

GORDONTON RETIREMENT VILLAGE PRELIMINARY SITE INVESTIGATION

**57 Piako Road
Gordonton**

BARKER AND ASSOCIATES LTD
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EXECUTIVE SUMMARY

GWE Consulting Engineers (GWE) have been engaged by Barker and Associates Ltd (the Clients) to undertake a Preliminary Site Investigation (PSI) for the property located at 57 Piako Road, Gordonton (the site). This PSI was completed to support the proposed development of a retirement village (refer Appendix A for concept plans) in gaining a resource consent under the Resource Management (National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS, 2011).

The site at 57 Piako Road has been an operating dairy farm, including farm buildings and three residences, from between 1963 and 2023 when the site was retired from dairy grazing and used for maize production. The client proposes to change the land use of the site, remove all the buildings and undertake extensive soil disturbance to convert the site to a retirement village complex.

GWE have undertaken a PSI commensurate with the requirements of the NESCS and Contaminated Land Management Guidelines (CLMG) that has identified that the site is the location of a number of verified potentially contaminating 'HAIL' activities associated with its historic use. A number of unverified but suspected activities that may cause localised contaminated soil and water risks have also been identified.

Consequently, the NESCS applies to the site and any subdivision, change in land use or soil disturbance at the site will trigger the requirement of the NESCS for further investigations, soil and water contact and disturbance risk mitigation, and consent.

Evidence suggests that the buildings on site are likely to contain asbestos and lead-based paints that must be identified and managed appropriately prior to demolition to prevent on site contamination during building removal.

The Conceptual Site Model (CSM) of contaminant risks indicates that the dominant currently known risks appear isolated to the top 0.5m of soil across the site, except for buried structures at site associated with the former effluent pond and the residential septic tanks and disposal fields. The risks associated with the septic tanks and disposal fields is regarded as minor, while the risk associated with the effluent pond is currently unknown.

A currently unknown Acid Sulphate Soils (ASS) risk exists at site predominantly associated with the shallow water table organic soils in the northern half of the site. While this risk may cause other contaminant risks to arise when dewatered and oxidised, the primary risk is for in-ground infrastructure of concrete and steel that may be eroded by ongoing acidic pH conditions caused during construction. The acidification and oxidation of ASS in this area may also result in acidic conditions in the off-site drain from this area that may result in an off-site discharge of mobilised contaminants.

The GWE developed CSM has identified that there is potentially a risk to development workers and future site users based on the identified potential contaminating activities at site. Unless a Detailed Site Investigation (DSI) is completed a consent can only be granted as a Discretionary Activity under the NESCS. It is highly likely that a discretionary consent would require a DSI prior to any earthworks at site.

1 INTRODUCTION

GWE Consulting Engineers (GWE) have been engaged by Barker and Associates Ltd (the Client) to undertake a Preliminary Site Investigation (PSI) for the property located at 57 Piako Road, Gordonton (the site). This PSI was completed to support the proposed development of a retirement village at the site identified in Figure 1 below. The site is highlighted in blue with the Gordonton settlement to the west.



Figure 1: Site Location (identified in blue)

Source: google earth pro via 2024 Airbus

1.1 Proposed Development

Concept plans provided to GWE by the client, indicates that the site will be developed into a retirement village with a central community facility including high needs care accommodation, dining and recreational facilities. Clustered bungalows will be located across the site linked by roadways, cycle ways and footpaths. Water management areas and stock grazing areas will be scattered through the village as indicated in Figure 2 below.



Figure 2 Concept Development Plan

Source: B&A Urban & Environmental Concept Development Plan, Feb 2023 Rev A

It is understood that this plan may not represent the final development. The concept development plans brief has been included in Appendix A.

1.2 Purpose

The purpose of this report is to:

- Assess whether there has been (or there is more likely than not to have been) a potentially contaminating activity at site that appear on the Ministry for the Environment (MfE) Hazardous Activities and Industries List (HAIL) (MfE, 2021);
- Assess the likelihood of adverse impacts on the site from HAIL activities at or within 100m of the site;
- Identify nature and source of probable contaminants;
- Identify locations of possible contamination;
- Develop a conceptual site model (CSM) of exposure pathways to identify areas of potential concern relevant to the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS, 2011) (if any), in the context of the proposed development; and
- Provide relevant recommendations as required to support the proposed development.

1.3 Scope of Works

The following scope of works was completed in the development of this PSI:

- Review of available desktop study information including:
 - Information available via WRC online maps¹
 - Available geological mapping from GNS science² at a 1:250k scale
 - Historical and current aerial photography from Retrolens³ and Google Earth/Google Maps.
 - Waikato Regional Council online HAIL report⁴.
 - Waikato District Council Property file.
- Interview with the current site operator.
- A visual inspection and walkover of the site.
- Provision of findings.

