WILLIAMSON
WATER & LAND ADVISORY

Karaka Road, Drury

Preliminary Site Investigation (Ground Contamination)

FISHER & PAYKEL HEALTHCARE PROPERTIES LTD

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Karaka Road, Drury

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1	23 February 2023	Fisher & Paykel Healthcare Ltd	PSI to support plan change application
2	29 August 2023	Fisher & Paykel Healthcare Ltd	Minor revisions to reflect client comments
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Investigation Summary

Fisher & Paykel Healthcare Properties Ltd (FPH) is planning to redevelop the site into a new research, development and manufacturing 'campus'. A Structure Plan change and Plan Change are required prior to any development commencing. Williamson Water & Land Advisory (WWLA) has prepared this ground contamination investigation (preliminary site investigation; PSI) to determine the potential for contamination and planning implications for the plan change and future development earthworks. The key findings of this report are:

History and potential for contamination [Section 3]	**An evaluation of past activities against the Ministry for the Environment's Hazardous Activities and Industries List (HAIL; those with potential to cause ground contamination) was undertaken to inform the resource consent planning assessment for the Plan Change and future soil disturbance.** The site has a history of rural use, with farming activities and more recently (post-2000) commercial glass houses and an associated packhouse and transport depot. A milking shed in the west dates from the 1970s, with poultry sheds constructed in the 1980s. Key features of note with regard to the potential for contamination are: • Asbestos may be present around older dwellings, the milking shed and poultry sheds. • Significant cut to fill has occurred on the site over its history, but it appears that all soils used for filling have been site-won rather than imported. Filling is therefore not considered a HAIL activity. • Glass house operations are modern with well-contained fertiliser storage and only minimal fungicide use. Diesel storage is well maintained. Effluent ponds at the glass houses are likely to be the main locations of contamination (if present). • Some fuel leakage/ spills were observed at the transport depot, at the diesel tank and the workshop. Again, contamination is likely to be localised and is highly unlikely to have reached groundwater or surface water. Overall, potential for contamination is moderate, but is highly localised with large areas of the site not being subject to HAIL activities.
Preliminary conceptual site model (CSM) [Section 4]	**A preliminary CSM is developed to identify possible risks to people and the environment. It requires confirmation/ completion once soil sampling has been undertaken.** The preliminary CSM for the proposed development and associated earthworks (soil disturbance) shows that: • Asbestos and chemical contamination present potential pathways to site users, future occupants and the environment (chemical contamination only). However, these pathways can be made incomplete with standard earthworks controls and procedures, and additional procedures in the event of asbestos contamination or if containment or offsite disposal of hot spot contamination is required. • Soil sampling will confirm the actual levels of contamination present, and an SMP can be prepared to set out what controls are required.
Pre-works testing [Section 5.1]	**Pre-works testing is expected to occur prior to each earthworks phase. This will inform consenting and earthworks requirements.** • Sampling will be focussed on HAIL areas and primarily target shallow soils as these are most likely to contain contamination. Some testing of sub-soils will be required to confirm no vertical migration of contamination has occurred. • In most cases, sampling will be targeted on expected hot spots. • Sampling shall be undertaken by a SQEP and samples tested at an IANZ accredited laboratory for the key contaminants relevant to the HAIL activity, as identified in **Section 3.3**.
Consenting implications [Section 5.2]	**No contamination-related constraints to use of the land for commercial/ light industrial purposes have been identified. In the future, ground contamination related rules will be triggered and need to be addressed in the consent application within areas where HAIL activities have occurred**. • Soil sampling will determine the consent status, but it is likely that either a Controlled Activity or Restricted Discretionary Activity will be required under the NESCS where HAIL activities have occurred. • Under the AUP Section E30, works will be either Permitted or a Controlled Activity depending on the level of contamination present. Again, this only applies to areas where a HAIL has occurred. • Consent is not required under the NESCS or Section E30 of the AUP where no HAIL activities have occurred. A Site Management Plan (SMP) is required to support consent applications and direct contractors in contamination-related requirements. The SMP informs Council and contractors how bulk earthworks will be

	managed and how potential discharges will be mitigated. We expect that stage-specific updates or addendums to the SMP will be produced following soil sampling.
Earthworks implications [Section 5.3]	**Standard earthworks controls are likely to be appropriate for the bulk of future earthworks.** • In our experience, low-level asbestos controls may be required around pre-2000s dwellings, the milking shed and poultry sheds. These are likely to be only required for a localised apron around each structure. • If hot spot contamination is identified, it is expected to be managed with localised controls and either on-site containment or offsite disposal. This will be informed by soil sampling. • Otherwise, most excavated soils are likely to be reused on site in cut-to-fill operations under standard earthworks controls.

Contents

1. Introduction

Williamson Water & Land Advisory (WWLA) has prepared this Preliminary Site Investigation (PSI) report to assist Fisher & Paykel Healthcare Properties Ltd (FPH) with the proposed Plan Change and Structure Plan update at Karaka Road, Drury (**Figure 1**).

Figure 1. Location of the site (Image source: LINZ). Thick red outline indicates site extent, thinner internal lines show individual property boundaries. The purple dashed line shows the area subject to the Plan Change application.

1.1 Background

FPH is proposing a Structure Plan (Structure Plan) and Private Plan Change (Plan Change) for land zoned Future Urban, located at 300, 328, 350, 370, & 458 Karaka Road, Drury (the site). The land is bound by State Highway 22 to the north, Oira Creek to the west and the railway network of the North Island Main Trunk (NIMT) Line to the south.

This Structure Plan is proposed in replacement of the Drury-Opāheke Structure Plan for this part of Drury West and the Plan Change will involve rezoning the land that is currently zoned Future Urban to Business – Light Industry. Land currently zoned Rural – Mixed Rural is not included within the scope of the Plan Change (but is within the Structure Plan area).

The purpose of the Structure Plan and Plan Change is to facilitate the future development of a research & development and manufacturing campus to support the growth and expansion of Fisher & Paykel Healthcare.

The site currently has a predominantly rural use, with some horticulture and associated distribution activities. If there is potential for contamination to be associated with these activities, then this is required to be documented and the potential implications understood as part of the Structure Plan revision and eventual Plan Change.

1.2 Objective and scope of work

This investigation has been undertaken to determine the potential for contamination at the site and the likely implications through the planning process. The objective of this investigation is to determine if any potentially contaminating activities have occurred (potentially impacting soil quality) and therefore if the proposed land use changes will be subject to National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations 2011 (NESCS) or if contaminated soil provisions in Auckland Unitary Plan (operative in part) (AUP) are applicable. If either are applicable, further (intrusive) investigation may be needed before development and the proposed change in land use. The scope of this investigation comprised:

1. Review of the site's history from:
   - Historical aerial photographs sourced from Retrolens and Auckland Council GeoMaps; and
   - The Auckland Council property file.
2. Site walkover inspection by a suitably qualified environmental practitioner (SQEP) i.e. contaminated land specialist.
3. Assessment of the potential for contamination, based on historical land use and evaluation of that against the HAIL[1].
4. Development of a preliminary conceptual site model (CSM) to assess contaminant risks and mitigation requirements during future earthworks and post construction.
5. Evaluation of the likely consenting requirements and earthworks/construction implications for redevelopment of the site for commercial/ light industrial purposes.

1.3 Legislative requirements

This report is commensurate with a Preliminary Site Investigation as set out in the NESCS and NESCS User's Guide[2]. WWLA has undertaken the assessment and prepared this report in general accordance with requirements of published industry best practice guidance, including the Ministry for the Environment (MfE) Contaminated Land Management Guideline No. 1: Reporting on Contaminated Sites in New Zealand (Revised 2021), (CLMG No.1).

This report has been prepared, reviewed, and certified by a SQEP as described in the NESCS and NESCS User's Guide. CVs confirming the SQEP status of our contaminated land specialists are available on request.

[1] Ministry for the Environment's Hazardous Activities and Industries List (HAIL)
[2] NESCS Users Guide (April 2012).

2. Site Description

2.1 Site identification

The site comprises five (5) titles as described in **Table 1**. Refer to **Figure 1** for internal site boundaries. The site is bound by Karaka Road in the north, the main truck railway line in the south, and Oira Stream to the west. A 'paper road' is present in the southwest of the site.

Table 1. Site identification

Address (west to east)	Legal description	Certificate of Title	Area (m^2)
458 Karaka Road, Drury	Lot 7 DP 14876, Pt Lot 5 DP 14876, Pt Lot 6 DP 14876, Pt Lot 3 DP 14876	NA889/168	331,426
370 Karaka Road, Drury	Lot 4 DP 14876, Pt Lot 6 DP 14876	NA889/167	274,857
350 Karaka Road, Drury	Lot 1 DP 205837	NA134A/751	195,860
300 Karaka Road, Drury	LOT 1 DP 523765	834199	52,750
328 Karaka Road, Drury	LOT 2 DP 523765	834200	195,700
TOTAL Area			**~1,050,000 m^2**

2.2 Environmental setting

The environmental setting is described in **Table 2**. The features of the environmental setting are considered in the context of their potential to affect the distribution, mobility and form of contaminants (if present). These variables set the scene and inform the preliminary conceptual site model (CSM) evaluation (**Section 4**) if it is established that activities with potential to cause ground contamination have occurred.

Table 2: Environmental setting.

Topography	*The topographical nature of the site impacts where contaminants might migrate to if present.* The topography of the site generally slopes gently to the west from a maximum elevation of approximately 30m RL. The slope steepens on the western boundary dropping to approximately 7m RL where the site is bordered by the Oira Creek. There are also some isolated steeper gullies in the northern portion of the site.
Geology	*Geological conditions are considered in the context of describing the preliminary conceptual site model (CSM) (**Section 4**) should a potential for contamination be identified by this desk study. For example, more porous soils can enable contaminants (if present) to move more quickly and potentially further than clay-rich soils that retain/ bind or prevent penetration of contaminants.* The published geology (**Figure 2**) shows that the site is located on alluvial deposits of the Puketoka Formation (predominantly fine-grained sands, silts and clays with some peat). Volcanic units of the South Auckland Volcanic Field (basalt, scoria, ash and lapilli) are located a short distance to the south of the site. Borehole data from the New Zealand Geotechnical Database (NZGD; www.nzgd.org.nz) shows that boreholes drilled within the site for water supply purposes encountered Puketoka Formation clay and silt with sandstone (Waitemata Group) encountered at depth (>30 m below ground level (BGL). Peat units were also intercepted (>20 m BGL) along with some surface fill (<2 m BGL). This is supported by site specific information in **Section 3.2.3**.
Hydrogeology	*Hydrogeological conditions affect potential risk of contaminants (if present) entering and being transported in groundwater.* Puketoka Formation sediments can hold perched groundwater units, although are unlikely to host a regional groundwater aquifer. The presence of a stream on the western boundary of the site indicates that shallow perched groundwater is likely with flow expected to follow topography. Regional groundwater units are likely to exist at depth (>30 m).
Surface water bodies	*Surface water features are potential receiving environments should contaminants be present on a site.* The nearest natural surface water feature is the Oira Creek on the western boundary of the site. The Creek drains into the Manukau Harbour. Farm drains/ swales and ponds have been created in lower-lying areas of the site.

Sensitive receptors	*Sensitive environmental receptors could include aquatic or terrestrial ecosystems. This is not an ecological assessment but is instead an initial review of the surrounding environment to assess where contaminants (if present) on the site could migrate to and affect.* The flora and fauna of the Oira Creek form the nearest sensitive ecological receptors to the site. Any contamination that is present also has potential to impact the Manukau Harbour via the creek.
	Sensitive human receptors could for example be children at a school or kindergarten on or adjacent to a site. Workers on industrial land (including or adjacent to a site) would be considered less sensitive. This people receptor interpretation informs the preliminary CSM and also future guideline value selection for evaluation of soil data. Surrounding properties are rural residential and may include young children or the elderly, as well as a high likelihood that produce is grown for home consumption. Therefore, residential occupants are considered sensitive receptors.

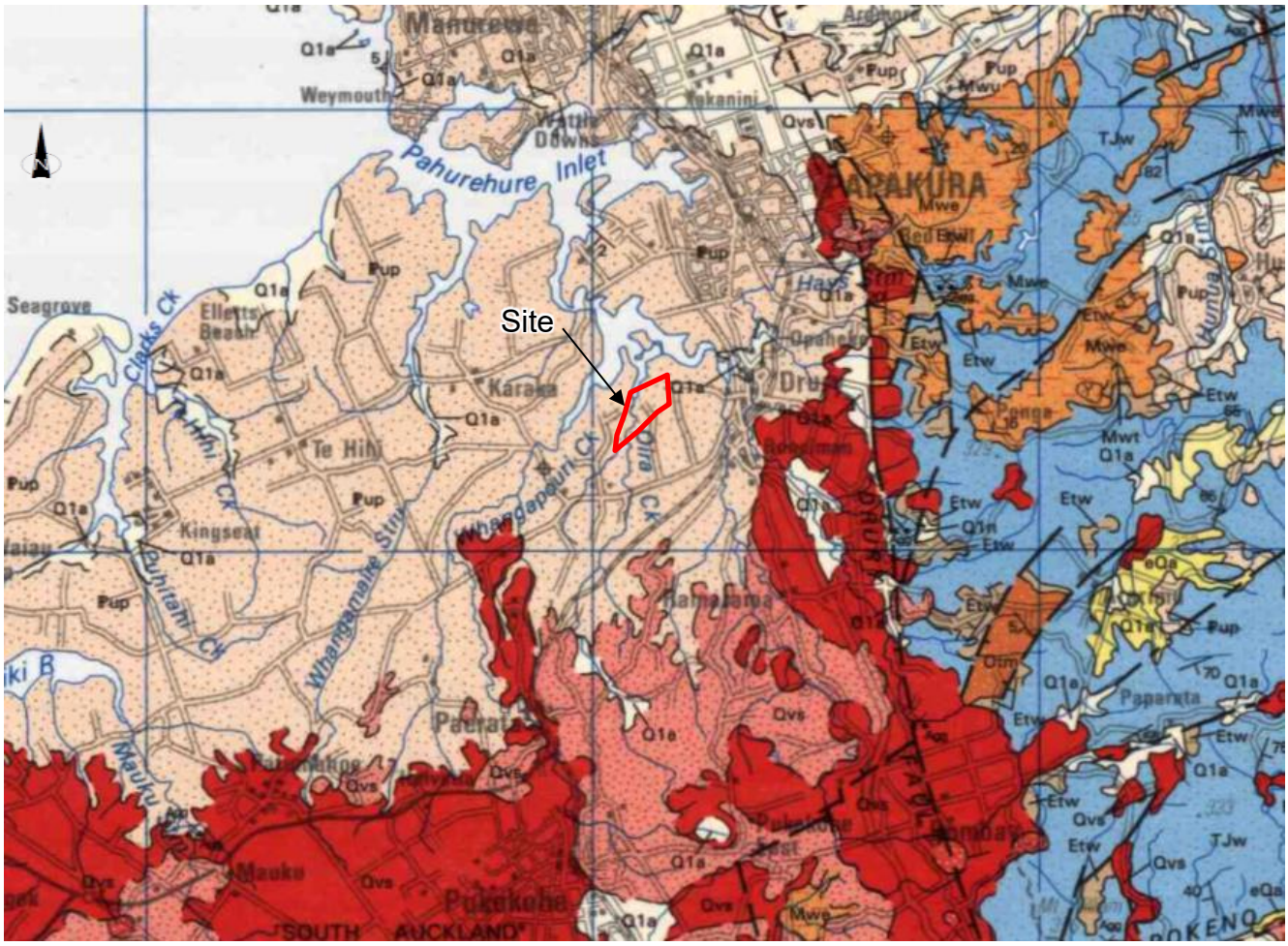


Figure 2. Published geology. Peach is Puketoka Formation, dark pink and red are volcanic deposits (Sourced from: Edbrook, S.W. 2001. Geology of the Auckland Area. GNS Geological Map 3, 1:250,000).

3. HAIL Assessment

This section details a HAIL Assessment, incorporating a walkover assessment to establish current site activities and a review of historical activities to determine whether or not activities listed on MfE's HAIL have occurred on the site. The findings of the HAIL review inform the requirement and scope for detailed investigations (sampling) and the planning assessment.

3.1 Site layout

The site was visited by a SQEP from WWLA on 20 December 2022 and 2 February 2023. The property is accessed via multiple entrances off Karaka Road in the north. The following is a summary of our observations (refer **Photographs 1** to **42** and **Figures 3** to **5**). Each property is covered in a separate sub-section with photos included.

3.1.1 300 Karaka Road

This property is occupied by NZ Hot House Ltd for a packhouse and transport depot, associated with the glasshouses at 328 Karaka Road (see **Section 3.1.2**). Refer **Figure 3**.

- A large, modern, commercial building is orientated north-south in the northwest corner of the site and contains offices, cool storage, packing facilities and distribution facilities. Truck loading occurs under canopies on the western side of the building (**Photo 1**).
- The building has a concrete floor in good condition (**Photo 2**), concrete block base and profiled steel cladding and roofing. The office on the northern side of the building has modern cement plaster cladding.
- No dangerous goods are stored within the building.
- On the southern side of the building (exterior) is an LPG storage area and a waste storage area (predominantly waste vegetables). The concrete is etched in this area, likely from the acid in waste tomatoes (**Photo 3**). The etched markings indicate drainage toward a stormwater sump which outflows to stormwater ponds south of the building.
- Immediately east of the packhouse/ distribution building is a small house that is used for an office (**Photo 4**). It dates from the 1920s/1930s. One panel was noted to be probably asbestos-containing material (ACM) but is in good painted condition. Paint is in a good condition throughout (no flaking) with no current evidence of lead-based paints.
- A small profiled steel shed is located south of the house but was not accessible.
- Also south of the house is a profiled steel former workshop/ storage building (**Photo 5**). It has a concrete floor that is stained with hydrocarbons. A truck was stored within it along with other machinery.
- West of the former workshop is another small storage shed. This contains a sprayer mounted on a quad bike and a mobile diesel refuelling trailer (used for filling the glasshouse boilers – see 328 Karaka Rd). Domestic volumes of paint and fuel additives are also stored here (**Photo 6**).
- Three above-ground storage tanks (ASTs) are present in this area:
  - The first is a 3,000 L "AdBlue" tank and bowser (**Photo 7**). AdBlue is a diesel fuel additive that minimises nitrogen oxide emissions. It comprises Urea (34%) and water. The tank and bowser are on a wooden platform with no evidence of staining on the asphalt surrounds.
  - The second tank also contains AdBlue, approximately 4,000-5,000 L, also with a bowser (**Photo 8**), also on a wooden platform and the surrounding asphalt is in good condition with no evidence of spills.
  - The third tank is a diesel AST, approximately 1,500-2,000 L (**Photo 9**). It is elevated above a small bunded area, with hydrocarbon-stained gravel at its base.
- The main workshop is located in the southeast of the property, at a lower elevation than other site features (**Photo 10**):

- The workshop is a profiled steel building with a concrete floor that is in good condition but is lightly stained (hydrocarbons).
- The workshop includes a truck hoist (**Photo 11**), a chiller room for storage, pallet racking storage in the main building and various lubricants, degreasers, etc (**Photo 12**). While dangerous goods storage is untidy and there is significant staining, the concrete floor is in very good condition with no evidence of leaks or spills.
- Waste oil is stored outside at the rear of the building (**Photo 13**). It is contained within a large concrete bund which sits partially on hardfill and partially on concrete. Empty lubricant drums are stored alongside, as well as a small transformer and water tanks. There is evidence of spills (hydrocarbon sheen on ponded water) and the ground slopes down to the west toward grassed banks.
- South of the waste oil storage is a spray painting area where truck fenders are spray painted (**Photo 14**). There is no enclosed booth but the asphalt underneath is in good condition and overspray appears to be very localised.
- A small truck wash bay is located on the southern side of the workshop. Drainage is to a stormwater grate that is expected to discharge directly south to the stormwater pond.

- Truck parking is located on the northeast portion of the site, along with staff parking.
- West of the packhouse/ distribution building is another truck wash with associated stormwater pond. The concrete around the wash bay is in excellent condition.
- Stormwater from elsewhere across the site appears to flow down to two stormwater ponds south of the packhouse/ distribution building (**Photo 15**).

