	mg/kg dry weight

>: greater than.

<: less than.

∅: ALS is not IANZ accredited for these tests.

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

~: Indicates an estimated value.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Samples were collected by yourselves (or your agent) and analysed as received at ALS NZ (or at the subcontracted laboratories, when applicable). Samples were in acceptable condition unless otherwise noted on this report.



Page : 3 of 4
 Work Order : NH2500823
 Client : R J Hill Laboratories Limited
 Project : fbSubAnalytica 707

Analytical Results

Sub-Matrix: SOIL

(Matrix: SOIL)

				Client Sample ID	3931481.1	3931481.2	3931481.3	3931481.4	----
				Client Sampling date / time	21-Jul-2025 00:00	21-Jul-2025 00:00	21-Jul-2025 00:00	21-Jul-2025 00:00	----
Compound	CAS Number	LOR	Unit	NH2500823-001	NH2500823-002	NH2500823-003	NH2500823-004	----	
				Result	Result	Result	Result	----	
MC_S: Moisture Content									
Moisture Content	----	0.1	%	19.7	24.6	27.8	25.1	----	
TC_S: Total Cyanide									
Total Cyanide	57-12-5	0.20	mg/kg dry weight	<0.20	<0.20	<0.20	<0.20	----	

Page : 4 of 4
Work Order : NH2500823
Client : R J Hill Laboratories Limited
Project : fbSubAnalytica 707



Brief Method Summaries

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Moisture Content in Soil	MC_S	SOIL	Moisture content is determined gravimetrically by drying at 103 °C.
Total Cyanide in Soil	TC_S	SOIL	Samples extracted in alkaline conditions prior to on-line distillation and colourmetric determination using Segmented Flow Analysis. EPA Method 9013A Revision 2 (Modified) and ISO 14403:2012(E) (Modified).

Certificate of Analysis

Page 1 of 2

Client: Tonkin & Taylor	Lab No: 3931750	A2Pv1
Contact: Sami Myers-Hutchings	Date Received: 05-Jul-2025	
C/- Tonkin & Taylor	Date Reported: 10-Jul-2025	
PO Box 5271	Quote No: 80842	
Auckland 1141	Order No: 1016043	
	Client Reference: 1016043	
	Submitted By: Sami Myers-Hutchings	

Sample Type: Soil			
Sample Name:		BH1 4.5-4.5m 30-Jun-2025 2:30 pm	BH1 4.5-5.0 30-Jun-2025 2:30 pm
Lab Number:		3931750.1	3931750.2
Asbestos Presence / Absence		Asbestos NOT detected.	
Description of Asbestos Form		-	
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001
As Received Weight	g	675.2	385.6
Dry Weight	g	493.6	297.9
Moisture*	%	27	23
Sample Fraction >10mm	g dry wt	41.1	167.4
Sample Fraction <10mm to >2mm	g dry wt	114.9	84.3
Sample Fraction <2mm	g dry wt	335.9	45.1
<2mm Subsample Weight	g dry wt	50.2	45.1
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001

Glossary of Terms

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

For further details, please contact the Asbestos Team.

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

The following assumptions have been made:

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

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



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Summary of Methods

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

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g	1-2
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g	1-2
Moisture*	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	1-2
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	1-2
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	1-2
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch.	0.1 g dry wt	1-2
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	1-2
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-2
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; Unit 1, 17 Print Place, Middleton, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	1-2
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2

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

Testing was completed on 10-Jul-2025. For completion dates of individual analyses please contact the laboratory.

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

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Dexter Paguirigan Dip Chem Engineering Tech
Laboratory Technician - Asbestos

Certificate of Analysis

Page 1 of 2

Client:	Tonkin & Taylor	Lab No:	3939090	SPV1
Contact:	Sami Myers-Hutchings C/- Tonkin & Taylor PO Box 5271 Auckland 1141	Date Received:	16-Jul-2025	
		Date Reported:	28-Jul-2025	
		Quote No:	80842	
		Order No:	1016043.200/05/01	
		Client Reference:	1016043.200/05/01	
		Submitted By:	Betsy Gillies	

Sample Type: Aqueous		
Sample Name:	GW1 16-Jul-2025	
Lab Number:	3939090.1	
Individual Tests		
Salinity*		17.0
Total Cyanide†	g/m ³	< 0.0010
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn		
Dissolved Arsenic	g/m ³	< 0.02
Dissolved Cadmium	g/m ³	< 0.0010
Dissolved Chromium	g/m ³	< 0.010
Dissolved Copper	g/m ³	< 0.010
Dissolved Lead	g/m ³	< 0.002
Dissolved Nickel	g/m ³	< 0.010
Dissolved Zinc	g/m ³	< 0.02
BTEX in Water by Headspace GC-MS		
Benzene	g/m ³	< 0.0010
Toluene	g/m ³	< 0.0010
Ethylbenzene	g/m ³	< 0.0010
m&p-Xylene	g/m ³	< 0.002
o-Xylene	g/m ³	< 0.0010
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq		
Acenaphthene	g/m ³	< 0.00010
Acenaphthylene	g/m ³	< 0.00010
Anthracene	g/m ³	< 0.00010
Benzo[a]anthracene	g/m ³	< 0.00010
Benzo[a]pyrene (BAP)	g/m ³	< 0.00010
Benzo[b]fluoranthene + Benzo[j]fluoranthene	g/m ³	< 0.00010
Benzo[g,h,i]perylene	g/m ³	< 0.00010
Benzo[k]fluoranthene	g/m ³	< 0.00010
Chrysene	g/m ³	< 0.00010
Dibenzo[a,h]anthracene	g/m ³	< 0.00010
Fluoranthene	g/m ³	< 0.00010
Fluorene	g/m ³	< 0.0002
Indeno(1,2,3-c,d)pyrene	g/m ³	< 0.00010
Naphthalene	g/m ³	< 0.0005
Phenanthrene	g/m ³	< 0.0004
Pyrene	g/m ³	< 0.0002



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Sample Type: Aqueous			
Sample Name:		GW1 16-Jul-2025	
Lab Number:		3939090.1	
Total Petroleum Hydrocarbons in Water			
C7 - C9	g/m ³	< 0.10	
C10 - C14	g/m ³	< 0.2	
C15 - C36	g/m ³	< 0.4	
Total hydrocarbons (C7 - C36)	g/m ³	< 0.7	

Analyst's Comments

‡ Analysis subcontracted to an external provider. Refer to the Summary of Methods section for more details.

Summary of Methods

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

Sample Type: Aqueous			
Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Salinity*	Conductivity Meter (WTW Cond 340i with nonlinear temperature compensation according to EN 27 888). APHA 2520 B : Online Edition.	0.2	1
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B : Online Edition.	-	1
Total Cyanide	Acid distillation, distillate measured by colourmetric analysis. Subcontracted test, Analytical Laboratories Limited, Hamilton. APHA 4500-CN C - Modified - Discrete Analyser - Online edition.	0.0010 g/m ³	1
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm Filtration, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.00005 - 0.0010 g/m ³	1
BTEX in Water by Headspace GC-MS	Headspace GC-MS analysis. In-house based on US EPA 8260 and 5021.	0.0010 - 0.002 g/m ³	1
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq	Liquid / liquid extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.00010 - 0.0005 g/m ³	1
Total Petroleum Hydrocarbons in Water			
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.10 g/m ³	1
C10 - C14	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.2 g/m ³	1
C15 - C36	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	0.4 g/m ³	1
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	0.7 g/m ³	1

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

Testing was completed between 21-Jul-2025 and 28-Jul-2025. For completion dates of individual analyses please contact the laboratory.

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

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