1.4 Report Certification

This PSI meets the requirements of the NESCS because it has been:

- a. Undertaken and managed by a person meeting the competency skills, knowledge and experience requirements of a Suitably Qualified and Experienced Practitioner (SQEP) defined by the User's Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (User's Guide) (MfE, 2012);
- b. Reported on with regard to the current edition of the MfE Contaminated Land Management Guidelines No. 1 – Reporting on Contaminated Sites in New Zealand (MfE, 2021); and
- c. The report has been reviewed and approved by a person meeting the competency skills, knowledge and experience requirements of a SQEP defined by the User's Guide.

Evidence of the qualifications and experience of the SQEPs who have done this investigation and approved this report are available on request from GWE.

¹ <https://waikatomaps.waikatoregion.govt.nz/Gallery/>

² <https://data.gns.cri.nz/geology/>

³ <https://retrolens.co.nz/>

⁴ <https://waikatoregion.govt.nz/services/regional-services/waste-hazardous-substances-and-contaminated-sites/contaminated-sites/hail-report/>

2 SITE DESCRIPTION

2.1 Site Details

A summary of the site identification details, retrieved from WRC Maps in June 2024, is presented in Table 1.

Table 1: Site Identification

ATTRIBUTE	DETAILS
Street Address	57 Piako Road, Gordonton
Legal Description	Lot 2 DP 481700, Lot 4 DP 328606
Title Number	676234
Site Area	675,523 m ²
Zoning	Rural (w)

Source: Waikato district council via waikatodc.spatial.t1cloud.com/gis/maps

2.2 Site Description

2.2.1 General

The site is a 6.75 hectare (ha) farm that was until c. 2022/2023 a dairy farm. It has recently been converted over to maize production. The site has a residential lot and farm buildings accessed from Piako Road identified (via Google Street View) as street address 35 Piako Road. There are a further two residential lots, potentially 57 and 57a Piako Road, also accessed from Piako Road. The farm and residential buildings at 35 Piako Road and both residential lots at 57 Piako Road appear on the same title LOT DP 481700.

- 35 Piako Road residential buildings, drive and immediate lawns cover an area of approx. 1,300 m².
- 57 Piako Road (west) residential buildings, drive and gardens cover an area of approx. 3,930 m².
- 57 Piako Road (east) residential buildings, ancillary buildings, drive and immediate lawns cover an area of 5,400 m².

Much of the site, 6.64 Ha (c. 98%), is productive land, associated buildings and farm access tracks. The western area of the site has interconnected farm drains discharging water west of site towards the Komakorau Stream which follows the western site boundary. The drains appear channelised. The northern part of the site discharges to a field drainage system exiting site to the north. The drains appear channelised.

2.2.2 35 Piako Road

The residential buildings at 35 Piako appear to include a house, an attached garage with extension and a standalone garage. There is a very limited garden area around the buildings c 40 m².

The main farm building complex, covering an area of approx. 16, 900 m², is accessed from this property. The farm complex consists of the following:

- A milking shed located near Piako Road
- A feed lot/pens to the north of the milking shed, concrete floored used for storing farm machinery at the time of writhing this report.
- A fertiliser bunker located to the northwest of the feed lot covered with a retractable roof. The bunker has a concrete floor and surrounding accessway.
- A three-bay shed located to the north of the feed lots,
- A domed shed to the west of the three-bay shed is adjacent to which are three plastic water tanks.
- A three-sided shed west of the domed shed which opens out to the paddocks to the north.
- Two large silage silos west and south of the cluster of sheds.
- A small house with separate garage east of the milking shed.

2.2.3 57 Piako Road

Two residential dwellings and grounds are accessed from 57 Piako Road roughly central to the site. The more westerly dwelling has an attached garage and a surrounding ornamental garden. A large shed is located between the two dwellings with various other smaller sheds placed around the area.

2.3 Surrounding Land Use

Th site is located within a predominantly rural area used for dairy stock grazing and maize cropping. A summary of surrounding land use is provided in Table 2.

Table 2 Summary of Surrounding Land Use

DIRECTION	SURROUNDING LAND USE
North	The north of site is predominantly surrounding by grazing and maize cropping land. The Gordonton School is located to the northwestern corner of the site.
East	The east of the site is predominantly surrounded by grazing land
South	Piako Road is located to the south of site beyond which is grazing land with some rural residential land use.
West	The Gordonton township is located immediately to the west of site

3 ENVIRONMENTAL SETTING

3.1 Topography

The review of the site topography on WRC online maps identified that the majority of the site is relatively flat and located at an elevation of between 28m and 30m above mean sea level (amsl (relative level (RL))). The western areas around the milking shed are located an elevation of between 29m and 30m RL which falls to an elevation of 23m RL on a lower lying level area adjacent to the Komakorau Stream along the western site boundary. A topographic plan has been presented in Appendix B.