Photo 1: Loading bay at the packing and distribution building

Photo 2: Interior of packhouse building

Photo 3: Etching in concrete from waste storage area, draining down to a stormwater sump.

Photo 4: House at 300 Karaka Rd. Suspected ACM panels are visible to the left of the photo. Paint is in excellent condition.

Photo 5: Interior of former workshop with staining evident.

Photo 6: Small storage shed with mobile refuelling trailer (left) and quad bike with sprayer (right). Paint is stored on the rear shelving.

Photo 7: AdBlue tank and bowser 1

Photo 8: AdBlue tank and bowser 2

Photo 9: Diesel tank. Hydrocarbon staining below.

Photo 10: Main workshop at 300 Karaka Rd, view looking west.

Photo 11: View looking east at the main hoist.

Photo 12: Lubricant and dangerous goods storage area

Photo 13: Waste oil storage, transformer and water tanks external to the workshop

Photo 14: Spray painting area on western side of workshop

Photo 15: One of two stormwater ponds that receive runoff from the packhouse/ distribution building

3.1.2 328 Karaka Road

This property is operated by Hot House NZ Ltd. The SQEP was accompanied by Health, Safety and Compliance Manager, Loy Martinez, for the visit. The information below includes comments from Mr Martinez. Refer **Figure 4**.

The main feature of this property is the large glasshouses used for growing tomatoes and cucumbers:

- The glasshouses have galvanised joinery and a concrete base. Exterior whitewash on some of the glass reduces glare within the glasshouses.
- A gravel access track is located on the northern side of the glasshouses, along with a drainage swale that discahrges via the southwest of the glasshouses to the rear of the site.
- The glasshouses themselves could not be accessed due to hygiene restrictions but were viewed from the central work area – refer **Photo 16**. They are split into two halves – the east block and the west block. Tomato plants were in the process of being removed in the east block as they were at the end of their 9-month lifecycle. Mr Martinez indicated the plants are grown hydroponically using rockwool and coconut fibre.
- The central building between the two glasshouse blocks contains the offices, fertiliser mixing areas, storage, boilers and a small workshop:
  - Offices and laundry are at the northern end of the building. They are of modern construction. Laundry products are all contained inside, within a room with a solid concrete floor that is in good condition.
  - Each glasshouse block has a chemical/ fertiliser storage and mixing area (called the Feed Room). Fertilisers that are stored and mixed include various brands of calcium and nitrogen fertlisers, potassium nitrate, magnesium/ potassium/ phosphate mixes, potash, iron chelate and others. They are stored within racking over a concrete floor (**Photos 17** and **18**). Fertilisers are mixed into large bins with water, from which an automatic dosing system then delivers the required amounts to the glasshouse plants via a fertigation system (**Photo 19**). Spills are discharged via internal drains to the effluent ponds on the southeast side of the glasshouses (refer below).
  - A chemical storage area is located in the southwest of the building (**Photo 20**). The concrete floor was in good condition with only minimal evidence of spills. Chemicals stored include sodium hypochlorite (bleach, for cleaning), proxitane (for cleaning) and small volumes of fungicide for treating leaf blight.
  - In the southeast of the building is a small workshop (**Photo 21**). Lubricants/ oils/ etc are stored in domestic/ small quantities. The concrete floor is in good condition with only minimal evidence of spills/ leaks.
  - In the centre-south of the building is the boiler room. Two large diesel-fuelled boilers (one for each glasshouse block) are present (**Photo 22**). The diesel is stored within a new double-skin 470 L tank (**Photo 23**). The diesel storage tank has recently been installed so that a larger external tank can be decomissioned (refer below), with the <500 L volume meaning more straightforward compliance requirements. The tank is regularly re-fulled from the mobile fuelling trailer that is stored at 300 Karaka Rd (refer to **Section 3.1.1**). Also present is a generator and miscellaneous equipment. The concrete floor is in excellent condition.
- At the rear of the central building is the main water tank storage area:
  - Two large hot water tanks are located adjacent to the building. South of these are a series of cold water tanks, most of them 20-30,000 L but with one larger tank (>50,000 L) (**Photo 24**). Mr Martinez also said that there are several underground tanks, with the tops/ fill points visible.
  - An old diesel AST is located on a concrete platform with a perspex and timber roof overtop (**Photo 25**). The tank is approximately 2/3 full and is in the process of being decomissioned as the indoor tank (discussed above) now fuels the boilers. The concrete platform is in excellent condition with no staining visible.
  - A small water pump shed is located in the southwest of the water tank compound (**Photo 26**). pH dosing chemicals (nitric acid and calcium hypochlorite) are located within the shed and also in a storage compound on its southern side (there is evidence of leaks from this compound which stores nitric acid; **Photo 27**).
  - A transformer is located in the northeast of the tank compound, adjacent to the main building (**Photo 28**). It is in moderate condition and is mounted on a concrete plinth.

- South of the water tank compound are two series of effluent ponds, one for each glasshouse block (**Photo 29**). From discussions with Mr Martinez, we understand that effluent/ wash water from the glasshouses goes first into the central two ponds before draining out to the larger outer ponds. Sand filters are the primary means of treatment, although pH dosing is also undertaken if necessary.

- On the southwest side of the glasshouses is a general storage area (machinery, containers) on a gravel/ earth platform (**Photo 30**) and an area of greenwaste (tomato vines and plastic twine) which appears to have been subject to intermittent burning (**Photo 31**).
- North of the glasshouses is a modern dwelling (circa 1990s) that is occupied by site staff.

Photo 16: View toward west block glasshouse at 328 Karaka Road.

Photo 17: West block fertiliser storage and mixing area. Pallet racking on right houses most fertilisers.

Photo 18: Open fertiliser storage and weighing on wooden pallets.

Photo 19: Automatic fertiliser dosing system. The mixing bins are in the rear of the photo and floor drain is visible.

Photo 20: Chemical storage room at 328 Karaka Road

Photo 21: Small workshop at 328 Karaka Road

Photo 22: The two boilers, one for each half of the glasshouses

Photo 23: Diesel storage within the boiler room

Photo 24: Water tanks – cold water tanks in the foreground and the tall hot-water tanks in the background.

Photo 25: Old AST in water tank compound, currently being decommissioned.

Photo 26: Water pump shed and chemical storage.

Photo 27: Nitric acid storage. The concrete showed some evidence of acid etching.

Photo 28: Transformer.

Photo 29: Effluent ponds. The first pond is visible behind the blue barrels, with the second (larger) pond in the distance.

Photo 30: Storage area at the southwest side of the glasshouses. Waste plant materials are at the rear right.

Photo 31: Burnt waste plant material at the southern end of the storage area.

3.1.3 350 Karaka Road

This property is predominantly farmland (refer **Figure 3**). The only structures present are a new profiled steel shed with a concrete apron surround (locked at the time of the site visit but large doors indicate it likely stores farm machinery and it corresponds with "implement shed" files from the property file review in **Section 3.2.2**; **Photo 31**) and a house. The house is tenanted and could not be visited at the time of the site inspection. From a distance it appears to be 1990s weatherboard/ Lockwood construction with a profiled steel roof.

A stormwater pond is also present on the property, recieiving stormwater outflows from the packhouse and transport depot at 300 Karaka Rd (**Photo 15**).

Photo 31: Galvanised shed at 250 Karaka Road

3.1.4 370 Karaka Road

The property is predoimantly in pasture/ farmland and has historically been a dairy farm (now used for drystock). There is also a poultry farm on the property. Refer **Figure 5**.

Four poultry sheds are located in the centre-west of the site (**Photo 32**):

- The sheds all have concrete bases and profiled steel (painted) cladding with timber on the ends.
- Surrunding land is predominantly grassed but there is a concrete strip around all of the foundations and larger concrete pads on the eastern sides of each shed.
- Two grain silos are located on the eastern side of each shed (**Photo 33**).
- Two propane gas tanks are located in the centre-east of the sheds to supply fuel for heating (**Photo 33**).
- A silage pit is located immediately west of the poultry sheds (**Photo 34**).
- Immediately north of the silage pit is a transformer (**Photo 35**). The transformer is largely on a concrete plinth, but the eastern and western sides of it are suspended over bare ground.
- The milking shed (**Photo 36**) is no longer used but contains the following features:
  - It is constructed from concrete blocks with a profiled steel roof and potential ACM on the northern apex (**Photo 37**).
  - The shed is stepped into a slight slope with the main facility room approximately 1 m below the surrounding ground level. This room contains the switchboard and general equipment storage. A container of pour-on drench (Eclipse – active ingredients Abamectin and Levamisole) was also located within this area.
  - The shed was partially flooded from recent rain so a full inspection was not possible, with three small rooms on the southern side not able to be viewed (**Photo 38**).

  - The dairy circle and surrounding ground all drain in toward the milking shed with property file records (refer **Section 3.2.2**) indicating effluent being discharged via two treatment ponds located northwest of the milking shed.
  - A likely drench application area is located on the western side of the milking shed. The ground is brick with no staining visible.
- The effluent ponds are still present.
- An implement shed is located north of the milking shed (**Photo 39**). This contains general farm equipment storage (tractor attachments, irrigation pipes, miscellaneous containers, plastic sheeting; **Photo 40**). The shed has an earth floor and is constructed of profiled steel with timber framing.
- The concrete foundations of a former shed are located adjacent to the driveway on the boundary with 458 Karaka Road (**Photo 41**; this may encroach on the 458 property).
- A single dwelling is located on the property, adjacent to the roadside in the north. It could not be accessed but from a distance appeared to be a circa 1920s-1930s weatherboard construction with timber baseboards. Profiled steel garden shed(s) could be seen at the rear. The dwelling is surrounded by landscaped gardens and mature trees.

Photo 32: Poultry sheds at 370 Karaka Road

Photo 33: Grain silos and LPG containers at the eastern end of the poultry sheds

Photo 34: Silage pit southwest of the poultry sheds

Photo 35: Transformer at 370 Karaka Road

Photo 36: Disused milking shed

Photo 37: Likely ACM cladding on the northern apex. Concrete block is also visible.

Photo 38: Interior of milking shed

Photo 39: Implement shed at 370 Karaka Rd

Photo 40: Storage within implement shed

Photo 41: Concrete base of former shed

3.1.5 458 Karaka Road

This property is predominantly farmland with a pond and isolated trees (**Figure 5**).

The only site features of note are two dwellings in the north of the property, near the road side. Neither was able to be visited at the time of the site walkover but the eastern-most one could be viewed from the driveway (**Photo 42**). It is a weatherboard house with a profiled steel roof and suspected ACM soffits and baseboards. A

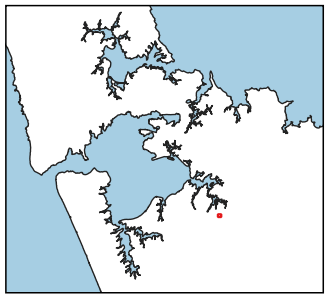
hardiplank (post-asbestos) garage is located on the southern side of the house. Mature trees surround the dwelling.

Photo 42: Eastern-most dwelling at 458 Karaka Road

Map Title:
300 and 350 Karaka Road: Site Features

Project:
Karaka PSI

Client:
Fisher & Payel Healthcare Ltd



Legend

- Site Features
- Site Boundary
- Property Boundaries

Drawn By:
Lauren Windross

Date:
20 May 2024

Data Provenance
Aerial Imagery derived from Land Information New Zealand

Layout & Project File
Figure 3 300+350 site features

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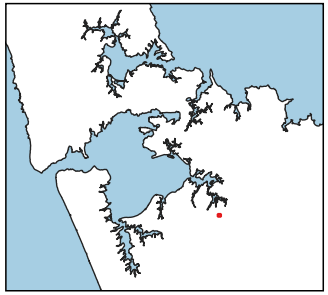
Figure 3

Map Title:
328 Karaka Road: Site Features

Project:
Karaka PSI

Client:
Fisher & Payel Healthcare Ltd



Legend

- Site Features
- Site Boundary
- Property Boundaries

Drawn By:
Lauren Windross

Date:
8 February 2023

Data Provenance
Aerial Imagery derived from Land Information New Zealand

Layout & Project File
FIgure 4 328 site features

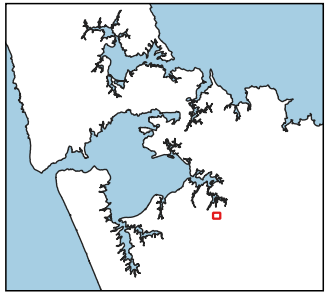
WILLIAMSON WATER & LAND ADVISORY

Figure 4

Map Title:
300 & 350 Karaka Road: Site Features

Project:
Karaka PSI

Client:
Fisher & Paykel Healthcare Ltd



Legend

- Site features
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Layout & Project File
Figure 5 370-458 site features

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Figure 3

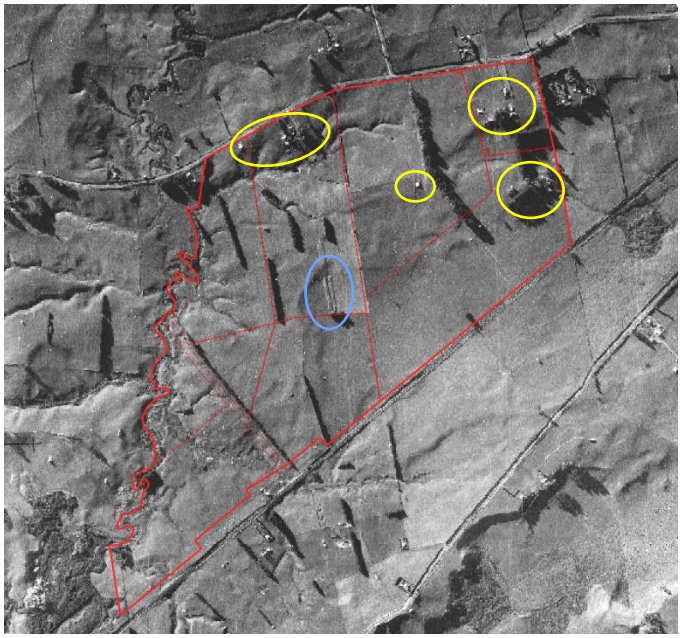
3.2 Site history

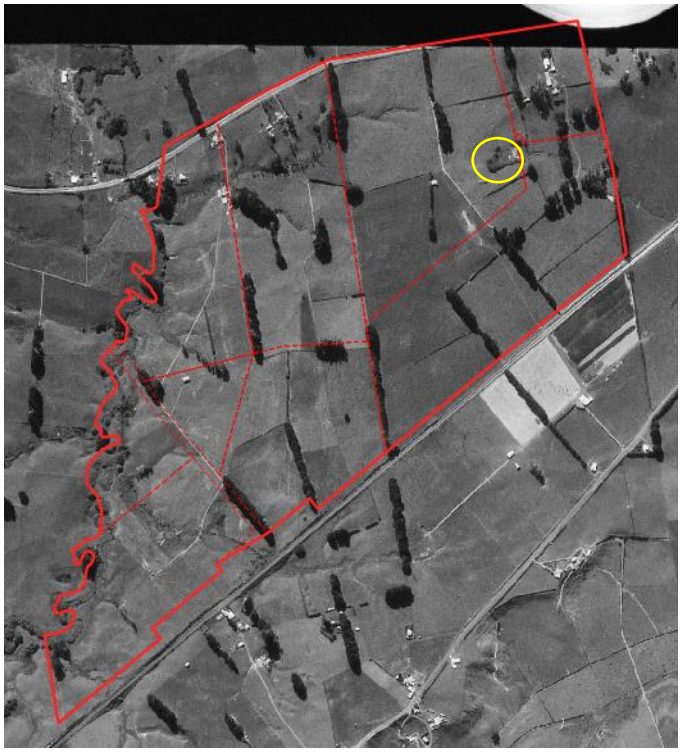
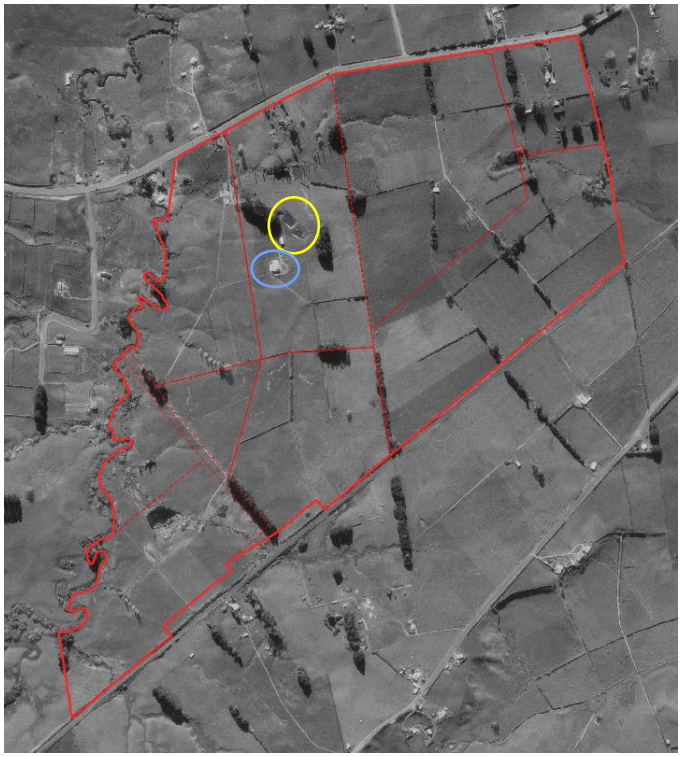
The historical review summarised in the following sections found the property has been predominantly used for grazing/ farming throughout its recorded history. A glasshouse facility was developed for growing tomatoes and cucumbers in 2001, alongside a transport depot. Minor cut-to-fill earthworks has occurred across the site since the 1970s for construction of farm ponds and to facilitate the glasshouse works above.

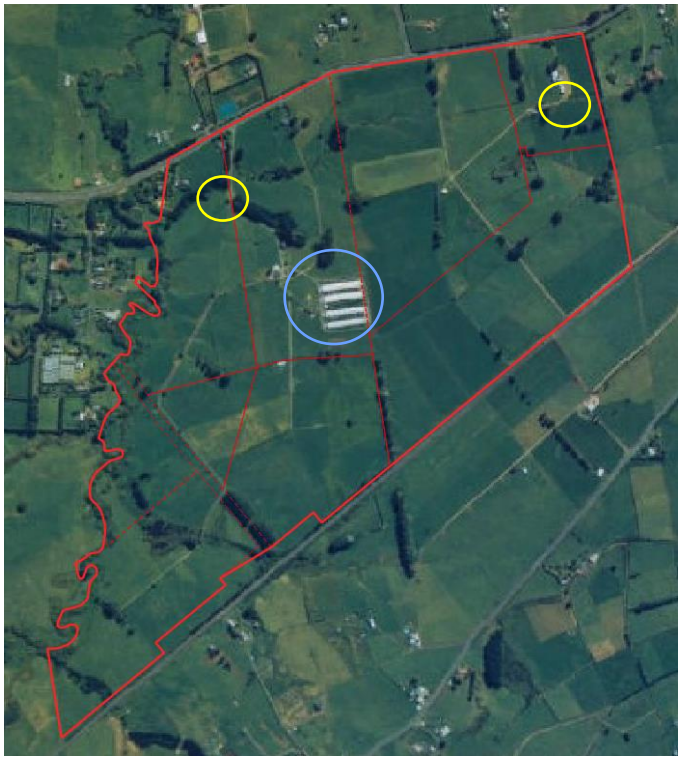
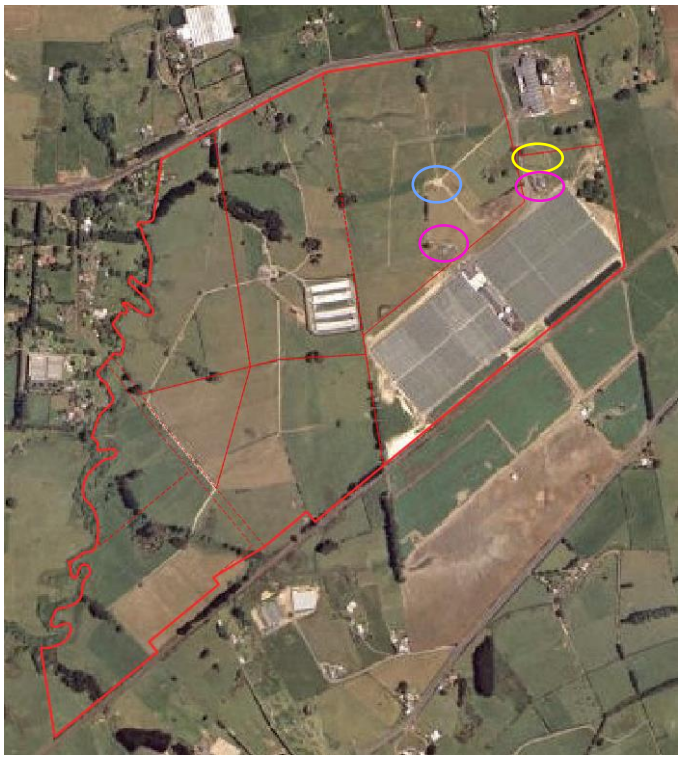
3.2.1 Aerial photograph review

Historical aerial imagery available from Retrolens and Auckland Council GeoMaps were reviewed and are summarised in **Table 3** below.