3.2 Geology

The review of geology on the GNS science website at a 1:250k scale identified that the site is underlain by two separate geological units:

- The northeast of the site underlain by Holocene Swamp deposits consisting of soft dark brown to black organic mud, muddy peat and woody peat with minor over bank sand, silt and mud; and
- The centre and west/southwest of site is underlain by late Pleistocene river deposits consisting of cross-bedded pumice sand, silt and gravel with interbedded peat.

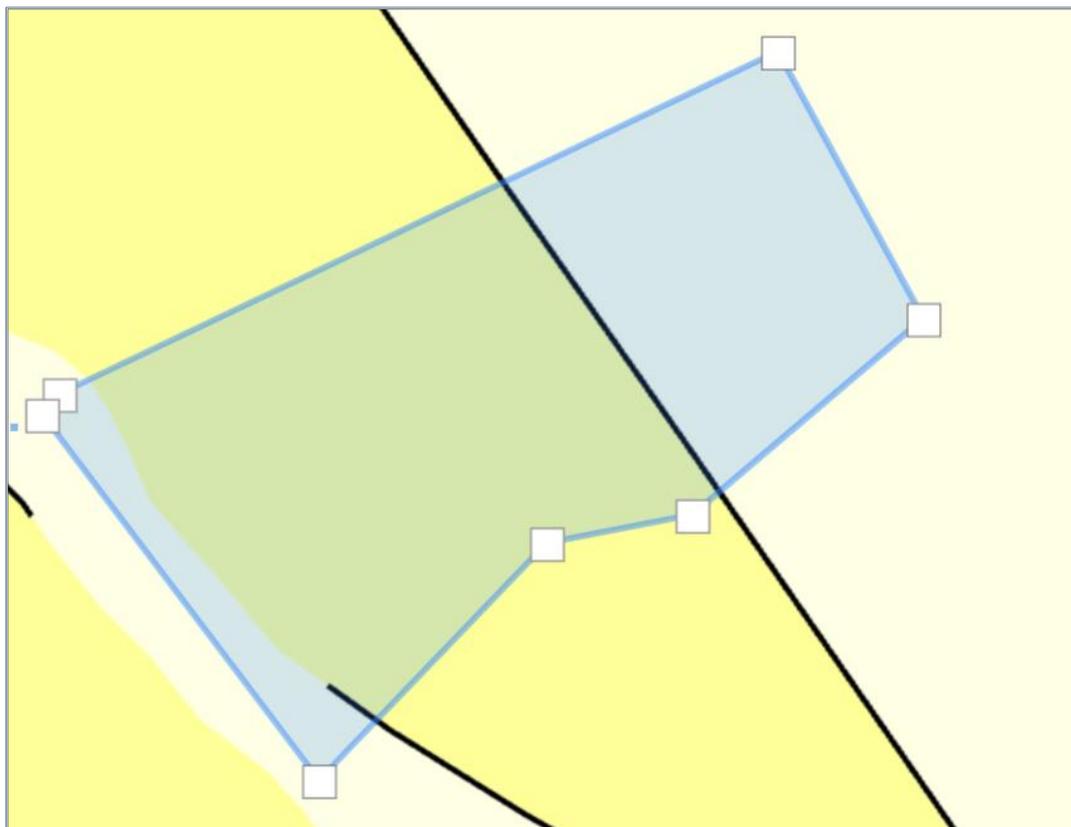


Figure 3:Geological Maps

Source: GNS science data.gns.cri.nz

3.3 Soil

The review of soil type on the WRC online maps indicate that the site has three distinct soil types:

- South and west of the westernmost dwelling at 57 Piako Road, is characterised as Sandy Loam of the Horotiu series, well drained, with a low Farm Dairy Effluent (FDE) risk;
- North and east of the westernmost dwelling at 57 Piako Road is characterised as Te Rapa peaty silt loam, and
- In the upper northeast as peaty loam of the Kaipaki series. This, and the previous Te Rapa, part of the site is noted by WRC as poorly drained with a High FDE risk.

A soil plan has been presented in Appendix B.

3.4 Bore Search

A review of Wells Aotearoa⁵ indicated the following bores on or within 100m of the site.

Table 3: Bore Search Summary

ADDRESS	BORE ID	STATUS	TYPE	DEPTH	STATIC LEVEL
35 Piako Rd	72_6475	Existing	Well	5.00m	N/A
	72_6476	Existing	Well	5.00m	N/A
	72-6477	Existing	Well	5.00m	N/A
	72-6478	Existing	Well	5.00m	N/A
Gordonton School, 50 Woodlands Road	69_912	Existing	Well	11.0m	4.52m
	72_9932	Existing	Well	6.10m	N/A

Notes: N/A – not available or not published

3.5 Consent Search

A review of the WRC online maps consents overlay indicated no active or recorded historic consents within 100m of the site.

3.6 Hydrology

3.6.1 Surface Water

The WRC online flood assets map indicates one drainage feature on the northwestern part of the site that drains off site to the north.

The Komakorau Stream is located along the southwestern site boundary. Farm drains from the western part of the site likely drain towards the Komakorau, while drains in the northeastern part of the site likely drain to the feature identified on the WRC maps.

⁵ <https://wellsnz.teurukahika.nz/>

Surface water flows are then expected to drain in two dominant directions from the northeastern and southwestern parts of the site to local surface features.

A water classification plan has been appended in Appendix B.

3.6.2 Groundwater

Bore consents within the wider Gordonton area⁶ record bores advanced to between 3.0m and 12m below ground level; bores onsite are advanced to 5.0m. Depth to static water level at Gordonton School (refer Section 3.4 above) was noted at 4.52m below ground level (bgl). The address at 11B Piako Road within 200m of the northern part of the site has two installed bores with a static water level recorded at 2m bgl in both bores.

The depth to water at Gordonton School is likely as a result of the well-drained soil type in that area; conversely the static water level at 111B Piako is likely due to the poorly drained soil type in that area.

This indicates there is a variable shallow aquifer approximately 1.5 m to 2 m bgl in the poorly drained northeastern part of the site and a better drained aquifer at 5 m bgl in the southwestern part of the site.

Drainage features indicate that groundwater flow is expected to drain generally north and west towards the Komakorau and the wider Hamilton basin, noting that small scale local variation may apply due to changes in permeability of underlying soils/geology.

4 HISTORICAL INFORMATION REVIEW

4.1 Aerial Photography

A review of available historical aerial photography is presented in Table 3, with referenced photographs provided in Appendix C.

Table 4: Summary of Aerial Photography

YEAR	SITE
1948	The site is cleared of vegetation and used for stock grazing with several farm sheds dotted about the wider property. Piako Road has been constructed. A dwelling has been constructed on the southeast of the site roughly equivalent to current 21 Piako Road. There is a dwelling at the current 57 Piako Road access.
1963	A milking shed, with connecting access tracks, has been constructed to the north of 21 Piako Road, commensurate with the current milking shed location at 35 Piako Road.
1974	Additional farm buildings have been constructed at 35 Piako Road, and a new shed at 57 Piako Road. The access road to the milking shed has been redirected to Piako Road direct and not through 35 Piako Road. Earthworks are occurring in the southwestern part of the site in a gully feature which appears to be a dam.
1979	The gully dam has been constructed and the upstream area has backfilled with ponded water. The earthworks associated with the pond appear to be locally to the southwest. A farm shed has appeared in the northeastern part of the site at the end of a farm track.

⁶ <https://wellsnz.teurukahika.nz/>

YEAR	SITE
1991	The gully dam and pond are no longer clearly visible.
1995	There is a L-shaped artefact in the location of the gully dam – purpose unknown.
2009	<p>There is exposed soil cover in the area of the former gully dam and a number of trees have been removed. The central farm area at 35 Piako has been expanded significantly with exposed soil and evidence of silage/hay bunkers in the central site, similar to current layout.</p> <p>The residential dwelling at 35 Piako Road (understood from the property file (see section 4.3 below) to have been relocated from 57 Piako Road) and the westernmost dwelling at 57 Piako Road have been placed/constructed.</p>
2013	The effluent pond is being constructed in the central portion of the site at 35 Piako Road. A number of new farm paths are also evident. A large pile of exposed spoil is evident in one of the paddocks to the west, presumably from the pond works. The colour of exposed soil in the paths and the pond suggest the soil from the pond excavations is also being used to form farm tracks around the property.
2014	The effluent pond construction is complete and a liner is clearly visible in the empty pond. The pond does not appear to be shallow and has some substantial depth. The earthwork spoil has been spread or reduced in size. Later in 2014 the pond is filled with water/effluent.
2015-2019	Between 2015 and 2019 the area of earthworks spoil appears to gradually undergo erosion processes until it becomes a moderate scale exposed soil depression around 2018.
2019	The eroded spoil depression is still visible. The effluent pond is still in use. Several paddocks have had turf stripped or been ploughed/turned over. The residential area at 57 Piako Road has been expanded with large ornamental gardens to the northwest.
2022	An excavated trench, with visible excavator, has appeared in an adjacent paddock northeast of 57 Piako Road. The ornamental gardens at 57 Piako Road have been removed.
2023	<p>The majority of the site has been stripped for planting. The moderate depression is now a pond, while the effluent pond is not visible, the paddock having been relevelled at some point. The fate of the pond, sediment and liner is not known. The trench to the northeast of 57 Piako Road has been filled but artefact of its placement remains visible. A drainage channel appears to have been cut around the same paddock, and water is evident within it. A series of regular shapes are adjacent to the trench suggesting stockpiles made as the excavator progressed along the trench. Similar features are visible on neighbouring properties in the poorly drained soils, also associated with drainage trenches.</p> <p>Later that year and in early 2024 the site is fully planted, understood to be Maize.</p>

4.2 Waikato Regional Council Selected Land Use Site Report

An application for the WRC selected land use information register site report for the site was undertaken on 21 May 2024. The report detailed the Land Use Information Register (LUIR) entry for the site. The report identified that the site is not on the LUIR. A copy of the LUIR entry is provided in Appendix D.