Table 3. Historical aerial photograph review

Photograph date (source)	Activities	Aerial image
1942 Retrolens (SN192, 275/23)	The site is being grazed/ farmed, with paddocks visible along with shelter belts. Houses are located predominantly along Karaka Road with a farm shed also visible within the three eastern land parcels (structures circled in yellow). Two elongated structures, possible silage storage, are located in the centre of 370 Karaka Road (blue circle). A valley can be seen in the southwest of the site. Surrounding land is also being farmed.	
1961 Retrolens (SN1397, Run 3244, Photos 33, 34)	The site remains as farmland with no significant changes. Four additional structures have been constructed in the west of the site, all likely houses (in the north) or farm sheds (in the south and centre)	

Photograph date (source)	Activities	Aerial image
1975 Retrolens (SN3800 Run P/6)	The site remains as farmland with no significant changes relative to the previous photograph. A small pond may have been formed in the centre of the site, likely in a former depression (yellow circle). Some market gardening may be occurring south of the southern boundary, but other surrounding land remains as farmland.	
1981 Retrolens (SN5738B Run V/15)	While the site remains as farmland, minor changes can be seen in the formation of farm ponds (circled in yellow) via damming of existing streams/ gullies, and two new sheds, one of which is large and has an associated turning circle that suggests it may be a milking shed (blue circle). Surrounding land remains as farmland with no horticulture visible.	

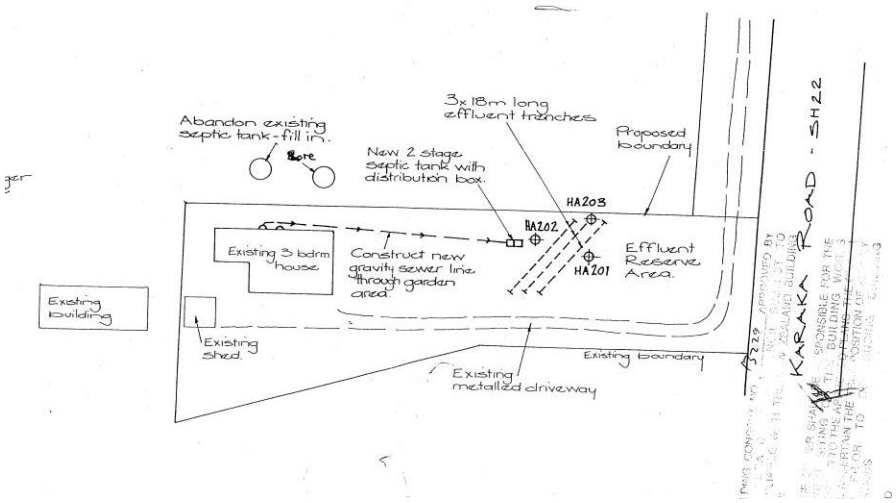
Photograph date (source)	Activities	Aerial image
1996 Auckland Council GeoMaps	Farm sheds have been removed in the northeast and northwest of the site (yellow circles). Four large sheds, corresponding with the location of the current poultry sheds, have been constructed in the centre-west of the site with associated farm tracks and a small effluent pond (blue circle). The remainder of the site is still used for grazing, as is surrounding land.	
2001-2003 Auckland Council GeoMaps (2003 image shown)	There are significant changes in the south and east of the site, predominantly within the titles at 300 and 328 Karaka Road. At 300 Karaka Road the previous dwelling and shed appears to remain but a new large commercial shed has been constructed to their west. This is surrounded by parking, landscaping and a stormwater pond. Works appear to be recent with exposed earth still visible. Within 328 Karaka Road a large greenhouse facility has been constructed. There are two greenhouses with a service building and water tanks between them. Large stormwater ponds are visible to their south (on the boundary of the site). They are surrounded by exposed earth with earthworks laydown areas extending to the north and northeast, as well as two modern dwellings (one of which is on the title at 350 Karaka Road) and associated water tanks and sheds (pink circles). By 2003 another farm pond has been constructed east of the original farm pond at 328 Karaka Road (yellow circle) In addition to the above changes, one small shed has been demolished at 350 Karaka Road (blue circle).	

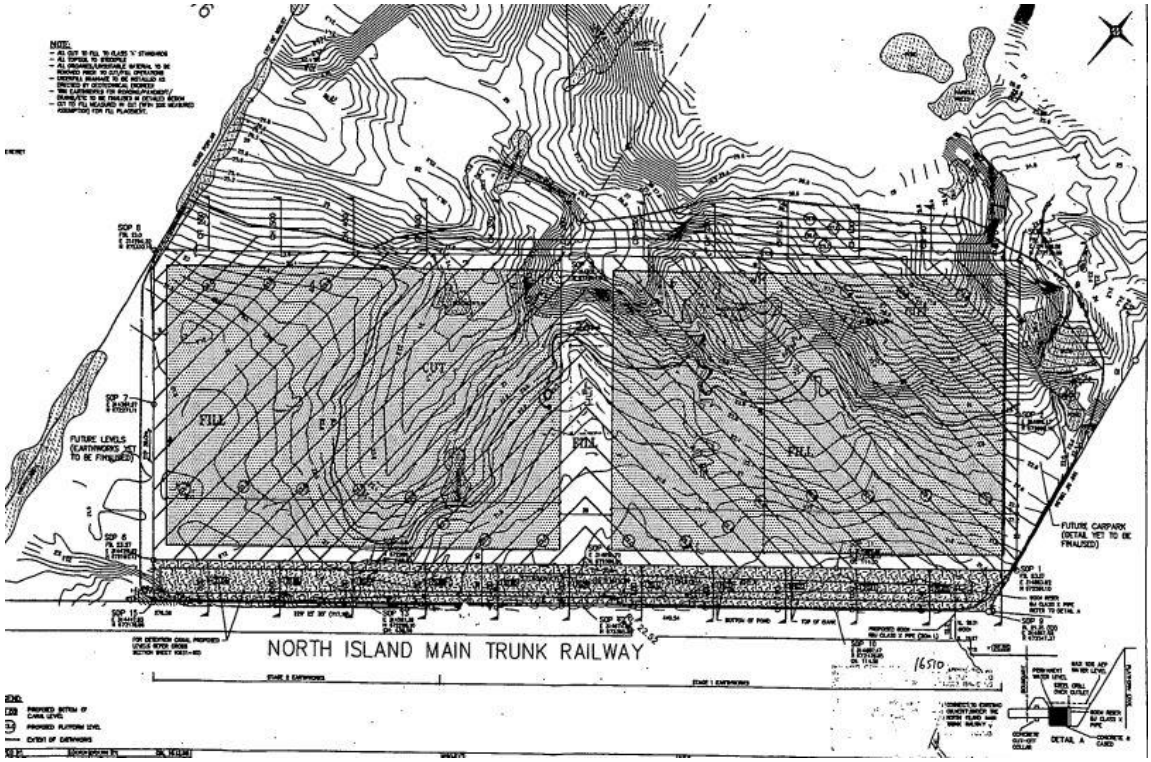
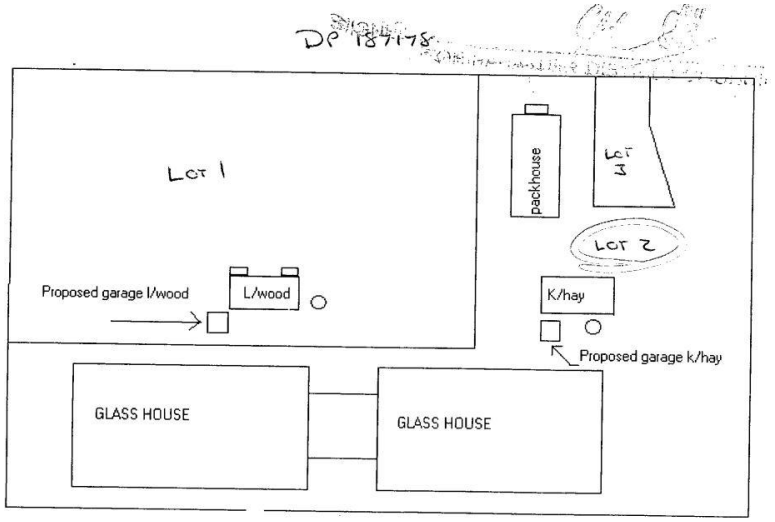
Photograph date (source)	Activities	Aerial image
2006-2017 Auckland Council GeoMaps (2011 image shown)	The site remains largely unchanged throughout this period. The only changes of note are as follows: 2006: - Stabilisation of the eastern portion of the site from the greenhouse construction earthworks (including removal of all topsoil stockpiles). - Construction of a new small shed near the northern commercial building and asphalting of eastern access roads. - Construction of a new shed north of the diary shed at 370 Karaka Road (yellow circle). 2008: - Between 2006 and 2008 the house at 350 Karaka Road was extended. 2010 - The small stormwater pond next to the poultry farm was filled in. - A small area of stockpiling commenced north of the glasshouses, remaining to 2017 (blue circle).	

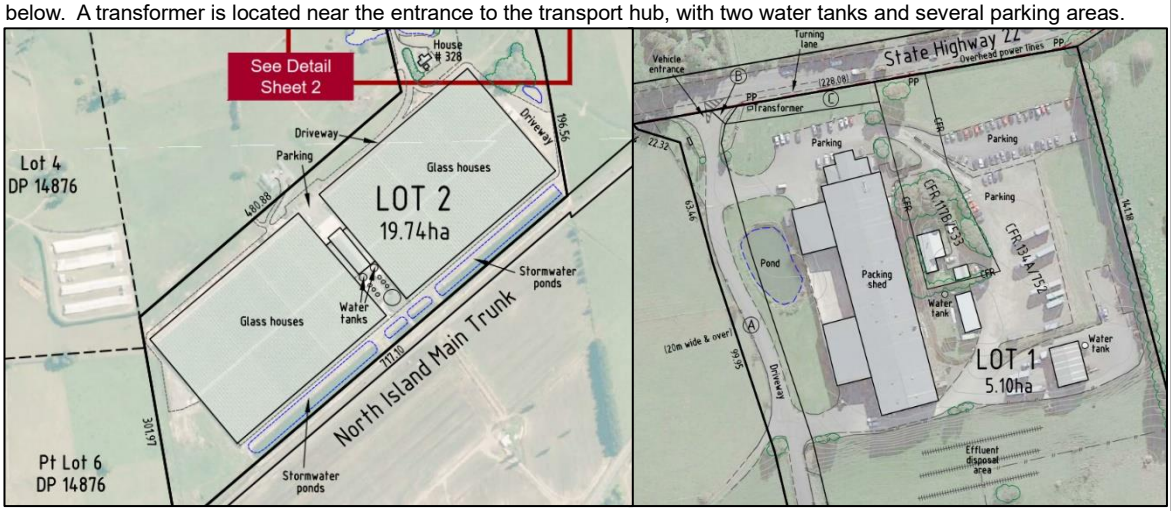
3.2.2 Property file

The Auckland Council property file was viewed in December 2022. The following key information related to ground contamination and historical use of the site has been identified (**Table 4**).

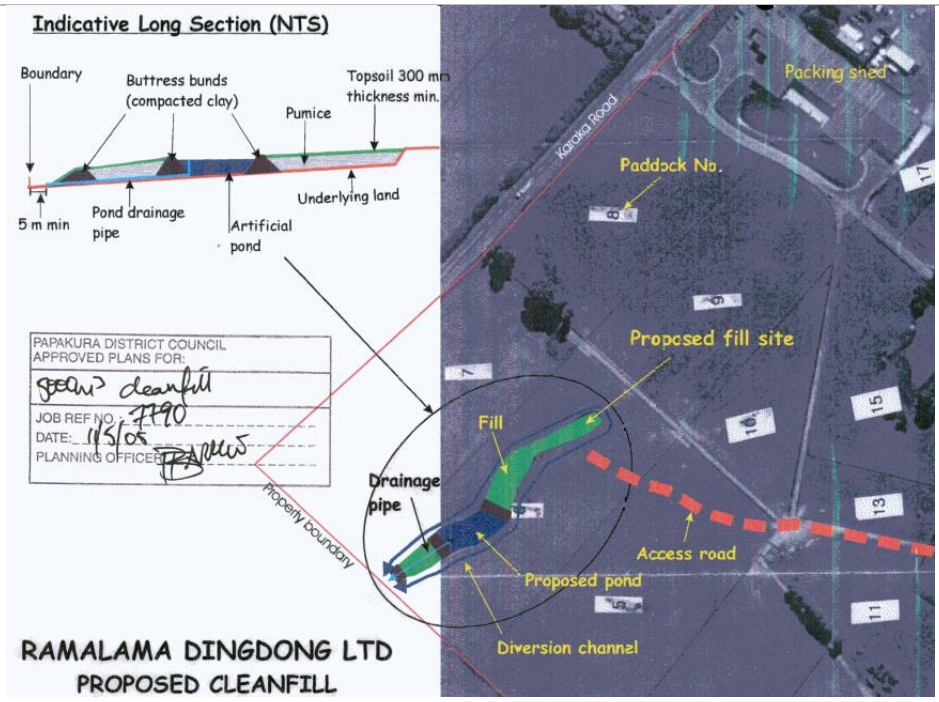
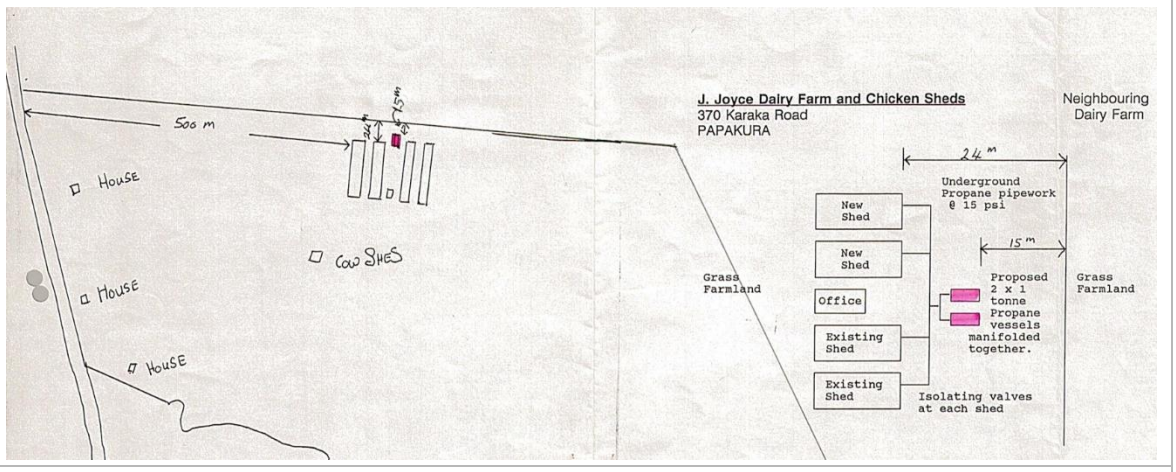
Table 4. Relevant property file information.

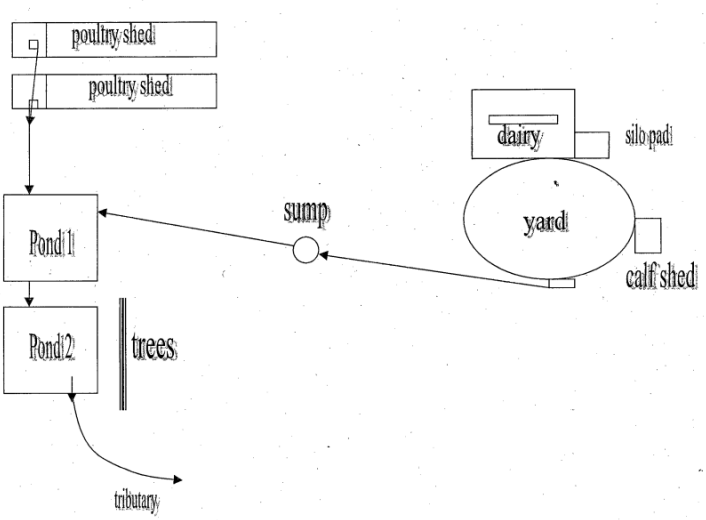
300 Karaka Road	
1997	A geotechnical report was undertaken to aid the subdivision of the parent lot. The report notes groundwater was not encountered and thus is greater than 1.3 m BGL. No fill was observed.
Feb 1997	Plans indicating the location of an effluent area (effluent trenches, lines and septic tanks). 
June 1999	A design for a sanitary sewer disposal system.

July 1999	Multiple documents regarding a proposed packhouse/ related offices and/ or staff facilities.
Sept 1999	A Geotechnical report, prepared by Geotek Services Ltd identifying shallow fill (<1.5 m) in three boreholes on the western side of the proposed packhouse. The logs and cross sections specify uncertified fill, although the description is suggestive of reworked natural material with no bricks/ concrete/ etc.
Jan-Mar 2000	Various building consent applications including for re-locatable dwellings and implement sheds.
Aug 2000	A land use consent application (No: 17447/1) for sediment control to undertake ~6.3ha of earthworks associated with developing a glasshouse complex. The following cut-to-fill plan is associated with the application: 
May 2001	A building consent application (No 179909/1) notes a proposed Keith Hay garage and also specifies that the dwelling on the site is a Keith Hay home and the dwelling on 350 Karaka Rd is a Lockwood. 
Aug 2004	An application to change and increase the groundwater take from a 352 m deep bore for Underglass Karaka Ltd. This was granted in 2009.
328 Karaka Road	
-	Multiple documents held within the property have been summarised above (300 Karaka Road).

Jan 1999	Resource consent granted for earthworks for the glasshouses (approximately 20,000 m^3). One of the consent conditions stated that no fill was to be brought onto the site – meaning that works were cut-to-fill only.
Nov 2007	An application for consent to discharge nutrient solution run-off from the glasshouses . The application include storage facilities/ pathways, nitrate waste calculations and a disposal plan. The consent was granted in December 2007 (Permit 35131) and expired 31 December 2022 (it is unclear if this was renewed). - Various compliance inspection forms from Auckland Council (found in the property file for 350 Karaka Road) show a generally good level of compliance with this resource consent. - A 2019 soil chemistry report for the discharge consent shows that potassium concentrations were increasing and potentially becoming a concern. Nitrate and nitrite were noted 'to watch', along with sulphate.
April 2009	Consent was granted (29607) for a water take, authorising up to 300 m^3 per day and 6,000 m^3 per year from a 76.2 m deep bore at the site. The use of the water was for standby irrigation for the glasshouses. The bore is located on the southern side of the glasshouses. The consent was extended in 2022 to 110,000 m^3 per annum.
Nov 2017	Plans associated with the consent described below show the layout of the glass house and transport depot areas. Refer below. A transformer is located near the entrance to the transport hub, with two water tanks and several parking areas. 
Feb 2018	An application was made to adjust the boundaries between two titles. Consent was granted in March 2018 (SUB60315729).
Jun 2020	A management plan was provided to show how discharges will be managed from the glasshouses in compliance with consent 35131. The plan describes how the denitrifiction bed treatement system operates, how irrigation is to be monitored and managed, and how reporting to Council will occur. Irrigation of treated wastewater is shown to occur over all paddocks between the glasshouses and Karaka Road (including between the greenhouses and the transport depot). Key contaminants are nitrogen, phosphorus, potassium, sulphate, sodium, calcium, magnesium and chloride.