4.3 Waikato District Council Property File Review

A review of the Property file held by WDC found only information on the constructions/movements of dwellings or renovation/extension of existing dwellings on the property since 1977. For brevity only the items discussed below relevant to this assessment have been appended to this report:

- A Waikato County Council, standard specification for the dwelling extension in 1977, believed to be the eastern dwelling at 57 Piako Road. The specification required:
 - Non-asbestos plaster, timber weatherboards fascia and brickwork.
 - Asbestos sheets in the formation of ceiling porches and soffits and the installation of 'Bakelite' electrical insulators throughout on switchboard, lamp holders, ceiling roses and switches, which is an asbestos-containing material. The use of decramastic roofing tiles, which are known to contain asbestos.
 - External roof valleys to be lined with lead and copper sheet.
 - Pipework to be lagged with hair felt.
 - The use of both red and white lead paint on exterior and interior timber.
- Site plans from 1990 and 2004 indicating on-site septic tanks at 57 Piako Road.
- Site plans indicate that the garage attached to the westernmost dwelling at 57 Piako Road was a '2nd Hand Skyline Garage' with a 'Hardiplank exterior'. Hardiplank has been associated with asbestos fibre cement sheeting.
- Site plans indicating the building being relocated from 57 Piako to 35 Piako Road.

Nothing else of relevance to this assessment was identified.

4.4 Site Walkover

A site walkover was undertaken by a GWE Senior Environmental Engineer on 6 June 2024. Site Photographs are attached in Appendix E.

The site appears to have been retired from dairy farming with evidence of maize production undertaken in the surrounding paddocks (refer image 4). The site visit focused on the farm staging areas around the feed pad and sheds to the east. At the time of the site visit the dairy waste treatment pond had been filled in.

During the site visit, farm machinery was being stored on the feed lot with some round hay bales. The milking shed did not appear to be used and had not been for a while. Observations of the farm sheds to the north of the milking shed have been summarised as follows:

Table 5: Site Observation Summary

LOCATION	ITEM	DESCRIPTION
Concrete feed pad and sheds	Machinery	Parked multi-use trailers for cropping and hay making
Lean-to southwest of southern shed	Chemicals	Storage of empty chemical drums to exposed/grassed ground within and outside a lean to of the southernmost shed comprising: <ul style="list-style-type: none"> • Oxonia Active – Hydrogen peroxide and peroxyacetic acid mixture • Teat guard – iodine solution • Hydraulic Oil • Engine oil
Inside domed shed	Chemical mixing	Weedmaster and fertiliser mixing was being undertaken within the domed shed. Weighing scales and several fertilisers and a drum of “weedmaster” (glyphosate) and container of Pentrant was observed adjacent to a spray trailer. Spillage was evident in this area.
Fertiliser bunker south	Fertiliser store	Empty at time of inspection
Silos	Tyre storage	Tyres were placed adjacent to the silage silos assumed to be used to hold down the silage covers. Tyres were used/weathered and appeared to have been used for some time.
	Green Waste	the site visit the silos appeared to be used for the dumping of green waste.
57 Piako Road Sheds	Machinery store	The site owner indicated that the sheds were the workshop for his farm equipment. To the west of the fertiliser bunker (below) is a 6-bay shed with the southern two bays inaccessible with locked roller doors, and concreted floors. The remaining bays were used for storing quad bikes, a boat and various quad bike trailers and other farm equipment. The area between the fertiliser bunker and the farm shed was gravelled and showed staining with what appears to be engine oil and other lubricants.
	Fertiliser bunker	A fertiliser bunker was located between the two dwellings.
	Above ground fuel storage tank (AST)	A mixed Diesel and petrol above ground storage tank (estimated 1,500L total) was located to the north of the farm shed. Some staining was observed beneath the bowsers, but not within the refuelling area.

5 KEY PSI FINDINGS

5.1 Summary of Verified HAIL Activities

Based on the results of the desktop study review and limited site inspection, a summary of HAIL activities have been identified to have historically occurred, be occurring or are more likely than not to have occurred at the site, summarised below.

Table 6: HAIL Summary

LOCATION	ACTIVITY	HAIL	COMMENT
Feet lot sheds	Chemical Storage	A17 – Storage drums for chemicals	A significant volume of empty drums was identified within and around a shed. Chemical handling and storage at the site were lacking in sufficient environmental protections.
	Chemical Mixing	A1 – Agrichemical mixing	Spray chemical mixing was identified within a shed. Chemical handling and storage at the site were lacking in sufficient environmental protections.
	Fertiliser storage	A6 – Bulk storage of fertiliser	A covered fertiliser bunker was identified.
	Tyre storage	I – Unintentional release	Significant numbers of tyres are stored around the former silage silos. Outdoor storage of tyres is recognised as a potentially contaminating under several HAIL subcategories.
Maintenance Sheds	Fertiliser Storage	A6 – Bulk storage of fertiliser	A covered fertiliser bunker was identified.
	Fuel Storage	A17 – Storage tanks for fuel	A diesel and petrol AST was observed onsite.
	Mechanical repairs	F4 - Motor vehicle workshop	Small scale repairs are undertaken on hardstand adjacent to the sheds. There was evidence of localised spills associated with this work.

A HAIL location plan has been prepared and attached in Appendix F.

5.2 Unverified Potentially Contaminating activities

There are additional activities or practices that have occurred at the site that may impact the soil quality at site but about which there may be insufficient evidence to conclude under a HAIL category, or where a HAIL category may not easily and simply apply. These are summarized in table 7 below.

Table 7: Unverified Potentially Contaminating Activities

ITEM	EVIDENCE
Asbestos in a deteriorated condition	<p>Many buildings have been present at the site since a time when asbestos was widely used in residential and industrial/rural buildings such as milking sheds.</p> <p>There are records indicating that buildings on site may have, or may still, contain asbestos that would be at the end of its useful life.</p> <p>Building materials are known to shed asbestos fibres into surrounding soils and water courses.</p>
Lead based paints (LBP)	<p>Many buildings have been present at the site since a time when red and white lead in paint was widely used on interior and exterior timber.</p> <p>There are records indicating that buildings on site may have been, or may still be, the location of LBP.</p> <p>Building materials are known to shed paint flakes into surrounding soils.</p>
Acid sulphate soils (ASS)	<p>ASS are naturally occurring sediments that contain reduced inorganic sulphur formed in redox conditions. WRC has noted adverse environmental impacts attributed to ASS including infrastructure damage, fish kills, surface water pH fluctuations and increased metallic compounds in water. WRC consider large areas of the Waikato and Hauraki basins as being the location of ASS.</p> <p>Evidence suggests poorly drained soil in the northeastern part of the site that shows strong indicators as being potential ASS.</p>
Cadmium from superphosphate application	<p>Environment Waikato Technical Report 2005/51 investigated and confirmed cadmium accumulation in soils in the Waikato region as a result of superphosphate fertiliser use. Landcare Research / Manaaki Whenua provided an update to that research in 2014 confirming dairy farms, as one of many agricultural practices, as having elevated concentrations of cadmium in upper soil horizons.</p>
Effluent pond	<p>Historical aerial imagery shows an effluent pond as having been on site from 2013 to 2022. The pond has been in-filled. Neither the pond nor the material used to fill it have been investigated. The disposal of unknown material to land may be regarded as waste disposal to land and a potentially contaminating activity.</p>
Earthworks	<p>Earthworks are not in and of themselves contaminating activities, but they may be triggers for further investigations as to the soil quality that remains, or whether the excavations were filled with off-site material or waste. Earthworks in potentially ASS soils may also cause changes to soil chemistry that generates contamination off-site.</p>
Farm Dump	<p>The MfE report on New Zealand Non-Municipal Landfill Database identified that as much as 92% of farm sites in NZ either burned, buried or stored waste material on their sites. Burn and bury sites on farms may be short-lived and can move from year-to-year. Tracking them may be impossible without all prior owners' consent and information. GWE could find no evidence of a farm burn or burial location at this site. However. This does not mean that one, or more than one, does not exist.</p>
Septic tanks and disposal fields	<p>While not considered a HAIL activity due to relatively small-scale effects, the disposal of effluent to land may change the immediate local soil chemistry and may increase certain contaminants in the disposal fields with impacts for handling and disposal.</p>

6 TIER 1 RISK ASSESSMENT

6.1 Conceptual Site Model

Based on our investigation GWE have prepared a basic Conceptual Site Model (CSM) for the proposed development provided below. Table 8 below indicates those impacts that have been confirmed while Table 9 indicates those impacts that have yet to be confirmed or dismissed.