	APPENDIX 1: IRRIGATION AREAS AND INFORMATION FOR UNDERGLASS KARAKA 
350 Karaka Road	
-	Multiple documents held within the property have been summarised above (300 and 328 Karaka Road).
1997	Geotechncial report (Geotek Ltd) summarised preliminary investigations for a proposed subdivision (into 6 titles). This summarised a series of shallow hand augers to 1.3 m below ground, all of which encountered topsoil overlying silty and fine sandy clays. No groundwater was encountered.
2001	A garage was installed adjacent to the house.
2004	An email from a Franklin Council officer to a Papakura District Council officer regarding a "cleanfill cum landfill" at SH22. The specific address is not provided but it is described as "not far from the large glasshouses on the left as you travel towards Pukekohe". Sand, also containing a considerable number of plastic bags, was stated to be used as fill. This activity may not have occurred on the site.
2005	Extensions proposed to the house and consent granted for them. The application documents show the house was constructed in 1998 and is a "Lockwood".
2005	Also in 2005 an application was made to operate a cleanfill at the site, with a proposed volume of 5,000 m^3, all of which was to be sourced from within the property. It was proposed to use primarily pumice and topsoil which would be placed within a gully and an ornamental pond created at the base of the gully to act as a sediment retention pond. The cleanfill was loated in the northwest corner of the property, was 3 to 4 m deep, 10 m wide at the top, and 200 m long. The consent has no contamination-related conditions. There are no documents to confirm that this filling occurred, and no evidence of filling on the aerial photograph review (**Section 3.2.1**).

	
2017	Building consent lodged for installation of a Kiwispan implement shed with concrete floor. This was then granted and the building completed.
370 Karaka Road	
1953	Application for “sleeping quarters” to be constructed. The walls were proposed to be fibrolite.
1957/1958	Application to extend a dwelling an an existing shed. Another application was dated 1959.
1962	Plans for additions to a dwelling describe an ‘iron’ roof, internal gibraltar board lining and weatherboard exterior. A shed to be constructed at the same time had a concrete base and galvanised weatherboard exterior.
1976	Plans for an extension to a dwelling. Also in the 1970’s a hay shed and garage were installed.
1978	Application forms and plans for a proposed cowshed. Plans are not legible to determine the building materials.
1985	First application to erect chicken sheds at the site. The sheds were to be of concrete block and timber construction with galvanised roofing.
1992	Consent application lodged to extend the poultry farm at the site. Refer below for the original layout and proposed expansion. Hardiflex is specified within the building materials (internal only).
1993	Application lodged to install two x 1 tonne vessels for the storage of propane gas. The propane was used for heating chicken sheds and replaced numerous 45 kg cylinders perviously being used. The layout of the site at the time is shown below. 
1995	A subdivision resource consent describes construction of two dams, but no further detail is provided.

	Another consent from this year relates to construction of a dwelling (no confirmation that this was undertaken).
1996	Geotech investigations during cut-to-fill activities for a dam show soft surficial materials were replaced with compacted clay fill.
1999-2004	Dangerous goods licenses state that on the site are the two LPG tanks described above, and a single 1,200 L above-ground diesel tank (prior to 1999 there had been licenses for LPG only).
458 Karaka Road	
-	Multiple files are associated with the chicken sheds and milking shed on 370 Karaka Road.
2003	A resource consent decision authorises the discharge of secondary treated farm dairy and poultry washwater from a two-pond treatment system to a water body. Further information within the decision states that the farm had 110 cows and 24,000 chickens per shed with two sheds included in the consent. The discharge point was to the Oira Stream. Stormwater from several sheds was observed to also flow to the treatment ponds and there were conditions put in place regarding the separation of these and the maintenance of the ponds. A schematic of the treatment system is provided below. Poultry shed washwater was assessed to contain: - pH: 7.11 - Suspended solids: 558 ppm - Nitrite/ Nitrate: 0.01 ppm - Total Nitrogen as N: 235 ppm - COD: 1,710 ppm 
2017	A code of compliance certificate for a new fireplace states the dwelling was first constructed in 1960. Photos associated with the same permit indicate a weatherboard house with galvanised steel roofing.
2020	A wastewater inspection certificate confirms the onsite septic system is in good operational condition except that the disposal field emitters are blocked. A new disposal field was recommended. The system was pumped out and cleaned.

3.2.3 Other reports

CMW Geosciences undertook an investigation of a portion of the site (350 and 370 Karaka Road) in 2022[3]. The investigation included ten (10) hand augers and four (4) cone penetrometer tests (CPTs). No fill was identified in any of the investigation locations, although CMW cautioned that aerial photographs suggest that filling has occurred in some valleys. Topsoil generally overlay South Auckland Volcanic and Puketoka Formation deposits, with isolated alluvium in gullies. Groundwater was measured at close to or greater than 5 m below ground in most investigation locations.

[3] CMW Geosciences, 13 July 2022. Geotechnical Assessment Report, 350 & 370 Karaka Road. Prepared for Dines Group Ltd

3.3 Potential for Contamination

Potentially contaminating activities are described in **Table 5** along with an assessment of the likelihood and magnitude of any contamination resulting from red and orange activities shown). Activities are also illustrated in **Figure 6**.

Those activities highlighted red are confirmed HAILs and those in orange activity status are required to be confirmed by testing as they are only considered a HAIL if soil testing shows they pose a risk to people or the environment (or that asbestos is in a degraded condition for Activity E1). Activities shaded green are not considered HAIL activities in the context of this site.

Table 5: Evaluation of potentially contaminating activities from previous and current land use.

Land use and *HAIL Activity*	**Potential contaminants**	**Potential likelihood and extent of contamination *Addresses potentially impacted***	**HAIL Activity Status**
Commercial market gardening/ glass houses *A6: Fertiliser bulk storage* *A10. Use of persistent pesticides*	Lead, copper, arsenic, OCPs	The glasshouses were constructed in 2001 so post-date the use of lead, arsenic and OCPs. During the site walkover inspection, it was noted that only fungicides specific to leaf blight are kept on site, along with generic fertilisers. In addition, the plants are grown hydroponically so there is no direct interaction with the underlying soils. Storage is in excellent condition and over concrete, with spills and wash water draining to the effluent ponds. Potential for contamination is therefore considered nil in the context of both HAIL activities, although there may be some localised contamination in the effluent ponds which receive runoff from these activities (refer HAIL Activity G6 below). *Address: 328 Karaka Road*	Not a HAIL in the context of this site
DG storage and chemical storage tanks. *A17. Storage tanks or drums for fuel, chemicals or liquid waste.*	Diesel	Diesel is stored on several sites, largely within double-skinned vessels. Tanks are generally in good to excellent condition with evidence of spills only observed at the transport depot. A single diesel tank was historically located at the poultry farm but was not observed during our site walkover inspection. Being only a small volume, it is unlikely to have resulted in more than localised contamination at the site. Localised contamination around fill points/ directly underneath the diesel tanks on all three sites can be expected. AdBlue additive is also stored in ASTs although it presents a low risk to human health and is not expected to persist in the environment. On this basis, storage of AdBlue is not considered to be a HAIL activity. *Addresses: 300, 328 and 370 Karaka Road*	Confirmed HAIL activity.
Transformers *B2: Electrical transformers*	Metals, polychlorinated biphenyls (PCBs), hydrocarbons	Several transformers were observed however, only the transformer near the poultry sheds has potential to contain PCBs as the other transformer post-dates PCB use. Localised soil contamination by cooling oil is possible beneath the transformers but the age and condition of the transformers suggests the potential is low. *Addresses: 328 and 370 Karaka Road*	Confirmed HAIL activity.

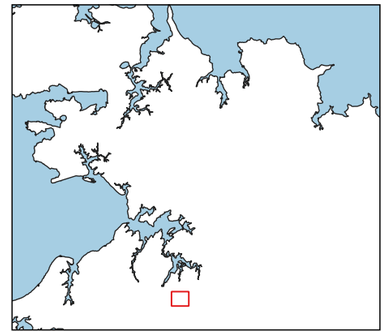
Land use and *HAIL Activity*	Potential contaminants	Potential likelihood and extent of contamination *Addresses potentially impacted*	HAIL Activity Status
Asbestos in current or demolished buildings. *E.1. Asbestos… including sites with buildings containing asbestos products known to be in a deteriorated condition.*	Asbestos	Asbestos building materials have been used on several buildings, as confirmed by the property file review and site walkover inspection. ACM is currently generally in good painted condition, although its previous maintenance is unknown, so there is potential for release of fibres into the surrounding soils, especially where paving does not exist or formerly didn't exist. If present, asbestos would be expected to be within surficial soils around the perimeter of buildings that contain or formerly contained ACM (typically within several metres unless redistributed by surface water flows or soil disturbance). It may also be present around formwork and underground services constructed from ACM. *Addresses: 300, 370, 458 Karaka Road*	Potential HAIL activity – if asbestos is found to be deteriorated on dwellings or present in soils.
Mechanical workshops *F4: Motor vehicle workshops*	Hydrocarbons, metals	The former workshop at the transport depot has the highest potential for contamination due to the poor quality of the flooring. The main workshop (currently in use) has less potential for contamination, although contaminants may have migrated off the asphalt pad and drained to ground or have impacted the ground immediately beneath the waste oil storage tank. Potential for contamination from both is moderate, although concentrations are likely to be low around the edge of the pad (not presenting a risk to human health or the environment). There is negligible potential for soil contamination beneath the workshop at the glass houses due to its small scale, location and underlying concrete floor. *Addresses: 328 and 350 Karaka Road*	Confirmed HAIL activity (328 Karaka Road only).
Stormwater and effluent ponds associated with commercial activities *G6: Wastewater treatment.*	Hydrocarbons, metals, nutrients, pesticides	Runoff from truck wash, workshops, refuelling areas and glass houses all goes to a series of stormwater and effluent ponds. Sediment accumulated within the ponds is likely to contain elevated levels of some contaminants that may require specific management if they are to be disturbed as part of any future works. *Address: 300, 328 and 350 Karaka Road*	Confirmed HAIL activity.
Farm effluent ponds and residential septic tanks *G6: Wastewater treatment.*	Various depending on the effluent source but nutrients and metals are common.	Farm effluent ponds have been operated on parts of the site and septic tanks are associated with the residences. The main contaminants associated with septic tanks and effluent ponds are nutrients and pathogens, although detergents and other chemicals used in the cleaning of milking equipment may also be included in small quantities in effluent discharges. With the exception of pathogens, these contaminants principally present a risk to the environment rather than to human health (except via consumption of groundwater). Pathogen concentrations would be expected to reduce rapidly over time following the decommissioning of the ponds and septic tanks and are therefore highly unlikely to present a risk to human health or the environment. *Address: 370 Karaka Road*	Highly unlikely to be a HAIL on this site

Land use and *HAIL Activity*	Potential contaminants	Potential likelihood and extent of contamination *Addresses potentially impacted*	HAIL Activity Status
Spray drift from historic horticulture *H: Migration of a hazardous substance in sufficient quantity that could pose a risk to human health or the environment.*	Lead, copper, arsenic, OCPs	Highly unlikely to have impacted on site soils as the horticulture occurred for only a short time. The site soils have subsequently been significantly earthworks for the glasshouse development meaning that it is unlikely that concentrations remain that present a risk to human health or the environment. *Address: 328 Karaka Road*	Highly unlikely to be a HAIL on this site
Spray painting *I. as above*	Semi-volatile organics (SVOCs)	Spray painting of fenders occurs outside so there is potential for overspray to impact shallow soils around the workshop pad. However, the distance from the spray area to the edge of the pad means contamination concentrations are likely to be very low, if present at all. *Address: 300 Karaka Road*	Highly unlikely to be a HAIL on this site
Placement of fill for creating farm ponds/ filling gullies/ earthworks for buildings *I. as above*	Depends on source but metals, polycyclic aromatic hydrocarbons (PAHs) and asbestos are common.	Formation of farm ponds will have required fill placement to dam the streams/ gullies. However, Council documents show that where consented, this is occurred via cut-to-fill methods. Property file documents also show that earthworks for the transport depot and glasshouses involved cut-to-fill earthworks. Therefore, it is highly unlikely that contamination has been introduced to site by this means. *Addresses: 300, 328, 350, 370 Karaka Road*	Highly unlikely to be a HAIL on this site
Lead paint on houses *I. as above*	Lead	Houses constructed pre-1970s may contain lead paint. As with asbestos, this can result in contamination of surface soils immediately around the structures. It is unlikely to extend into subsoils. *Addresses: 300, 370, 458 Karaka Road*	Potential to be a HAIL depending on level of contamination present.
Burning of waste plant products *I. as above*	Copper, PAH	There is an isolated area adjacent to the hothouses where intermittent burning of waste plant materials takes place. It is expected that shallow soils will be contaminated to a moderate degree, but contamination is highly unlikely to mobilise either vertically or horizontally. *Address: 328 Karaka Road*	Potential to be a HAIL depending on level of contamination present.
Potential landfilling *I. as above*	Metals, PAH	Filling using plastic bags was observed either on the site or in the vicinity of the site. Given the limited information in the property file, and lack of evidence of filling in aerial photographs at the time of the complaint, we consider it highly unlikely that this activity occurred on the site.	Highly unlikely to be a HAIL on this site
Implement shed *I. as above*	Metals, hydrocarbons	Machinery storage may have resulted in contamination of shallow soils from leaks/ spills. Any contamination present is likely to be confined within the shed, as its roof will have prevented any significant migration via dust or stormwater. *Address: 370 Karaka Road*	Potential to be a HAIL depending on level of contamination present.

Map Title:
HAIL Plan

Project:
Karaka PSI

Client:
Fisher and Paykel Ltd



Legend

- **Site Boundary**

HAIL Activities

- **A17: Fuel or DG storage**
- **B2: Transformers**
- **E1: Asbestos building products**
- **F4: Motor vehicle workshop**
- **G6: Wastewater treatment**
- **I: Implement shed**
- **I: Waste burning**
- **I: Lead paint**

Drawn By:
Lauren Windross

Date:
20 May 2024

Data Provenance
Aerial Imagery derived from Land Information New Zealand

Layout & Project File
HAIL Figure 6

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Figure 6.

4. Preliminary Conceptual Site Model

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

While the works will comprise a large volume of earthworks, the works are expected occur over an extended timeframe with only limited areas of ground exposed at a single time. This means that while the actual contamination concentrations are not yet known, there is likely to be sufficient scope and flexibility in plans so that areas of potential contamination can be investigated and managed as required as the works progress. There is also likely to be sufficient scope to keep all excavated soils on site, so long as they don't present an ongoing risk to human health or the environment.

The Preliminary CSM is described in **Table 6** and takes into account the proposed nature of the works as described above, and the HAIL Activities as per **Figure 6**. It is assumed that detailed site investigations (DSIs) will be undertaken in a staged manner before each phase of works at which point the CSM can be finalised.

Table 6. Preliminary CSM for Karaka Road Plan Change

Source	Receptor	Exposure pathway	Assessment during development	Assessment on completion of development
Asbestos fibre contamination around pre-1990s structures	Future site occupants.	Inhalation of dust.	**Potentially Complete Pathway:** Occupants will likely vacate the site prior to development. But in any event the Asbestos Regulations require appropriate management of asbestos to protect occupants.	**Likely Incomplete Pathway:** Asbestos contamination, if present, is likely to be removed from site or encapsulated during enabling works for each stage of the development.
	Site workers during soil disturbance.	Inhalation of dust.	**Potentially Complete Pathway:** If asbestos concentrations exceed the applicable criteria, the pathway can be easily made incomplete with use of the appropriate controls. Asbestos controls are discussed further in **Section 5.2**.	**Likely Incomplete Pathway:** If asbestos remains onsite at completion of the development works, it will need to be controlled via implementation of an Asbestos Management Plan.
	Ecological receptors at the nearest surface water bodies and receiving soil disposal site.	Surface water runoff on the site and at any receiving disposal site.	**Not applicable:** Asbestos is not currently considered an environmental contaminant.	**Not applicable:** Asbestos is not currently considered an environmental contaminant.
Metals and hydrocarbons from a range of HAIL activities.	Future site occupants.	Dermal contact, inhalation of dust.	**Potentially Complete Pathway:** There is potential that human health exceedances will occur as a result of some HAIL activities. However, occupants will likely vacate the site prior to development. But in any event risks to occupants (if any) will be mitigated by implementation of a Site Management Plan (SMP).	**Likely Incomplete Pathway:** It is expected that areas of contamination are more likely than not to be localised, so should be readily managed (most likely removed from site) during enabling works at each stage. It is unlikely that there will be a long-term risk to site users.
	Site workers during soil disturbance.	Dermal contact, inhalation of dust, ingestion of soil.	**Potentially Complete Pathway:** If contaminants exceed human health criteria in localised areas, it is expected that these risks can be	**Likely Incomplete Pathway:** If contamination remains onsite at completion of the development works, it will need to be controlled by

Source	Receptor	Exposure pathway	Assessment during development	Assessment on completion of development
			mitigated with use of a SMP that sets out how soils should be handled and disposed of, and health and safety requirements for workers. With such controls on place, it is unlikely that there will be a risk to site workers.	the implementation of an ongoing site management plan. With such controls on place, it is unlikely that there will be a risk to site workers. Appropriate controls are expected to be able to be implemented readily (if required). However, as noted above, it is expected that localised areas of contamination that might present a risk to workers are most likely to be removed from the site.
	Ecological receptors at the nearest surface water bodies and receiving soil disposal site.	Leaching to groundwater or surface water runoff on the site and at any receiving disposal site.	**Potentially Complete Pathway:** Again, if contaminant concentrations are elevated, the SMP will provide procedures for managing soils, with a focus on minimising discharges of sediment-laden water from site, and appropriate management, such as offsite disposal to a facility licensed to take the level of contamination present.	**Likely Incomplete Pathway:** As above, localised areas of unacceptable contamination are most likely to be removed. But otherwise will need to be controlled. Appropriate controls are expected to be able to be implemented readily (if required).

5. Development Implications

The HAIL assessment presented in **Section 3** and evaluated via the preliminary CSM in **Section 4**, confirms that while contaminant concentrations may exceed applicable environmental and human health criteria in localised areas, these exceedances are expected to be easily managed through implementation of a SMP. The SMP will include remedial or ongoing management measures, if required.

5.1 Pre-works testing

It is expected that soil sampling, sufficient to prepare DSI reports, will be undertaken in a staged manner for each phase of earthworks. Detailed sampling plans have not been prepared at this time, but key points to note are:

- Soil sampling plans and the sampling itself must be carried out by a SQEP in accordance with the industry guidelines at the time (this is expected to evolve over the lifetime of the project).
- Sampling is expected to be focussed on surface soils in HAIL areas. There will be some requirement to also test sub-soils in selected locations to confirm that no vertical migration of contamination has occurred.
- In most cases, soil sampling will be focused on defining relatively small 'hot spot' areas of contamination.
- Testing shall be carried out at an IANZ-accredited laboratory for the key contaminants relevant to the activity, as identified in **Section 3.3**.
- No soil sampling is anticipated to be required in non-HAIL areas, unless it is required to confirm offsite cleanfill disposal suitability.
- No groundwater monitoring or testing is currently anticipated due to the limited potential for contamination identified in **Section 3.3**.

5.2 Consenting implications

This PSI has been prepared to support a Structure Plan update and eventual Plan Change. **There are no barriers to future use of the Plan Change area for commercial/ light industrial purposes as a result of the potential contamination sources identified in this PSI.**

This PSI is likely to also be used to support future resource consent applications, so we have assessed the current regulatory context in the sections below. These assessments assume that soil sampling (DSIs) will be undertaken prior to each stage of works commencing. If no DSIs are undertaken, then consent would be required as a Discretionary Activity under both sets of regulations for HAIL Areas (**Figure 7**).

Regulatory Framework	Rule	Consent required (Y/N and type)
NESCS	8(1) Removal of a fuel storage system	Yes – Restricted Discretionary or Controlled Activity
	8(2) Soil sampling	No – not applicable
	10 Disturbing soil (permitted activity 8(3) unlikely to be met)	Yes – Restricted Discretionary or Controlled Activity
	10 Subdivision and land use change (permitted activity 8(4) unlikely to be met)	Yes – Restricted Discretionary or Controlled Activity
AUP	E30.6.1.2 Soil disturbance (permitted activity provisions may not be met)	Yes – Controlled Activity

5.2.1 NESCS

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

activity included on the HAIL has occurred. The soil disturbance rules, subdivision and land use change rules would apply to any future proposal to redevelop the land.

Based on our potential for contamination assessment (**Section 3**) and the preliminary CSM (**Section 4**):

- **The NESCS applies to discrete areas distributed across much of the site** because HAIL activities have occurred (**Figure 7**), and because redevelopment will involve removal of fuel storage systems, soil disturbance and land use change (and possibly subdivision).
- However, the NESCS does not apply to areas of the site where no HAIL activities have occurred (refer **Figure 7**).
- Earthworks volumes for the upgrade works have not yet been established. We have therefore conservatively assumed that earthworks volumes will exceed permitted activity volumes where HAIL activities have occurred:
- If soil sampling is undertaken for the stage that consent is being sought for, then the consent status will be either Restricted Discretionary or Controlled, depending on the level of contamination present.
- If consent is sought before soil sampling occurs, then a Discretionary Activity status will apply.
- Given the nature of the HAIL activities present, it is unlikely that subdivision or land use change would be considered Permitted Activities by Council.
- Again, if soil sampling is undertaken then the consent will be either Restricted Discretionary or Controlled depending on the level of contamination present.
- Consent for subdivision or land use change will be required as a Discretionary Activity if no soil sampling is undertaken.

A SMP is required to support consent applications under the NESCS and is also recommended to support permitted activity standards when elevated contaminants are present.

5.2.2 Auckland Unitary Plan: Operative in Part

The Auckland Unitary Plan (AUP), Section E30 contains rules that address discharges to the environment, both during works and in the long term. The contaminated land rules of the AUP apply to soils that contain 'elevated levels of contaminants' which is defined as contaminants exceeding the permitted activity discharge criteria in Standard E30.6.1.4. Consent is required when contamination levels exceed the permitted activity discharge criteria and earthworks exceed either two months duration or 200 m^3, among other conditions.

Given the nature of the HAIL activities present, soil sampling is recommended to determine if disturbance of soil in the HAIL areas requires consent as a Controlled Activity or can be undertaken as a Permitted Activity (depending on the level of contamination present). If no sampling is undertaken, then consent as a Restricted Discretionary Activity will be required for soil disturbance in HAIL areas.

5.3 Earthworks implications

The earthworks implications outlined in **Table 9** are based on our preliminary CSM and assume sampling will be undertaken prior to works commencing.

An SMP will be prepared to support earthworks decision making, with stage-specific updates or addendums recommended so that controls can be adapted to the nature of contamination and type of works being undertaken.

Table 9: Earthworks implications

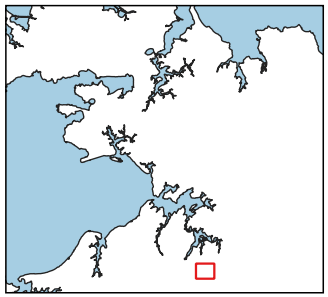
Consideration	Actions
Remediation requirements	Any remediation requirements are likely to be highly localised and managed in the enabling works phase of each development stage. With current landfill rates, the most economic solution is likely to be offsite disposal to a managed fill or landfill facility, although we acknowledge that this may change over the lifetime of the project. If more widespread contamination is encountered (considered unlikely), then there is expected to be sufficient scope to create containment/ encapsulation cells on site within landscaping areas or beneath building footprints (if geotechnically appropriate).
Soil disposal and re-use*	Cut-to-fill earthworks are highly likely to extend across most of the site area, although in a staged manner. While some isolated areas may require remediation and either encapsulation or offsite disposal, it is expected that the majority of the soils will remain on site. Specific soil management and/or disposal requirements will be determined via sampling at each stage of works.
Health and safety	There are unlikely to be significant health and safety risks as a result of ground contamination, with the possible exception of asbestos as described below. If localised areas of elevated contaminants are present, they are expected to be able to be readily managed via the SMP at the enabling works stage. If contamination is removed from site there will be no ongoing risk to future site workers or occupants. If contamination is retained onsite (e.g. encapsulated), appropriate management plans will need to be implemented. Unexpected contamination response procedures will provide health and safety requirements to ensure workers and the public are not exposed should more significant levels of contamination be uncovered.
Asbestos controls	Based on our experience of similar sites, it is expected that generally low levels of asbestos contamination may be present around the pre-1990s dwellings, the milking shed and the poultry sheds, commonly along with lead contamination from lead-based paints. Contaminant concentrations are typically at the "Unlicensed Asbestos Works" or "Asbestos-Related Works" levels, with Class B controls only occasionally being required. In any event the NZAG[4] provide established procedures for addressing all levels of asbestos contaminated soils. Actual concentrations will be determined via testing at each stage of works, but as an example, "Asbestos Related Works" require disposable overalls and nitrile gloves be worn, along with a disposable P2 dust mask. Water should be used to wet down surfaces being worked and basic decontamination facilities (boot wash and collection of used PPE) are appropriate.
Earthworks controls	Standard earthworks controls are expected to be appropriate for most earthworks with a focus on control of dust, sediment and water discharges. Additional targeted controls will be implemented via the SMP if soil sampling identifies elevated levels of contaminants. Ideally stormwater shall be allowed to soak to ground but treatment and disposal to stormwater should also be achievable, depending on the nature of the works proposed at each stage. Procedures for managing any unexpected contamination shall be implemented in the event any is uncovered. The SMP will set out this procedure.
** Re-use describes the contamination characteristics only, confirmation of geotechnical (and other) suitability may be required*	

[4] New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ, Nov 2017)

Map Title:
Consent Area Plan

Project:
Karaka PSI

Client:
Fisher & Paykel Healthcare Ltd



Legend

- Site Boundary
- Site Boundaries
- Plan change boundary
- No contamination consent required
- Contamination consent required

Drawn By:
Cherise Martin

Date:
07 May 2024

Data Provenance
Aerial Imagery derived from Land Information New Zealand

Layout & Project File
Figure 7 Consent areas

WILLIAMSON WATER & LAND ADVISORY

Figure 7

6. Conclusions

This PSI has been prepared according to industry standards, by a SQEP, to support the proposed Plan Change and Structure Plan update for the site at 300-458 Karaka Road by Fisher & Paykel Healthcare Ltd.

The site has a history of farming and rural production uses, including commercial glass house operations and an associated packhouse and transport yard since the 2000s. A former dairy farm is no longer operational in the west of the site, but poultry sheds remain.

Several potential sources of contamination have been identified, largely related to rural production activities. However, if contamination is present it is expected to be highly localised around each source and therefore unlikely to present a risk to the use of the land for broader commercial/ light industrial activities.

It is expected that future earthworks will be staged, and there will be sufficient scope in each stage to retain surplus soils on site for use in later stages. Hot spots of contamination (if any) are likely to be managed during enabling works for each stage, likely with disposal offsite if concentrations exceed applicable human health or environmental criteria.

In the event of future consent applications, it is expected that soil sampling (DSI) will be undertaken to inform a SMP and determine if remediation is required, and what controls should be in place to mitigate effects on site workers, the environment, and future occupants.

WILLIAMSON
WATER & LAND ADVISORY

Karaka Road, Drury

Site Management Plan (Ground Contamination)

FISHER & PAYKEL HEALTHCARE PROPERTIES LTD

WWLA0754 | Rev. 3

20 May 2024

Karaka Road, Drury

Project no:	WWLA0754
Document title:	Site Management Plan
Revision:	3
Date:	20 May 2024
Client name:	Fisher & Paykel Healthcare Properties Ltd
Project manager:	Wendi Williamson
Author(s):	Lauren Windross
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Document history and status

Rev	Date	Description	By	Review	Approved
1	18 April 2023	SMP to support plan change and structure plan change applications	Lauren Windross	Wendi Williamson	Wendi Williamson
2	5 September 2023	SMP to support plan change and structure plan change applications	Lauren Windross	Wendi Williamson	Wendi Williamson
3	20 May 2024	SMP to support plan change and structure plan change applications	Lauren Windross	Wendi Williamson	Wendi Williamson

Distribution of copies

Rev	Date issued	Issued to	Comments
1	18 April 2023	Fisher & Paykel Healthcare Properties Ltd, Barker & Associates	To support plan change and structure plan change applications
2	5 September 2023	Fisher & Paykel Healthcare Properties Ltd, Barker & Associates	Minor changes to reflect client comments
3	20 May 2024	Fisher & Paykel Healthcare Properties Ltd, Barker & Associates	Minor changes to reflect legal review comments

Contents

Appendices:

1. Introduction

Williamson Water & Land Advisory (WWLA) has prepared this Site Management Plan (SMP) to support Structure Plan and Plan Change applications for Fisher & Paykel Healthcare Properties Ltd's (FPH) proposed future development at Karaka Road, Drury (**Figure 1**).

This SMP will support the Plan Change application, but also inform contractors of their obligations during the development earthworks. A SMP Summary Checklist to assist contractors in complying with this document is provided in Appendix A. This report is intended to be a 'live document' and will be updated following site investigations to be undertaken in accordance with Section 3 of this SMP.

Figure 1. Location of the site (Image source: LINZ). Thick red outline indicates wider extent, thinner internal lines show individual property boundaries. The purple dashed line shows the Plan Change area to which this SMP applies.

1.1 Site identification

The site comprises five (5) titles as described in **Table 1**. This SMP applies only to the Plan Change area (purple outline on **Figure 1**), although the wider landholding is included in Figure 1 for completeness. The site is bound by Karaka Road in the north, the main railway line in the south, and Oira Stream to the west. A 'paper road' forms the southwest boundary.

Table 1. Site identification

Address (west to east)	Legal description (Plan Change area)	Certificate of Title	Area (m^2)
458 Karaka Road, Drury (part of)	Pt Lot 6 DP 14876, Pt Lot 3 DP 14876	NA889/168	~146,600
370 Karaka Road, Drury	Lot 4 DP 14876, Pt Lot 6 DP 14876	NA889/167	274,857
350 Karaka Road, Drury	Lot 1 DP 205837	NA134A/751	195,860
300 Karaka Road, Drury	LOT 1 DP 523765	834199	52,750
328 Karaka Road, Drury	LOT 2 DP 523765	834200	195,700
TOTAL Area			**~865,767 m^2**

1.2 Overview

FPH are proposing a Structure Plan (Structure Plan) and Private Plan Change (Plan Change) for land zoned Future Urban and Rural – Mixed Rural, located at 300, 328, 350, 370, & 458 Karaka Road, Drury (the site). The land is bound by State Highway 22 to the north, Oira Creek and a paper road to the west and the railway network of the North Island Main Trunk (NIMT) Line to the south.

This Structure Plan is proposed in replacement of the Drury-Opāheke Structure Plan for this part of Drury West and the Plan Change will involve rezoning the land from Future Urban to Business – Light Industry. This SMP applies only to the Plan Change area.

The purpose of the Structure Plan and Plan Change is to facilitate the future development of a research & development and manufacturing campus to support the growth and expansion of Fisher & Paykel Healthcare.

The site currently has a predominantly rural use, with some horticulture and associated distribution activities. Many of these activities will remain operational on the site in the early stages of the development, as land that is currently vacant (pasture) is targeted for the first stages.

This SMP supports a Plan Change application to demonstrate how contamination can be managed during future earthworks and ongoing occupation of the site. It is also intended to be flexible enough to support future resource consent applications under both the NESCS[1] and the AUP[2]. As there is currently no detailed site investigation (DSI) for the site, this SMP is intended to be updated on a stage-by-stage manner as investigations are progressed. Full details of the sites history and potential for ground contamination is provided in a preliminary site investigation (PSI) report by WWLA[3].

1.3 Objectives and scope of this plan

The objectives of this SMP are to:

- Outline further investigation requirements prior to works commencing;
- Provide procedures to guide contractors in materials management, reuse, disposal, health and safety and response to unexpected contamination encounters; and
- Support the plan change applications and future resource consent applications.

A summary of the sections of this SMP are provided below:

Sections 1 to 2	Supporting evidence used to inform the requirements of this SMP. The relevant information and conclusions from the contamination investigation completed for the site is summarised in these sections.
Section 3	Contains requirements for sampling prior to works commencing.
Section 4	Sets out remediation requirements, if a need for remediation is identified during soil sampling.

[1] National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health Regulation (2011).
[2] Auckland Unitary Plan – Operative in Part
[3] WWLA, 7 May 2023. *Karaka Road, Drury – Preliminary Site Investigation (Ground Contamination)*. Prepared for Fisher & Paykel Healthcare Ltd.

Section 5	General contamination-specific requirements for the contractor establishing the site and procedures prepared to ensure soils are handled, contained or disposed of appropriately and discharges to the environment are mitigated.
Section 6	Health and safety measures applicable to ground contamination are included to prevent effects on construction workers if contamination is found to be present.
Section 7	Monitoring requirements for the Contractor and suitably qualified environmental practitioner (SQEP) during works.
Section 8	Contingency measures are provided in the event that unexpected ground conditions are encountered, discharges occur and / or complaints are received during site works.
Section 9	Lists the information the contractor is required to provide at the end of the project to be included in a validation report.
Appendices	A **SMP Summary Checklist** is provided to assist Contractors with compliance with this document. It is intended to be updated after each sampling stage.

1.4 Legislative requirements

WWLA has prepared this SMP in accordance with requirements of the AUP, NESCS, NZAG[4], and MfE CLMG No.1[5]. The persons preparing and certifying this SMP are suitably qualified and experienced practitioners as defined in the NESCS Users Guide (2012).

1.5 Plan management and control

Contaminated land-related responsibilities during development of the site, including management, distribution and implementation of this plan are as set out in **Table 1**.

Table 1: Roles and responsibilities under this plan

Organisation	Role and responsibilities
Fisher & Paykel Healthcare Ltd	Land owner. - PCBU as defined in the Health and Safety at Work Act 2015 (Health and Safety Regulation).
Lead Contractor	Responsible for: - Distribution of this plan to sub-contractors and ensuring they understand their obligations under the plan; - Compliance with resource consent conditions; and - Implementation of this plan.
Contractor's Site Manager	Responsible for: - Liaising with the SQEP to ensure appropriate inspections are undertaken at the key times (refer **Sections 3 – 6** and Contractor Checklist, **Appendix A**); - Monitoring compliance with consent conditions; - Ensuring disposal of surplus materials is to an appropriate location; and - Monitoring earthworks controls.
Site Health and Safety Officer	Responsible for: - Ensuring adequacy of health and safety provisions during unexpected contamination encounters.
Subcontractors	Responsible for adhering to procedures and requirements of this plan.
Contaminated Land Specialist/ Suitably qualified environmental practitioner (SQEP) [WWLA]	Responsible for: - Post-demolition or -remediation contamination testing of soils; - Soil and water monitoring (if required); - Advice during the works; - Validation reporting.

[4] New Zealand Guidelines for Assessing and Managing Asbestos in Soil, BRANZ 2017
[5] Ministry for the Environment Contaminated Land Management Guideline No. 1 – Reporting on Contaminated Sites in New Zealand (updated 2021)

Organisation	Role and responsibilities
Auckland Council	Responsible for monitoring compliance with resource consent conditions.
Worksafe NZ	Responsible for overseeing compliance with the Health and Safety Regulations.

1.6 Users' guide

This SMP has been prepared to provide expected procedures for Contractors undertaking the works. This SMP will be updated at each stage of future works as soil investigations are completed.

While Contractors are expected to review the document in its entirety, a Checklist has been prepared to assist Contractors with compliance with this document. The checklist (**Appendix A**) provides the key actions required to comply with this SMP. A Suitably Qualified Environmental Practitioner (SQEP) will review the checklist with the Contractor at the establishment phase as indicated in **Section 4.1**.

Throughout this report, times when the SQEP is required to be consulted are highlighted for easy reference.

2. Site Description and Project Requirements

2.1 Site description and setting

A summary of key details of the site's layout, position and setting are summarised in **Table 2**.

Table 2: Environmental setting.

Topography	The topography of the site generally slopes gently to the west from a maximum elevation of approximately 30m RL. The slope steepens on the western boundary dropping to approximately 7m RL where the site is bordered by the Oira Creek. There are also some isolated steeper gullies in the northern portion of the site.
Existing site layout	The site is largely pasture with the following key features: - A large glasshouse operation is located on the southeast boundary of the site, with associated water storage, dangerous goods storage and staff amenities. - A transport depot and packhouse are located in the northeast corner of the site. Again these have associated dangerous goods storage, a truck workshop and offices. - Poultry sheds and a former dairy shed are located on the western side of the site. Other features in this area include an electrical transformer, an implement shed, a silage pit and effluent ponds. - Isolated dwellings across the site – predominantly on the roadside in the north and also near the glasshouses in the southeast.
Surrounding land use	Surrounding land use is rural or rural residential in all directions. The main truck south railway line is located on the southern boundary of the site.
Site history, historic features and land use	The site has been predominantly used for grazing/ farming throughout its recorded history with the dairy shed being pre-1981 and the poultry sheds dating from the 1990s. A glasshouse facility was developed for growing tomatoes and cucumbers in 2001, alongside a transport depot. Minor cut-to-fill earthworks has occurred across the site since the 1970s for construction of farm ponds and to facilitate the glasshouse works above.
Geology and hydrogeology	The published geology (**Figure 2**) shows that the site is located on alluvial deposits of the Puketoka Formation (predominantly fine-grained sands, silts and clays with some peat). Volcanic units of the South Auckland Volcanic Field (basalt, scoria, ash and lapilli) are located a short distance to the south of the site. Borehole data from the New Zealand Geotechnical Database (NZGD; www.nzgd.org.nz) shows that boreholes drilled within the site for water supply purposes encountered Puketoka Formation clay and silt with sandstone (Waitemata Group) encountered at depth (>30 m below ground level (BGL). Peat units were also intercepted (>20 m BGL) along with some surface fill (<2 m BGL). This is supported by geotechnical investigations undertaken in 2022[6]. No fill was identified as part of these investigations, but it was inferred that cut-to-fill had likely occurred in some valleys. Topsoil generally overlay South Auckland Volcanic and Puketoka Formation deposits, with isolated alluvium in gullies. Groundwater was measured at close to or greater than 5 m below ground in most investigation locations; this is expected to be perched groundwater with regional groundwater units at >30m depth.
Hydrology	The nearest natural surface water feature is the Oira Creek on the western boundary of the site. The Creek drains into the Manukau Harbour. Farm drains/ swales and ponds have been created in lower-lying areas of the site.
Significant receptors	The flora and fauna of the Oira Creek form the nearest sensitive ecological receptors to the site. Any contamination that is present also has potential to impact the Manukau Harbour via the creek. Surrounding properties are rural residential and may include young children or the elderly, as well as a high likelihood that produce is grown for home consumption. Therefore, residential occupants are considered sensitive receptors.

[6] CMW Geosciences, 13 July 2022. Geotechnical Assessment Report, 350 & 370 Karaka Road. Prepared for Dines Group Ltd

2.2 Ground disturbance related development works

The project is expected to involve the following general process at each stage:

1. Soil sampling will occur first to inform any remediation requirements (**Section 3**). In already developed areas of the site this will need to occur following demolition of structures and removal of hard standing.
2. Isolated remediation (if necessary) followed by stripping of topsoil (enabling works). It is expected that only contaminated soils will be taken offsite, with clean surplus topsoil retained for landscaping.
3. Re-contouring of the site to achieved desired levels (bulk earthworks). Again, it is expected that soils will be predominantly retained on site via cut-to-fill earthworks.
4. Building construction.