Table 8: Verified Risks

SOURCE	IMPACTED MEDIA	PATHWAYS	RECEPTORS	VERIFIED / UNVERIFIED	NOTES
Chemical Storage and mixing	Surface soil not deeper than 0.5m.	Soil dust inhalation Soil dust ingestion Dermal contact	Site workers Site visitors End-users	Verified	Observed site practices indicate a likelihood of contaminants to soil that may pose a risk to human health if disturbed.
	Surface water run-off and ponded water from works.	Run-off and transport	'Downstream' users		
Fertiliser storage	Surface soil not deeper than 0.5m.	Soil dust inhalation Soil dust ingestion Dermal contact	Site workers Site visitors End-users	Verified	Runoff from the fertiliser loadout areas are likely to have concentrated in the receiving soil which may pose a risk to human health if fertilisers were high in heavy metals.
	Surface water run-off and ponded water from works.	Run-off and transport	'Downstream' users		
Tyre storage	Surface soil not deeper than 0.5m.	Soil dust inhalation Soil dust ingestion Dermal contact	Site workers End-users	Verified	Contaminants from tyre storage are likely quite localised and while small-scale local impacts may be evident, it is unlikely that contaminant concentrations in all, but well concentrated areas would be sufficiently high as to pose a health risk if disturbed.
Fuel Storage	Surface soil not deeper than 0.5m.	Soil dust ingestion Dermal contact	Site workers End-users	Verified	Contaminants from the AST are likely quite localised and while small-scale local impacts may be evident, it is unlikely that contaminant concentrations in all, but well concentrated areas would be sufficiently high as to pose a health risk if disturbed.

SOURCE	IMPACTED MEDIA	PATHWAYS	RECEPTORS	VERIFIED / UNVERIFIED	NOTES
Vehicle Maintenance	Surface soil not deeper than 0.5m.	Soil dust ingestion Dermal contact	Site workers End-users	Verified	Routine machine maintenance has resulted in minor spills of oils/hydrocarbons to ground. Small-scale local impacts may be evident, but it is unlikely that contaminant concentrations in all, but well concentrated areas would be sufficiently high as to pose a health risk if disturbed.

Table 9: Unverified Risks

SOURCE	IMPACTED MEDIA	PATHWAYS	RECEPTORS	VERIFIED / UNVERIFIED	NOTES
Asbestos	Surface soil not deeper than 0.5m.	Soil dust inhalation Soil dust ingestion	Site workers Site visitors End-users	Unverified	The construction dates of site buildings suggest asbestos may be present within building materials. Asbestos in buildings can cause concentrations in surface soil that poses a risk to human health if poor removal and demolition practices are undertaken during site clearance and can lead to concentrations of asbestos in soil that pose a risk to human health when disturbed.
Lead Based Paints	Surface soil not deeper than 0.5m.	Soil dust inhalation Soil dust ingestion	Site workers Site visitors End-users	Unverified	The construction dates of site buildings suggest LBP may be present at site on older buildings. LBP in buildings can cause concentrations in surface soil that poses a risk to human health if disturbed. Poor removal and demolition practices during site clearance can lead to concentrations of LBP in soil that pose a risk to human health when disturbed.
Acid Sulphate Soil	Waterlogged soil expected between 2m bgl to 5m bgl.	Indirectly attributable to causing other contaminant risks	Site workers Site visitors End-users	Unverified	When dewatered and oxidised, ASS causes changes in soil pH and chemistry that can result in mobilisation of other contaminants,

SOURCE	IMPACTED MEDIA	PATHWAYS	RECEPTORS	VERIFIED / UNVERIFIED	NOTES
			'Downstream' land users		and naturally occurring metals, that lead to an increased risk to human health.
Cadmium from superphosphate	Surface soil not deeper than 0.5m.	Soil dust inhalation Soil dust ingestion Dermal contact Run-off and transport	Site workers Site visitors End-users 'Downstream' land users	Unverified	Cadmium is known to accumulate in upper soil horizons associated with historic dairy practice. Where this does apply, concentrations may pose a risk to human health when the soil is disturbed.
Dairy Effluent Pond (filled)	Soil around pond – depth not verified. Nature of fill material used – unknown.	Soil dust inhalation Soil dust ingestion Dermal contact Run-off and transport	Site workers Site visitors End-users 'Downstream' land users	Unverified	Risk unknown. There is no evidence of the pond's use or decommissioning.
Earthworks	Soil around excavations – depth not verified.	Soil dust inhalation Soil dust ingestion Dermal contact Run-off and transport	Site workers Site visitors End-users 'Downstream' land users	Unverified	Risk unknown. There is no evidence as to the nature of soil disturbance in earthworks areas or whether off-site soil from a potentially contaminated site elsewhere was used to backfill excavations.
Farm Dump	Soil around dump or burn site – depth not verified.	Soil dust inhalation Soil dust ingestion Dermal contact Run-off and transport	Site workers Site visitors End-users 'Downstream' land users	Unverified	Risk unknown. No farm dump or burn site has been identified. Given the scale of the site and length of farm use it suggests at least one is likely to be or has been present at site.
Septic Tanks and disposal fields	Soil around tank and disposal fields – depth not verified.	Soil dust inhalation Soil dust ingestion Dermal contact	Site workers Site visitors End-users	Unverified	Risk likely to be low. Household effluent may contain low concentrations of metals from excreta processes, or household chemicals that accumulate in local soil. Risk are generally expected to be low in all but extreme cases or in cases associate with clandestine laboratories.