Soil-disturbance will occur during Phases 2 and 3 above. Management of contamination in soil and any unexpected discovery of contamination will be required during this period.

2.3 Soil management requirements

Soil management rationale	The PSI indicates that potentially contaminating activities have occurred on isolated portions of the site. Localised shallow contamination is likely to be associated with some of these activities, but concentrations are unlikely to present any significant risk to human health or the environment and can likely be managed through standard earthworks controls. A potential exception is if asbestos is identified in surface soils around older buildings, in which case there may be a requirement for specialist asbestos management. Investigations are proposed to inform each stage of works (refer **Section 3**). Following each stage of investigations, this SMP will be updated to reflect the findings of the investigation and the management strategies required. However, it is expected that the overall rationale will remain the same: minimisation of potential impacts on site workers during redevelopment, and for future workers at the site, and minimisation of discharges to the environment.
Soil management strategies	The objective of soil management strategies documented in this report is to protect site workers and future site users from the effects of contaminated soil, and minimise discharges to the environment, while achieving the best outcomes for the site in terms of programme and cost. The management strategy is as follows: • Complete soil sampling prior to each stage (**Section 3**) to update this SMP and inform soil management requirements. • Remediation activities in isolation to bulk earthworks to prevent cross-contamination of clean soils. • Standard earthworks controls and procedures during bulk earthworks, with focus on good practice soil management, appropriate disposal of surplus soil, minimising generation of potentially contaminated sediment-laden stormwater and prompt response and management of unexpected contamination. • Regular communication between FPH's project manager, the Contractor and the SQEP to ensure that contaminated soil is appropriately managed without delay to the programme. • Site closure reporting to satisfy Council requirements on completion of earthworks. Unexpected contamination contingency measures are included in this document in the event that materials are identified that require further action (**Section 7**). All key contractor requirements are summarised in the contractor checklist in **Appendix A**.
Remediation Strategies	**Remediation will be required for soils that exceed environmental discharge criteria or industrial/ commercial land use standards for assessing effects on people/ human health (considered high level contamination).** A range of remediation strategies are available to FPH, depending on the location, type and magnitude of the contamination present. **Table** sets out the most common remediation strategies used in New Zealand, with a discussion on the benefits and disadvantages of each, and the types of contamination they are most likely to be used on. *The SQEP will determine the best remediation strategy in conjunction with FPH following each sampling phase* (**Section 3**). In accordance with CLMG No.1, this will include consideration of the following: • The remediation objectives, both for the immediate project and in the long term.

	• Consent requirements. • Stakeholder views, including Te Ao Māori. • Exposure to site workers both during remediation and in the long term. • Practicality and onsite management considerations. • Sustainable remediation objectives. Note that methods of remediation other than those in **Table 3** (such as bioremediation and pyrolysis) may also be options for remediation in the future. These are not currently being used on a large-scale commercial basis in New Zealand, but there is potential for them to be at such a scale within the lifetime of this project.

Table 3. Remediation strategies

Strategy	Benefits	Disadvantages	Contamination types
Excavation and removal: Removal of the contaminated soil from site via mechanical means. For this project, this approach is most likely to be applied to asbestos contamination or high levels of hydrocarbon contamination from any fuel spills.	• Completely removes the contamination from the project area. • No further consideration for contamination required. • Project location is close to many potential tip sites.	• Costs of trucking and tip disposal fees. • Low value from a sustainability and Te Ao Maori perspective.	• Suitable for the bulk of the potential contamination sources.
Encapsulation: Contamination is contained below a layer of cleanfill material, or beneath a building or paving/ concrete (i.e. car park), or within a landscaped area. Encapsulation requires management of the cap to ensure it remains in good condition. Depending on the level of contamination, the contaminated material may also need to be above winter-high groundwater levels.	• Reduced offsite disposal costs in the case of asbestos. • Reduced trucking/ handling costs.	• Requires ongoing management and monitoring of the cap. • Not suitable for areas where a second stage of soil disturbance is likely to occur (i.e. should only be used where cap is likely to be maintained in the long term). • Not generally suitable for topsoil due to its instability in future land use scenarios from a geotechnical perspective (unless used in landscaping areas).	• Suitable for most contamination types. • Unlikely to be suitable for large areas of contaminated topsoil due to issues with geotechnical suitability.
Soil mixing: Soil mixing reduces contamination levels in soil by mixing it with clean soil. It is only suitable for silty and sandy materials (i.e. some types of topsoil) and is not effective with clays which do not mix well. Mixing is undertaken using an excavator to manually blend two stockpiles together, or to mix contaminated surface soils with clean underlying materials.	• Can be cost effective, particularly for small areas of contamination.	• Must be carefully designed to avoid resulting in a larger volume of soil with contamination levels exceeding the desired thresholds. • Not suitable for asbestos contamination or very high levels of contamination. • Requires particular soil types that will mix well together.	• Small areas of metal, pesticide or hydrocarbon contamination in topsoil or silty/ sandy soils. • Unlikely to be suitable for large areas of contaminated soil.

3. Investigation Requirements

This sampling section sets out a framework for sampling and an example sampling plan. Final sampling plans are to be determined by the SQEP as each stage of the works progresses.

3.1 Sampling

Sampling is expected to occur in a staged manner and the development progresses. As Revision 1 of this SMP is being written in the very early stages of development planning, we have provided a framework for sampling activities rather than specific sampling requirements (however, an example sampling plan for the area proposed is provided in **Figure 2**). These sampling requirements are designed to meet the currently operative legislative requirements set out in **Section 1.4**, although it is acknowledged that these may change over the 35-40 year lifespan of the project. As such, this section may need to be updated in the future to reflect new legislation and best practice techniques. The general sampling plan is set out in **Table 4**.

Table 4: Sampling requirements

Feature	Objective and rationale	No. of sampling locations	Contaminants tested
General site soils (no existing development)	General sampling across paddocks to inform soil reuse and disposal options, only if requested by receiving fill site. Sampling should include topsoil and underlying natural materials.	Sampling at a density of 1 sample per 1,000 m^3 that is proposed to be disturbed.	Metals (7; arsenic, cadmium, chromium, copper, lead, nickel and zinc).
Fill (if identified in geotechnical investigations)	As fill is expected to be site-won, sampling will be targeted to primarily inform soil reuse and disposal options.	Sampling at a density of 1 sample per 500 m^3 that is proposed to be disturbed.	Metals (7) and polycyclic aromatic hydrocarbons (PAH)
Pre-1990 dwellings and farm sheds	Inform potential human health risks from asbestos building materials (if present) and both human health and environmental risks from lead paint or other metals within building materials. Sampling is likely to be targeted, with composite sampling permitted in accordance with CLMG5[7] if the SQEP deems it an appropriate sampling technique.	Number of sampling locations to be determined by the SQEP based on the condition of the structures, the presence of surface coverings and the potential for additional contamination to be created via demolition activities.	Depending on the building materials, asbestos and metals should be considered (semi-quantitative testing for asbestos).
DG stores, fuel tanks, workshops, transformers, stormwater/ effluent ponds	Inform potential human health and environmental risks. For fuel tanks, sampling in accordance with the tank removal guidelines[8] and checklist[9]. This typically involves sampling on each of the four walls (number of samples dependant on the size of the tank) and sampling on the base of the tank pit following removal. Removal of SPH on a visual basis followed by validation sampling once the SQEP is satisfied that the excavation has been adequately remediated from a visual and odour perspective. For all other sources, targeted sampling techniques will be required, with composite sampling unlikely to be appropriate.	Number of sampling locations to be determined by the SQEP based on the potential contamination source.	Depending on the contamination source, testing may include metals, PAH, total petroleum hydrocarbons (TPH) and polychlorinated biphenyls (PCBs).

Soil sampling will be undertaken using either a trowel (for surface samples) or a hand auger or excavator by the SQEP, according to the following procedure:

[7] Contaminated Land Management Guidelines No.5, Site Investigation and Analysis of Soils, (MfE, revised 2021) (CLMG5)
[8] MfE, Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand.
[9] MfE, Contaminated Land Management Guidelines No.1, Reporting on Contaminated Sites In New Zealand (MfE, revised 2021) (CLMG1). Report form for the removal and replacement of petroleum underground storage tanks and underground equipment.

- Materials encountered will be logged in general accordance with the NZ Geotechnical Society "*Guidelines for the classification and field description of soils and rocks for engineering purposes*".
- Soil sampling will be in general accordance with the MfE's CLMG5, including:
  - Collection of samples using freshly gloved hands, directly from the excavated ground, and placement into laboratory supplied glass jars to avoid cross contamination between sample positions.
  - Decontamination of equipment (trowel) between sample locations using a phosphate-free detergent and freshwater rinses.
  - Couriering samples chilled, under chain of custody documentation, the same day they are collected.
- All samples will be sent to an IANZ accredited laboratory for testing.

No groundwater monitoring is proposed as contamination, if present, is likely to be at surface and therefore highly unlikely to impact groundwater at depth. If significant contamination is observed in fill within gullies then this will be reassessed by the SQEP and targeted groundwater monitoring can be undertaken.

Figure 2: Example sampling plan; actual sampling plan to be determined on a case-by-case basis by SQEP.

3.2 Evaluation criteria

The currently applicable evaluation criteria are set out below. We note that these are likely to change over the lifetime of the project, so should be updated to reflect the latest legislation at the time of each sampling event.

Table 5. Evaluation Criteria

Protection of Human Health	• NESCS SCS for commercial/ industrial use to inform potential effects on site workers. Recreational guidelines can be considered if the area is proposed to be part of a recreational or landscaped space (or soils are proposed to be moved to such a space) Where NESCS SCS values were not provided, guidance obtained from the following documents were used, as per MfE's "*Contaminated Land Management Guideline No. 2, Hierarchy and Application in New Zealand of Environmental Guideline Values* (Revised 2011)". • For asbestos, the New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ, 2017), all users criteria (and commercial/ industrial criteria for bonded ACM) to assess both effects on people and remediation requirements.
Discharges to the Environment	For discharges to the environment the Auckland Unitary Plan (AUP) Permitted Activity (PA) Soil Acceptance Criteria or where appropriate the criteria specified by Rule E30.6.1.4 of the AUP. Where contaminants are not listed in the Table E30.6.1.4.1, the hierarchy listed in AUP Chapter E30 has been adopted. We note that there is an intention to introduce a "National Standard" for ecological soil guideline values. These are currently in draft form and are referred to as the "Ecological Soil Guideline Values" [10]. They have already been considered by some Councils outside of Auckland and it is highly likely that they will be formally introduced during the lifetime of this project. We therefore propose that the Ecological Soil Guideline Values (for commercial/ industrial settings) are also considered (2016 is currently the most recent version, or replacement National Environmental Standard).
Soil Disposal	For soil disposal, published volcanic and non-volcanic background concentrations for Auckland described in TP153[11], non-volcanic are used as a basis for acceptance of soil to cleanfill sites. Background values are also considered when assessing the activity status of the NESCS for soil disturbance and removal. While Puketoka Formation sediments were mapped and recorded at the site, the volcanic influence on these sediments can be significant so the use of volcanic background values is warranted. Site-specific background values can also derived if necessary. This will be determined by the SQEP on a case-by-case basis.

3.3 Reporting requirements

The results of sampling for each stage of the investigation shall be reported in a form that is commensurate with a DSI as outlined in the NESCS Users Guide. The report shall be prepared, reviewed and authorised by a SQEP. Results shall be forwarded to AC prior to works commencing.

On completion of each stage of sampling, the **SMP Summary Checklist** will be prepared by the contaminated land specialist to reflect the confirmed contamination conditions. All checklists shall be provided to AC prior to works commencing for that stage. A SMP Summary Checklist template is provided in **Appendix A**.

[10] Landcare Research, 2016. User Guide: Background soil concentrations and soil guideline values for the protection of ecological receptors (Eco-SGVs) – Consultation Draft. https://envirolink.govt.nz/assets/Envirolink/R10-420User20Guide-Background20soil20concentrations20and20soil20guideline20values20for20the20protection20of20ecological20receptors.pdf

[11] Auckland Regional Council, Technical Publication 153 (TP153): Background concentrations of inorganic elements in soil from the Auckland Urban Region.

4. Remediation Requirements

The following procedures are provided in the event that remedial works are required prior to bulk earthworks occurring (i.e. high level contamination is present). This will be confirmed on completion of pre-works testing as per Section 3.

If no remediation is required, disregard this section.

The following considerations will be made during remediation planning, the:

1. Media involved; soil, groundwater, surface water, sediment;
2. Type of contaminant and the magnitude present (addressed in this section);
3. Remediation strategy (offsite disposal, encapsulation or soil mixing; **Section 4.4**).

While the remediation strategy may vary from works area to works area depending on the nature of the activity being undertaken, the controls required for each contaminant will be largely the same regardless of the remediation strategy. The SQEP, in conjunction with FPH, will determine the remediation strategy being used for each works area as per **Section 2.4.4**.

There are a range of contamination types that may need remediation throughout the life of this project. These can be categorised into; asbestos, hydrocarbons, and metals and other (non-hydrocarbon) organic compounds, and unexpected contamination. A summary of each of these is outlined below, along with a reference to which controls need to be implemented. *The SQEP will confirm the controls are applicable to the level of contamination present* prior to remedial works commencing.

Table 6. Guide to remediation types and controls required

Remediation type	Description	Controls required
Asbestos remediation	Asbestos fibres or bulk asbestos identified in soils. This is most likely to be required around older farm buildings or dwellings, or if farm dumps are encountered. *Note: Does not relate to asbestos on buildings themselves, only soil. Asbestos in buildings is addressed under separate legislation and is not within the scope of this report.*	Site Establishment: **Section 4.1** Asbestos remediation: **Section 4.2**
Hydrocarbon remediation	May occur in isolated areas around workshops or fuel storage facilities. Unlikely to be widespread.	Site Establishment: **Section 4.1** Hydrocarbon remediation: **Section 4.3**
General soils remediation	Includes contamination associated with general pesticide/ drench use, metals contamination around dwellings or operational areas. Only required when contamination levels exceed the evaluation criteria in **Section 3.2**.	Site Establishment: **Section 4.1** General soils remediation: **Section 4.4**
Unexpected contamination	Contamination which is identified during bulk earthworks are requires remediation before bulk earthworks can recommence in the impacted area.	**Section 8**.

The control tables are set out below. The SMP Summary Checklist (**Appendix A**) will be completed by the SQEP prior to each stage of works commencing and will specify what controls are applicable to that stage.

4.1 Site establishment for remediation

Site establishment is applicable to all remediation types.

Table 7. Site Establishment for remediation

1. Notify Council	Advise Auckland Council five (5) days prior to the commencement of works.
2. Permits	Obtain permits if contaminated soil is to be taken offsite (*the SQEP will provide a Soil Disposal Certificate to aid this process*). Establish a tracking system for soil being relocated within the site. Notify disposal destinations of expected dates of disposal.
3. Signage and fencing	The remediation area shall be separately fenced and only site workers essential to the specific tasks being undertaken shall be admitted. The hazard board shall be specified to the contamination present and remediation method being used.
4. Induction	Site workers shall complete an induction specific to the contamination being remediated. Induction topics are addressed in each of the remediation control tables below.
5. Erosion and sediment control	Depending on the works being undertaken, separate erosion and sediment control may be required for the remediation area. This is to ensure contamination does not migrate over uncontaminated parts of the site. This will be determined on a case-by-case basis as it will be largely dependent on the nature of the contamination, the remediation method, and the surrounding site status.

4.2 Asbestos remediation

Asbestos-in-soils controls are defined in the NZ Asbestos Guidelines. There are several classes of works depending on the concentration of asbestos in the soil and its potential to generate airborne asbestos.

Where asbestos-in-soils are identified a *SQEP shall be engaged to define the level of control and requirements under the NZ Asbestos Guidelines and Asbestos Regulations*. A summary of the works controls under each risk level is summarised in **Table 8**. Tables 6 and 7 of the NZ Asbestos Guidelines are provided in **Appendix B** and define in full the controls that are required.

For health and safety requirements, also refer to the controls in **Section 6**.

Table 8. Asbestos remediation: Summary of asbestos works categorisation and controls required

Works category	Definition	Worksafe notification required?	Licensed removalist required?	Supervision level	Air monitoring required?	PPE required	Key controls
Unlicensed Works	For soils with ≤0.001% w/w AF/FA and/or ≤0.01% w/w bonded ACM	No	No	SQEP	No	No asbestos specific PPE is required.	Standard earthworks controls as per **Section 6.2**.
Asbestos-Related Works	For soils with >0.001% w/w AF/FA and/or 0.01% w/w bonded ACM	No	No	SQEP	No	No asbestos specific PPE is required but a P2 dust mask is recommended.	Standard earthworks controls as per **Section 6.2** with additional vigilance regarding dust emissions.

Works category	Definition	Worksafe notification required?	Licensed removalist required?	Supervision level	Air monitoring required?	PPE required	Key controls
Class B Works	For soils with >0.01% w/w AF/FA and/or 1% w/w bonded ACM	Yes	Yes	SQEP meeting competency under Regulation 41(3) Asbestos Regulations	Recommended	Half face P3 mask and disposable overalls and boot covers. Decontamination tent needed.	Dust mitigation including application of polymers/ surfactants to soil prior to excavation.
Class A Works	For soils with >1% w/w AF/FA (friable)	Yes	Yes	SQEP meeting competency under Regulation 41(3) Asbestos Regulations	Yes	Full face P3 mask and disposable overalls and boot covers. Decontamination tent needed.	Dust mitigation including application of polymers/ surfactants to soil prior to excavation.

Following remediation works, *the SQEP shall validate the excavated area* on a 5x5 m grid basis. The remediation/ evaluation criteria are as set out in **Section 3.2**. Sampling shall be undertaken as per the asbestos sampling procedure set out in **Section 3.1**.

4.3 Hydrocarbon remediation

Hydrocarbon remediation is likely to be limited in extent and magnitude of contamination given that only small volumes of fuels have been stored within the site.

Table 9 includes procedures for other types of hydrocarbon remediation, including management of separate phase hydrocarbons (SPH) and management of odours and vapours.

Table 93. Controls for hydrocarbon remediation

1. Soil disposal and reuse	• Soil sampling (**Section 3**) will determine if soils can be reused on site from a contamination perspective or require specific offsite disposal. • Odours may restrict the locations in which soil can be disposed. • All trucks removing soil from site shall be loaded within the area of erosion and sediment controls and submit tracking documentation so that the volumes of soil disposed of at each disposal site are recorded for validation reporting (**Section 9**).
2. Stockpiling	Stockpiling of material containing odours shall not take place. These materials shall be removed directly offsite to a licensed disposal facility. The only exception is temporary stockpiling (less than 1 day) to accumulate sufficient material for offsite transport. The following procedures shall be applied during temporary stockpiling: • Where possible stockpiles shall be placed within excavations to avoid the potential for rainfall induced runoff. • For stockpiles formed on ground surface, the following controls shall be in place: - Stockpiles shall be placed within a designated area as defined on the ESCP. - Stockpiles shall be bunded to control runoff of surface water falling on them. - Stockpiles should be covered when not being worked. There shall be no stockpiling of materials containing separate phase hydrocarbons (SPH; free product). These materials shall be either immediately replaced or disposed from site.
3. Dust controls	Dust control measures shall comply with the Good Practice Guide for Assessing and Managing Dust, Ministry for the Environment (2016). To avoid dust generation, should dry conditions prevail, and to mitigate against dust created by vehicular movement, the following control system shall be put in place:

	• Frequent spraying of water to ensure the working surfaces remain damp. • Dampening of the loaded material once placed on the truck, where tarps are not used. • Use of a water truck or portable water sprays in trafficked areas to dampen dust.
4. Separate phase hydrocarbon (SPH) management	Based on the site infrastructure there is minimal potential for SPH, but it cannot be ruled out. The key issues during the disturbance or removal of soils containing SPH are: 1. Development of hazardous atmospheres, particularly within excavations/ voids; 2. Odour generation; and 3. Soil handling, transport and disposal management. Given the nature of fuel storage within the site, the volume of soils with SPH (if any) is expected to be very small. However, the odour created from even a small volume can be significant, so care is required. Procedures for odorous materials are outlined below.
5. Water management	Rainwater gathering in excavations may be managed through soakage to ground as per the procedures in **Section 5.2**. If hydrocarbon sheens are visible, then an oil-water separator may need to be introduced to the system to remove hydrocarbons prior to discharge. Significant hydrocarbon content will require disposal to an offsite licenced liquid waste facility.
6. Health and safety	Workers may be exposed to vapours that can commonly bring on headaches and nausea. The following should be followed when remediating hydrocarbon-impacted soils: • Workers shall be aware of the potential risks and be confident to cease works as soon as there is any sign of a headache or nausea. • Half-face respirators with organic cartridges shall be provided if required. • Excavations shall be kept open and able to naturally vent periodically when being worked. • No worker shall enter an excavation that is impacted by hydrocarbons without the appropriate confined-spaces training and procedures. These will be advised separately on a case-by-case basis. • Monitoring for odours and vapours shall be carried out as per **Tables 9** and **10** at all times during hydrocarbon remediation works. If the trigger levels in **Tables 9** or **10** are exceeded, works shall cease immediately, and the excavation be allowed to vent. Works shall only resume when concentrations have decreased to save levels. Refer to **Section 8.4** for further controls.
7. Odorous materials procedure	The following procedures shall be implemented to minimise odour/vapour effects to workers and surrounding properties during disturbance and disposal of soils impacted by hydrocarbon contamination: • Monitoring weather conditions including wind direction and wind speed on-site. • Minimising works during early mornings and late evening periods when the wind speed is expected to be lowest. • Minimising the generation of odour and vapour by maintaining minimal open areas. This will include reducing the volume of material being excavated during wind conditions that have a greater potential for odour effects (e.g. specific wind directions, low wind speeds, early morning during warming conditions). • Application of dust/vapour/odour suppression measures such as: - Use of water sprays; and/or - Use of deodorisers delivered via demisting sprays around the excavation plant if water sprays are insufficient. Air Repair FS Gold odour suppressants (or equivalent) will be used conservatively assuming a dosing rate of 100:1. • Ongoing monitoring of vapour by the contractor, with recording of the odour in accordance with the levels shown in **Table 11**. If the works reach the 'Very Strong' level, works shall cease and controls shall be reviewed with the objective of reducing the odour back to safe working levels. Works will not recommence until odours are sufficiently reduced. If an odour is detected at the site boundary, the contingency measures in **Section 8.4.1** shall be implemented.
8. Hydrocarbon monitoring	The Contractor or *SQEP shall undertake monitoring using a portable PID and Multi-gas meter* during remediation. The trigger levels at which stop-works procedures should be implemented are set out in **Table 10** below and contingency procedures are set out in **Section 8.4.2**. The Contractor shall also undertake ongoing boundary monitoring to ensure that during the remediation works:

	1. No discharges from any activity on site shall give rise to visible emissions, other than water vapour, to an extent which is noxious, dangerous, offensive or objectionable. 2. Beyond the boundary of the site, there shall be no hazardous air pollutant, caused by discharges from the site that causes, or is likely to cause, adverse effects on human health, environment or property. 3. There is no discharge of hydrocarbons to any stormwater system or water body. This can be undertaken by regular boundary checks (walking around the perimeter of the remediation area), with the use of monitoring devices such as a PID or LEL meter if odours/ vapours are suspected.
9. Personal decontamination	All personnel involved in ground disturbance activities associated with hydrocarbon contamination must be decontaminated before leaving the site. Decontamination facilities shall comprise, as a minimum: 1. Facilities for storing and changing PPE. 2. Boot wash facilities. 3. A hand and face wash facility. 4. Bins for disposal of contaminated gloves and other consumables. All personnel need to complete the personal decontamination procedures whenever they stop work, i.e. for meal breaks, toilet breaks etc. Decontamination shall be undertaken immediately in the event of any body parts coming in direct contact with any soil and/or groundwater. Personnel decontamination shall comprise: 1. Rinsing and/or scrubbing of boots, gloves and other PPE to remove dirt and dust residues. 2. Removal of all PPE with disposable items such as gloves and dust mask (if worn) placed in a plastic bag or drum for waste collection. 3. Thorough washing of hands and face with soap and water. All waste materials shall be considered as contaminated and disposed appropriately.
10. Vehicle decontamination	For machinery that is used for remediation (e.g. excavators, rollers, stabilising equipment) decontamination shall comprise washing prior to leaving the site. Washing shall be undertaken within the area of erosion and sediment controls. Successful decontamination of all machinery/equipment used for soil disturbance of material shall be confirmed by visual assessment *undertaken by the SQEP* prior to the machinery/equipment leaving site.
11. Validation sampling	*The SQEP shall collect validation samples* in the areas where remediation has been undertaken. The density of sampling will depend on the size of the remediation, but generally a 10 m grid is sufficient, reduced to a 5 m grid for small areas. A minimum of two validation samples will be collected per remediation area. Validation sampling shall be as per the sampling methodologies set out in **Section 3.1** with the remediation criteria set out in **Section 3.2**.

Table 10. Air monitoring trigger values

Vapour	Action level	Measure with
Explosive gases	10 % LEL[1] 0 % LEL for hot works/ mechanical activities (piling, excavation)[3]	Multi-gas meter
CO2	0.5 %[2]	Multi-gas meter
O2	>19.5 %[2]	Multi-gas meter
H2S	10 ppm[2]	Multi-gas meter
VOCs	5 ppm[4]	PID

Notes:

1 AS/NZS 60079.10.:2009 Part 10.1: Classification of areas – Explosive gas atmospheres.

2. Worksafe Exposure Standard TWA.

3. Any hot works at or below ground level shall only be carried out when no combustible gases are detected. As defined by WorkSafe New Zealand, hot works includes welding, thermal or oxygen cutting, heating, including fire-producing or spark-producing operations that may increase the risk of fire or explosion.

4. Only a limited number of compounds have New Zealand Workplace Exposure Standards (WES) lower than 5 ppm and it is unlikely that these compounds will be present in sufficient quantities to exceed their individual WES. 5 ppm has therefore been adopted as a practical screening level to avoid false positives associated with weather effects and instrument drift.

Table 11. Odour intensity evaluation descriptions

Very strong	Offensive odour that is unable to be tolerated. May cause headaches. Strong, clearly recognised type of odour and may be uncomfortable. Works shall cease and passive or active treatment provided (**Section 8.4.2**).
Moderate	The type of odour is easily recognised but not uncomfortable
Slight	May be difficult to identify the type of odour
Very slight	The type of odour not able to be discerned nor is the source
Not detected	No measurable odour

4.4 General soils remediation

Generally speaking, general soil remediation can be undertaken with standard earthworks controls and procedures, but with additional focus on minimising the potential for discharges from site (i.e. stormwater runoff, dust generation), and a focus on worker safety (refer **Section 6**). Key points to note are:

Table 12. General soils remediation controls

1. Key Controls	• Site establishment, with the remediation area fenced off from the remainder of site, and with appropriate erosion and sediment controls, will be the key controls to prevent discharges of contaminated runoff onto clean ground, and protect site works. • Ideal works conditions are when the ground is slightly damp to prevent dust generation, but not so wet that runoff is created. Use of misting/ water sprays should be used to achieve these conditions where possible. • Works should be avoided in heavy rain or wind.
2. Stockpiling	• Stockpiling should be avoided, if possible, with contaminated soil loaded directly into trucks if offsite disposal is occurring. If contaminated soil requires stockpiling, it shall be: - Within the area of dedicated erosion and sediment control. - On an impermeable surface (or tarpaulin) if practical. - Covered with tarpaulins/ polythene, anchored at the edges outside working hours and during periods of heavy rain.
3. SQEP involvement	*The SQEP shall make regular site visits during remediation works* to observe that the appropriate controls are in place and collect validation samples as required. Validation sampling is not always necessary for general soils remediation, depending on the nature of the initial soil investigation.
4. Validation sampling	If validation sampling is required, it shall generally be on a 15x15 m grid. *Validation sampling shall be undertaken by the SQEP* in accordance with the methodology in **Section 3.1**. The evaluation criteria are set out in **Section 3.2**.

5. Bulk Earthworks

The following procedures apply to bulk earthworks, following any remediation activities (if required). Confirmation that remediation has been achieved and bulk earthworks can proceed must be obtained by the SQEP prior to this section being implemented.

5.1 Site Establishment

The contractor shall implement the following in addition to the Contractor's standard establishment works.

Table 13: Site establishment

Notify Auckland Council	Advise Council five (5) days prior to the commencement of ground disturbance works or as per the conditions of consent regarding notification of works.
Permits	Obtain permits for disposal of surplus soil and water discharge to stormwater/ trade waste (if required). Notify disposal destinations of expected disposal dates.
Signage and hazard board	Placed at the site entrance, the signage and hazard board shall include summary information on site works and notification processes for unexpected contaminated soil encounters, including health and safety actions.
Induction	Site workers shall complete a contaminated land briefing prior to commencing works. *The briefing shall be led by the SQEP,* i.e. WWLA (subsequent inductions may be by the Site Manager) and shall cover: • Spoil management to minimised discharges to the environment; • Material disposal constraints and reuse opportunities; and • Procedures for responding to unexpected contamination.
Erosion and sediment control	Implement site specific ESCP. Implement daily erosion and sediment control checks as per **Section 5.2, Table 14(4).**

5.2 Soil disturbance controls and procedures

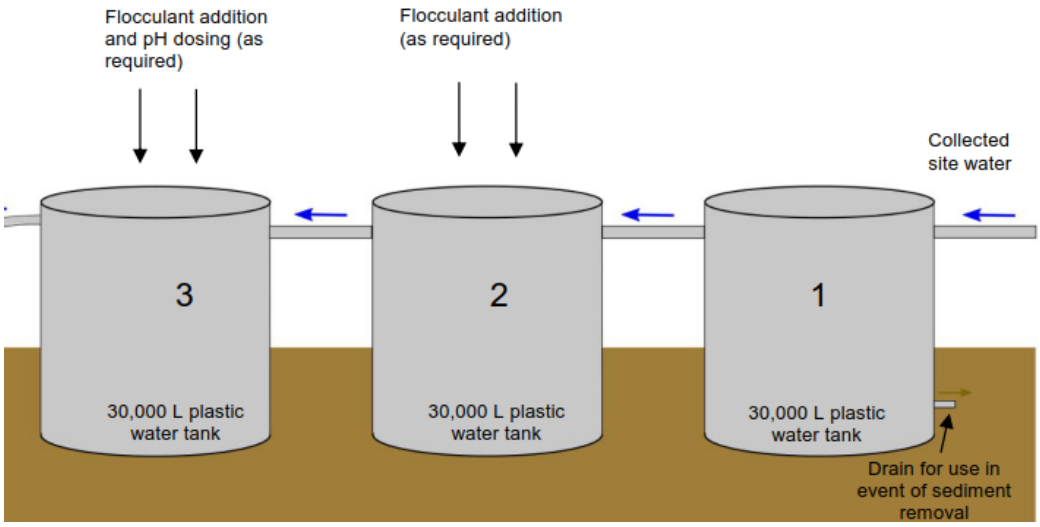
The procedures in this section are standard earthworks practices with the exception of disposal requirements.

The SMP Summary Checklist sets out the key actions for the Contractor (**Appendix A**).

Table 14: Soil disturbance controls and procedures

1. General materials handling, excavation and transportation procedures	The following shall be adhered to during excavation and offsite transportation of excavated material: • Project-relevant earthworks controls shall be in place during excavation. • Trucks transporting surplus soil offsite shall be loaded within the site where runoff and possible spills during loading shall be controlled and contained. • Any materials defined as suitable for cleanfill should be targeted where possible for offsite disposal as opposed to those that exceed background, to ensure cost efficiencies. • Trucks shall have their wheels maintained clean of debris and there shall be no tracking of material onto roads or footpaths. • All disposal dockets shall be retained, with weighbridge summaries *provided to the SQEP for closure reporting* as per **Section 9.**
2. Soil disposal and reuse	Soil sampling proposed in **Section 3.1** will inform soil disposal and reuse options. Based on the PSI, it is expected that most soils will be suitable for reuse from a contamination perspective and will only require offsite disposal if there is a human health or environmental exceedance. If there is surplus soil relative to site needs, clean soils shall be targeted for offsite disposal to minimise disposal costs.
3. Imported materials procedure	Any material imported to the site shall originate from: • A site which has been *determined by a SQEP* to have had no known history of potentially contaminating activities, as detailed on the HAIL.

	• A site which has been adequately *investigated by a SQEP*, in accordance with CLMG.5 to meet the 'Cleanfill material' definition as prescribed in the Auckland Unitary Plan (Operative in Part). This shall include: - Sampling at a rate of 1 sample for every 1,000 m^3; - Testing for metals and PAH, depending on the land use at the material's source, testing for OCPs and asbestos content may also be required; and - It is preferable that the fill is tested at its source prior to its use at the site. However, if not, then the Contractor shall stockpile the fill on site until test results are available. • Hardfill imported for backfill, if sourced directly from a quarry or supplier, does not require testing. • *Contact the SQEP should there be any uncertainty about the certification of imported materials*. • A weighbridge or load count summary of imported materials shall be provided to the SQEP on completion of works.
4. Management of erosion and sediment controls	Erosion and sediment controls installed as per the ESCP and shall be managed as follows: • Any operating stormwater drains onsite shall be covered by filter cloth to avoid the discharge of water that has come into contact with soil. • Vehicles shall be inspected prior to leaving the works area and wheels brushed/cleaned as required to avoid the potential for sediment to leave the site on vehicle tyres and enter the stormwater system. • Soil disturbance work in heavy rain shall be avoided. • The site shall be kept clean of debris and stockpiles unless necessary. • Erosion and sediment controls shall be checked regularly and made sure that are in good working condition. To ensure good practice: - The entry/exit point shall be reapplied with aggregate, or in the case of a pavement entrance, cleaned if excessive sediment build-up occurs. - Erosion and sediment control measures shall be upgraded/ modified where necessary. - Sediment fences will be replaced if the fabric is ripped or otherwise damaged. They shall be retrenched if needed. - The weather conditions along with the performance of the erosion and sediment control measures shall be monitored. Erosion and sediment control measures shall remain in place until surface reinstatement is established.
5. Dust controls	Dust control measures shall comply with the *Good Practice Guide for Assessing and Managing Dust*, Ministry for the Environment (2016). To avoid dust generation, should dry conditions prevail, and to mitigate against dust created by vehicular movement, the following control system shall be put in place: • Frequent spraying of water to ensure the working surfaces remain damp. • Dampening of the loaded material once placed on the truck, where tarps are not used. • Use of a water truck or portable water sprays in trafficked areas to dampen dust.
6. Stockpiling procedures	Standard procedures shall apply for stockpiling unless contamination is present. Controls in **Table 12(2)** shall be implemented. As a minimum, stockpiles shall be placed within a designated area defined on the ESCP.
7. Water management	Rainwater gathering in excavations may be managed through soakage to ground. Water that cannot be managed by soakage will require treatment prior to discharge to stormwater or trade waste. The need for a tradewaste permit for disposal of potentially contaminated surface water during contaminated soil removal will need to be made early as permits can take 20 days from Watercare Services. *The SQEP shall be contacted if water requires discharge or disposal offsite*. A typical treatment method (applicable for both stormwater and tradewaste pre-treatment) is shown in the schematic below and includes collection of pumped stormwater (in tanks, 2 minimum), settlement and flocculant addition to enhance settlement if required. pH dosing may also be required where concrete (generating high pH) may be present. Alternatively, a licenced liquid waste contractor can be engaged to remove water from the site for disposal (but this is expected to be an expensive option). Dewatering to be observed by the contractor on twice daily basis during working hours to ensure sediment removal is adequate. Water will require testing by the SQEP to ensure stormwater discharge levels (as per the AUP) can be met otherwise discharge to tradewaste (only via a permit) would be required/ or tankered offsite.



Schematic: Suggested water treatment is required prior to discharge to reticulated stormwater system

6. Health and Safety

6.1 Overview

Health and safety management for the works is informed by:

4. The site Hazard Register. Available in the site office and attached to the daily contractor and visitor sign-in book.
5. The Site-Specific Health and Safety Plan (SSSP) for the site including an Emergency Plan, Training and Induction Plan, Incident and Accident Reporting Form and the aforementioned Hazard Register. Attached to the daily contractor and visitor sign in book.
6. Contractor works-specific SSSPs. These documents are produced by the contractor, including any Safe Works Method Statements (SWMS) specific to their activities.
7. The Contamination-specific requirements related to asbestos and hydrocarbon remediation are included in **Section 4**. For the remainder of works, standard good hygiene practice is the best defence for health and safety with regards to contamination. Works areas should be separated from break areas, and all workers shall wash their hands and faces before eating, drinking or smoking. Used PPE shall be disposed of appropriately.

6.2 Induction and training

All contractors and visitors to the site shall be inducted as per **Section 4.1**. Contractors' workers shall be appropriately trained and qualified in their area of work. Proficiency confirmation is the responsibility of the lead Contractor.

The following general safety procedures shall be followed by construction staff and visitors:

1) Any incidents shall be reported to the HSO;
2) Site workers shall avoid unnecessary contact with unexpected contamination and shall generally avoid handling known or suspected contaminated soil or water;
3) No person to enter and work on the site alone; and
4) Workers to be provided with appropriate training on hazards and reporting on any issues or discomfort experienced.

7. Monitoring

The following applies to general soils remediation and bulk earthworks following remediation. The requirements for monitoring vapour and odour during hydrocarbon remediation is set out in **Section 4.3**. Requirements for monitoring during asbestos remediation are set out in **Section 4.2**.

Table 15. Monitoring requirements

Contractor obligations	The Contractor is responsible for general site monitoring and maintaining records to confirm monitoring was carried out. We recommend this is via a daily log form. Monitoring includes for erosion and sediment controls, dust controls, noise and odour discharges from site. The Contractor shall ensure that during the works: 1) No discharges from any activity on site shall give rise to visible emissions, other than water vapour, to an extent which is noxious, dangerous, offensive or objectionable. 2) Beyond the boundary of the site, there shall be no hazardous air pollutant, caused by discharges from the site that causes, or is likely to cause, adverse effects on human health, environment or property. 3) There is no discharge of hydrocarbons to the stormwater system or surrounding receiving environments.
Contaminated Land Specialist obligations	*The SQEP shall visit the site on a regular basis* to confirm the procedures in this SMP are being following and to respond to issues of unexpected contamination. *The SQEP shall maintain site visit records of each visit* for including in the site validation report (SVR) outlined in **Section 9**. *The SQEP will also assist in monitoring* as described in **Section 4.2** and **4.3** for asbestos and hydrocarbon remediation.

8. Contingency Measures

Contingency measures are provided in the event that unexpected ground conditions are encountered, discharges occur and/ or complaints related to contamination are received during site works. The following sections set out the triggers for contingency measures to be implemented, who is responsible for implementing them, and the emergency and complaints procedures for the site.

8.1 Contingency Triggers

Unexpected contamination, complaints or an uncontrolled discharge will trigger implementation of contingency measures. Key identifiers for *unexpected contamination* that will trigger these measures include (refer images below in **Table 16**):

- Bulk asbestos fibres and/ or building products.
- Odours such as hydrocarbons or solvents.
- Discoloured soil such as black, blue or green staining, or any staining that appears out of the ordinary.
- Underground structures such as fuel tanks. Tanks could arise from the use of fuel for boilers to heat the buildings, although none were noted during the inspection.
- Fill materials – generally visibly different from natural ground and potentially identifiable via the presence of buried topsoil, refuse and/or brick/ concrete/ timber/ pipe fragments.

Uncontrolled discharges are any discharge of soil, water, sediment, or hydrocarbons/ chemicals from the site that is unexpected and not able to be controlled/ retained by standard erosion and sediment control measures.

Table 16: Unexpected contamination identifiers

	
Odours/sheen such as hydrocarbons or solvents.	**Asbestos fibres and/or building products.**
	
Discoloured soil such as black, blue or green staining.	**Underground structures such as fuel tanks/drums, or other buried waste.**

Fill materials.

Fill materials.

8.2 Contingency Responsibilities

Mitigation measures must be applied in accordance with the hierarchy of control described in the Health and Safety in Employment Act (2015) – Eliminate, Isolate, Minimise.

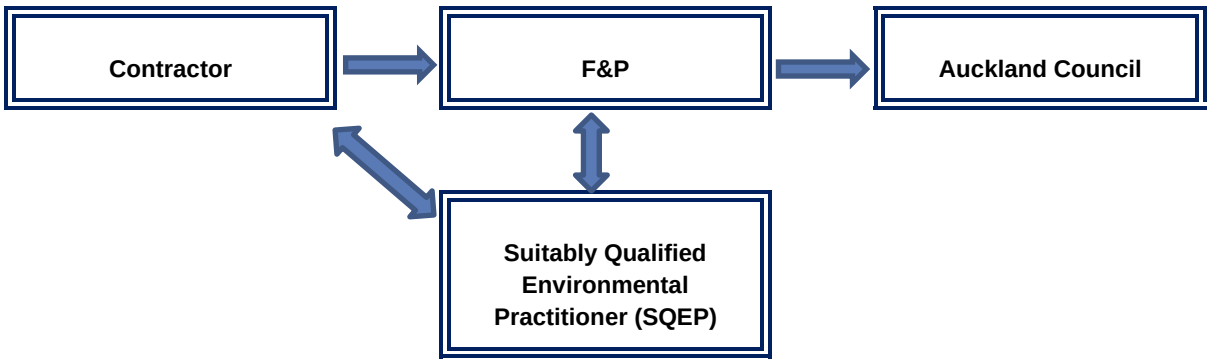
Responsibility for identifying the need for contingency measures, commencing the notification process and enacting onsite measures lies with the Contractor. The Contractor shall:

a) Apply the notification process outlined below.

b) Notify OGNZL and the SQEP immediately in the event that any unexpected contamination is identified or, contingency measures are required to be implemented.

c) Waikato Regional Council and Hauraki District Council shall be notified by OGNZL (or the SQEP if formally delegated) in writing within 24 hours of contingency measures being implemented.

d) Worksafe NZ may need to be notified, depending on the nature of contamination or possible exposure by workers. *The SQEP shall make the decision whether or not Worksafe notification is required*. If asbestos is identified then Worksafe notification is mandatory.



8.3 Unexpected Contamination Procedure

In the event that unexpected contamination is identified as illustrated in **Section 8.1**, the following shall be implemented by the Contractor:

STOP WORK (in the immediate area)	• Remove all unnecessary site staff from the immediate area of unexpected contamination.
ISOLATE	• Install temporary fencing, taping, or cones to identify the area.
NOTIFY	• Advise the OGNZL Site Manager. • *Liaise with the SQEP*. • Update the site hazard board to warn workers and visitors.
REVIEW CONTROLS	• The SQEP shall review controls with the Site Manager and determine any external notification requirement. • The Contractor shall implement additional controls if required. These may include contingency mitigation controls.
ASBESTOS	• If ACM is observed P2 dust masks shall be provided to all works required to enter the isolated area. • The level of control shall be reviewed by the SQEP. This shall include inspection and review of the works. • Additional testing may be required, and this shall be undertaken in accordance with the NZ Asbestos Guidelines. • If the above assessment indicates that it is possible that asbestos in soil will be encountered at concentrations exceeding the relevant standards, an Asbestos Removal Control Plan shall be prepared to support removal of the materials. In this event a Licensed Asbestos Removal Supervisor shall be engaged.

8.4 Emergency Response

Should an incident occur on site which may result in any uncontrolled or unauthorised discharges (water, soil, vapour, hydrocarbons etc.), the Contractor's site supervisor will take control of the situation and coordinate the efforts of all on site to minimise the impact. *The SQEP shall be notified and inspect the discharges and advise on mitigation*.

In the unlikely event that sustained uncontrolled discharges occur from the site, emergency response and evacuation procedures, including provisions for notifying and managing neighbouring site users, shall be implemented.

The emergency response and evacuation procedures shall be specified in the project specific health and safety plan.

8.4.1 Odour discharges

The following hierarchy of actions is proposed in the event that odour discharges occur from the works (very strong level in **Table 10**):

- Increase wetting of the exposed materials by use of water carts or hosing etc.
- Automated suppression systems may need to be implemented.
- Minimise the open areas of excavations as much as practicable, including whenever possible covering or temporarily backfilling excavations when not excavating.

If these measures do not address odour discharges the works, in the area of the discharges, shall be suspended, if possible the exposed soils covered, and *the SQEP consulted to define alternative mitigation measures.* These may include:

1. The use of automated suppression systems such as rotary atomisers or spray line systems with and suitable, approved, odour suppressants.
2. Observation of the odours around the works by a person whose nose has been tested in accordance with the AS/NZS 4323.3:2001, Stationary Source Emissions – Determination of Odour Concentration by Dynamic Olfactometry.

8.4.2 Air monitoring triggers exceeded

The following hierarchy of actions shall be implemented if air monitoring triggers (**Table 9**) are exceeded:

CEASE WORKS (in the immediate area)	- Switch off all mechanical and electrical equipment. - Evacuate the immediate area and, assuming discharges are not extending beyond the site boundary, allow the area to ventilate for at least 15 minutes, then resample. - If conditions fall and remain below the required level works can be recommenced, otherwise additional mitigation measures shall be implemented. - If discharges are impinging on the site boundary additional control measures, as described in the following sections, shall be implemented immediately
VENTILATE	- Increase ventilation to the area using ducted fans or other additional mechanical ventilation. The effect of discharges from these systems on other receptors must be considered before implementation.
PPE review	- Half mask respirators with organic filter cartridges maybe provided to protect personnel from elevated vapour concentrations. - This method should only be considered after other engineering controls (for example ventilation) have been implemented. The use of respirators requires documented procedures to demonstrate that appropriate training, fit testing, inspection and maintenance, including the frequency of cartridge changes, are implemented appropriately.
TESTING (if required)	- Additional testing may be required including use of compound specific detector tubes (e.g. Gastec) to confirm the contaminants of concern and associated concentrations with revision of vapour monitoring and action levels to reflect these. .

8.4.3 Water discharges

If the quality of water being discharged from the site cannot meet the standards required for discharge to stormwater (as per **Section 5.2**) the following shall be employed:

1. Improving effluent quality through additional treatment.
2. Reducing the quantity being generated, through for example reducing the excavation area or improving the casing seal in pile holes.
3. Collection (for example by tanker trucks) for treatment at the site's Water Treatment Plant or offsite disposal to an appropriately licensed facility.

The *SQEP will be consulted to assist with defining appropriate control measures* if the standards required for discharge to stormwater cannot be met.

8.5 Complaints Procedure

The hazard board shall include a 24-hour emergency contact number for the project. Any complaints received via a contractor shall as soon as practicable be notified to the OGNZL Company Liaison Officer to investigate and report. The Company Liaison Officer shall maintain and keep a complaint register for any complaints received from any member of the community. As a minimum, the register shall record, where this information is available, the following:

- The date, time, and details of the incident that has resulted in a complaint,
- The location of the complainant when the incident was detected,
- The possible cause of the incident,
- Any corrective action taken by the consent holder in response to the complaint, including timing of that corrective action; and
- Communication with the complainant in response to the complaint.

The complaints register shall be made available to Council on request or as otherwise specified in specific land use or resource.

9. Closure Reporting

9.1 Site validation report

Upon completion of each stage of works a Site Validation Report (SVR) shall be prepared confirming the works were undertaken according to this SMP, unexpected contamination encounters (if any) and any remedial measures implemented. If asbestos was found to be present in soil the report shall confirm asbestos clearance. Preparation of the SVR shall also be in accordance with the conditions of the consents anticipated to be granted for each stage of the development.

If no remediation is undertaken, then a simpler Works Completion Report (WCR) can be prepared instead of an SVR.

The following information is required from the Contractor for inclusion in the SVR/ WCR:

- Copies of weigh bridge summaries for the disposal destination of any surplus soil or water generated during the redevelopment works;
- Documentation confirming the source, where necessary testing data, and weighbridge summaries or load counts from the source of certified imported clean materials
- Records of visits by Council representatives that relate to ground contamination;
- Details of any contamination-related complaints and actions in response to these;
- Details of any contamination-related health and safety incident and how they were resolved;
- Details of unexpected contamination encounters/events and the action taken; and
- Any contingency actions implemented.

The Contractor shall provide the *required information to the SQEP* within one month of completion of groundworks.

The SVR shall be submitted to Auckland Council and shall be prepared to generally comply with CLMG1.

9.2 Long term monitoring plan

If residual contamination remains onsite post development at concentrations exceeding AUP discharge criteria or NESCS soil contaminant standards for commercial/ industrial use, the SQEP shall prepare a LTMP in accordance with CLMG1.

The LTMP shall include as a minimum:

- A summary of the contaminated soil remaining on the site, including the soil validation results in the context of effects on site occupants, and location of contaminated soil on the site.
- An asbestos management plan for asbestos remaining on site (if required) prepared in accordance with the Health and Safety at Work (Asbestos) Regulations (2016) if asbestos remains on the site.
- Appropriate management measures for the site cover, and for future ground disturbing work.

The LTMP shall be prepared within 3 months of ground works completion.

Appendix A. SMP Summary Checklist

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Karaka Road, Drury: Site Management Plan Summary Checklist *[Template]*

Site ID:	*[insert name and address]*
Overview: Fisher & Paykel Healthcare (FPH) proposes a new campus in an area of Future Urban and Rural – Mixed Rural zoned land at Karaka Road, Drury. The land is located immediately south of State Highway 22 and north of the North Island Main Trunk Railway Line. The site will be redeveloped over three main stages with many sub-stages possible. The scale of works may vary significantly in each area, with minor soil scrapes and relevelling required in some places in contrast to demolition of existing structures and bulk earthworks elsewhere. *[Update to reflect specific works being undertaken with this Checklist].* A site management plan[1] ("SMP") for ground contamination was submitted in support of the Structure Plan Change and Plan Change applications and will also support future resource consent applications. **This SMP Summary Checklist provides the controls and procedures specific to the particular stage/ area of works being undertaken.** This SMP Summary Checklist is a template that must be completed for each stage/ area of works to reflect the site-specific soil testing undertaken by the SQEP. The SQEP shall submit this SMP Checklist to Auckland Council for their records prior to works commencing.	
Previous contamination investigations:	A preliminary[2] site investigation was undertaken by WWLA in 2023. This identified a number of HAIL activities across the site. A detailed site investigation was then completed for the *[site name]* specific area. The results of this showed: • *HAIL activities investigated* • *Summary of result findings* • *Remediation requirements*
HAIL Activities:	*[update for specific area]*
Remediation required?	Yes / No *[circle one]* If Yes, Sections of SMP that apply: *[reference sections and highlight specific controls if necessary]*
FPH will be responsible for overseeing the implementation of this SMP Checklist, although the primary day-to-day responsibility will sit with the lead contractor *[insert contractor name].* Where input is required by a SQEP (i.e. WWLA), it is *highlighted* below.	
Briefed by (SQEP):……. ……	Date: ……
Understood by (Contractor's Site Manager):……..	Date: ……

Task	Description	Check
Remediation *[delete if not required]*	• Establish remediation-specific site establishment controls as per **Section 4.1**.	☐
	• *Insert asbestos remediation controls (**Section 4.2**) if required including:* - *Class of asbestos works.* - *Requirements for licensed removalists and/or Worksafe NZ notification.* - *Requirements for supervision, PPE and key controls.*	☐
	• *Insert hydrocarbon remediation controls (**Section 4.3**) if required including:* - *Health and safety requirements.* - *Monitoring requirements (odour/ vapour).* - *Stockpiling controls.* - *Separate phase hydrocarbon management.* - *Odour and vapour management.*	☐
	• *Insert general soils remediation controls (**Section 4.4**) if required including:* - *Stockpiling controls.* - *Restriction of work in heavy rain or wind.* - *Monitoring requirements.*	☐
	• *Contact SQEP* to undertake validation sampling as per **Section 4.5** of the SMP, on completion of the works, to enable bulk earthworks to proceed.	☐

[1] WWLA, 7 May 2024. Karaka Road, Drury – Interim Site Management Plan (Ground Contamination) prepared for Fisher & Paykel Healthcare Ltd. Ref. WWLA0745, Rev 3.
[2] WWLA, 7 May 2024. Karaka Road, Drury – Preliminary Site Investigation (Ground Contamination). Prepared for Fisher & Paykel Healthcare Ltd. WWLA0745, Rev 3.

Task	Description	Check
Site Establishment (SMP Section 5.1)	• If no remediation is required, or following validation sample and clearance from the SQEP, establish general earthworks controls for bulk earthworks as per **Section 5** of the SMP and the relevant erosion and sediment control plan ("ESCP") for the stage/ area.	☐
	• Arrange disposal permits before any soil leaves the site. *If in doubt about disposal requirements contact the SQEP.* *[Is soil suitable for reuse on site? Yes / No]* *If No, specify where soil should be disposed of to (i.e. asbestos contaminated soil to licensed landfill).*	☐
	• Induct any new workers or subcontractors to the requirements of the SMP as works progress. *The initial induction shall be led by the SQEP*, i.e. WWLA (subsequent inductions may be by the Site Manager) and shall cover: - Spoil management to minimise discharges to the environment. - Material disposal constraints and reuse opportunities. - Procedures for responding to unexpected contamination.	☐
General Earthworks Requirements (SMP Section 5.2 and Section 7)	• Maintain the approved erosion, sediment, and surface water controls until an erosion-free surface is reinstated. • The focus should be on containment of sediment-laden runoff, and clean-water diversion, to minimise runoff potential.	☐
	• The Site Manager shall undertake daily inspections to ensure compliance with the **Section 5** and ESCP procedures and controls.	
	• The following dust management practices shall be implemented as per **Section 5**: - Avoidance of work in windy conditions if ground conditions are dry. - Water can be used lightly as a dust suppressant. - Use of gravel on entrance ways and haul roads. - Ensuring stockpiles are covered when not being worked, and trucks transporting soil have covers. - Filter fabric may be used on site fencing to further reduce dust if necessary.	☐
	• Keep records of disposal volumes and destinations for inclusion in the works completion report ("WCR") or site validation report ("SVR").	☐
	• Ensure any imported materials are clean. *Materials not sourced from a quarry must be verified by the SQEP prior to arrival on site*.	☐
	• No water is to discharge to surrounding sites or stormwater without prior testing, and if necessary, approval by Auckland Council. Water may discharge to ground within the works area. *Contact the SQEP to undertake testing if necessary.*	☐
	• Undertake regular monitoring of all of the above controls as per **Section 7**.	☐
Health and Safety Requirements (SMP Section 6)	• There should be a focus on good hygiene – wearing gloves if directly contacting soil, washing hands before eating/drinking, and avoiding eating/drinking in works areas. • *[Additional H&S requirements for remediation are to be set out in the remediation section above].*	☐
Unexpected Contamination response (SMP Section 8)	• *Liaise with the SQEP should any unexpected contamination be identified* and implement mitigation measures advised by the SQEP. Signs of soil contamination may include: – Odorous materials (i.e. hydrocarbons, solvent odour). – Discoloured soil (green, black, blue). – Asbestos cement board fragments. – Refuse, putrescible or demolition materials.	☐
	• If unexpected contamination is encountered, or a discharge occurs, the following steps must be taken by the Contractor: – Cease works in the immediate vicinity of the suspected contamination and tape or cone off. – *Notify the project manager/client representative and the SQEP.* – Implement any additional contaminated land-related health and safety procedures and PPE if deemed necessary by the SQEP. – Update the Hazard Board to direct site workers should continued exclusion of the area be required. – Implement and maintain any additional controls required by the SQEP to manage contamination.	☐

Task	Description	Check
	• If asbestos is identified, requirements of the Health and Safety at Work (Asbestos) Regulations 2016 must be followed. *The SQEP shall provide direction* and if required, a licensed asbestos contractor engaged.	
	• Notify Auckland Council *via the SQEP* within 24 hours of implementing any contamination mitigation measures.	☐
Contamination indicator examples	 **Odours/sheen such as hydrocarbons or solvents.**	
	 **Asbestos fibres and/or building products.**	
	 **Discoloured soil such as black, blue or green staining.**	
	 **Underground structures such as fuel tanks, drums, pits.**	
	 **Unexpected fill materials (different from those already known to be present on the site).**	
	 **Unexpected fill materials (different from those already known to be present on the site).**	
Post Works (*Provide to SQEP* to prepare works completion/ site validation report)	• Weighbridge summary of all materials disposed from and introduced to site (including soil and water).	☐
	• Details of any health and safety or environmental incidents related to contaminated land (if any).	☐
	• Details of mitigation measures implemented (if any).	☐
	• Details of visits by Council representatives.	☐
	The SQEP shall prepare a site validation report within one month of earthworks completion, detailing the results of validation sampling (refer above), the post-works information provided by contractor(s) (above), and general compliance with this SMP and relevant resource consent conditions.	☐

Appendix B. Asbestos-in-Soils Controls

Scenario	PPE	Respiratory protective equipment (RPE)*	Dust/asbestos fibre suppression	Decontamination facilities
Class A: friable >1% w/w FA and/ or AF in soil	Disposable coveralls rated type 5, category 3, nitrile gloves, steel toe capped gumboots or safety footwear with disposable overshoes.	Full-face P3 respirator with particulate filter. Consider increasing to power-assisted if required.	Water and asbestos-encapsulating polymer emulsion product applied before starting work and during as required. Consider adding a surfactant to water for amphibole fibres (brown and blue).	Basic disposable wet decontamination tent or trailer. Consider powered and plumbed decontamination unit if project scale warrants.
Class B: non-friable >0.01% w/w FA and/or AF in soil >1% w/w ACM		Half-face P3 respirator with particulate filter. Consider increasing to full-face if friable ACM present.		Basic disposable decontamination tent and foot wash.
Asbestos-related work >0.001% w/w FA and/or AF in soil >0.01% w/w ACM		Disposable P2 dust mask.	Water via localised points. Addition of surfactants and polymers where the location is sensitive (such as adjacent to busy centres, schools). Temporary cover of contaminated area awaiting remediation.	
Unlicensed asbestos work ≤0.001% w/w FA and/or AF in soil ≤0.01% w/w ACM	No asbestos-specific PPE if air monitoring confirms asbestos below 0.01 f/ml.	No asbestos-specific RPE if SQEP confirms unlikely to exceed trace levels in air monitoring (0.01 f/ml) and/or if air monitoring confirms asbestos below 0.01 f/ml.		Foot wash and used PPE collection area.

*Refer to Part C section 14 of the ACOP and AS/NZS 1715:2009 for more information on RPE selection.

Table 6. Primary mitigation control requirements for work involving asbestos.

Scenario	Vehicle assessment before demobilisation from site	Vehicle assessment completed by	Vehicle (truck) protection	Truck/excavator air conditioning
Class A: friable >1% w/w FA and/or AF in soil	Visual plus swab samples, air sampling should be undertaken inside the cab.	Independent assessor or independent competent person.*	200 µm heavy-gauge polythene wrapped soil/lined trays and truck covered.	HEPA filter system fitted for all occupied vehicles, filter replaced or clean down with HEPA vacuum cleaner post work.
Class B: non-friable >0.01% w/w FA and/or AF in soil >1% w/w ACM	Visual (plus swab samples if friable ACM is elsewhere on site – lagging, insulation, etc).	Independent assessor or independent competent person.*		HEPA filter system fitted for all occupied vehicles where friable ACM on site (lagging, insulation, etc).
Asbestos-related work >0.001% w/w FA and/or AF in soil >0.01% w/w ACM	Visual assessment.	Competent person or SQEP.	Truck lining/soil wrapping depends on the receiving landfill. All trucks should be covered.	Standard air conditioning.
Unlicensed asbestos work ≤0.001% w/w FA and/or AF in soil ≤0.01% w/w ACM				

*An independent competent person must meet the requirements of regulation 41(3) under the Asbestos Regulations.

Table 7. Vehicle decontamination requirements.