7 REGULATORY ASSESSMENT

7.1 NESCS Regulations

7.1.1 Applicability

This assessment concludes that the NESCS applies to the entire site as potentially contaminating activities identified on the HAIL list are occurring or have occurred at site, more likely than not.

7.1.2 NESCS Activity Status

Subdivision, change in land use and disturbance of soil on a HAIL site all trigger the requirements of the NESCS. GWE does not know if subdivision is planned but change in land use and disturbance of soil will be associated with the proposed development.

The indicated magnitude of disturbance will exceed NESCS permitted activity criteria. Commensurate with the NESCS, a Detailed Site Investigation (DSI) is required for the proposed development to be considered as either a Controlled Activity or a Restricted Discretionary Activity under the NESCS.

Failure to conduct a DSI prior to application would trigger the requirements for a Discretionary Activity consent. Based on GWE's investigation the consenting authorities would very likely require, as a minimum, a DSI as part of a Discretionary Activity consent process.

8 RECOMMENDATIONS

1. We recommend that, commensurate with the Health and Safety at Work (Asbestos) Regulations 2016 (HSWAR) and the WorkSafe New Zealand, Good Practice Guidelines for Conducting Asbestos Surveys 2016 (GPG), all buildings and structures on site are surveyed for asbestos prior to disturbance or demolition. We recommend that a lead-based paint survey is undertaken at the same time.
2. We recommend ascertaining the exact location, depth and dimensions of in-ground structures including the former effluent pond, septic tanks and disposal fields using ground penetrating radar (or similar) If possible, to ascertain investigative requirements, if any.
3. Following those investigations, we recommend that the client, and GWE, develop a sampling and analysis plan to verify and quantify the findings of the CSM for the site. Based on our observations, this would be better undertaken once the site has been vacated, services isolated and cut, and all non-essential equipment and machinery removed from site. The investigation would likely require the use of an excavator at site.
4. Once the results of the DSI are known, further work that may be required for consent such as controlled or licensed asbestos removal, a Site Management Plan (SMP), a Remedial Action Plan (RAP), an Acid Sulphates Soil Management Plan (ASSMP), and post-works Site Validation and Sampling and Reporting (SVR) can be determined.

9 CONCLUSIONS

The site at 57 Piako Road has been an operating dairy farm, including farm buildings and three residences, from between 1963 and 2023 when the site was retired from dairy grazing and used for maize production. The client proposes to change the land use of the site, remove all the buildings and undertake extensive soil disturbance to convert the site to a retirement village complex.

GWE have undertaken a PSI commensurate with the requirements of the NESCS and CLMG that has identified that the site is the location of a number of verified potentially contaminating 'HAIL' activities associated with its historic use. A number of unverified but suspected activities that may cause localised contaminated soil and water risks have also been identified.

Consequently, the NESCS applies to the site and any subdivision, change in land use or soil disturbance at the site will trigger the requirement of the NESCS for further investigations, soil and water contact and disturbance risk mitigation, and consent.

Evidence suggests that the buildings on site are likely to contain asbestos and lead-based paints that must be identified and managed appropriately prior to demolition to prevent on site contamination during building removal.

The CSM of contaminant risks indicates that the dominant currently known risks appear isolated to the top 0.5m of soil across the site, except for buried structures at site associated with the former effluent pond and the residential septic tanks and disposal fields. The risks associated with the septic tanks and disposal fields is regarded as minor, while the risk associated with the effluent pond is currently unknown.

A currently unknown ASS risk exists at site predominantly associated with the shallow water table organic soils in the northern half of the site. While this risk may cause other contaminant risks to arise when dewatered and oxidised, the primary risk is for in-ground infrastructure of concrete and steel that may be eroded by ongoing acidic pH conditions caused during construction. The acidification and oxidation of ASS in this area may also result in acidic conditions in the off-site drain from this area that may result in an off-site discharge of mobilised contaminants.

The GWE developed CSM has identified that there is potentially a risk to development workers and future site users based on the identified potential contaminating activities at site. Unless a DSI is completed a consent can only be granted as a discretionary activity under the NESCS. It is highly likely that a discretionary consent would require a DSI prior to any earthworks at site.

10 LIMITATIONS

This report has been prepared for the sole benefit of **Barker and Associates Ltd** as our Client, and their appointed representatives, according to their instructions, for the specific objectives described herein. This report is qualified in its entirety by and should be considered in the light of our Terms of Engagement with the Client and the following:

- d. Data or opinions contained within the report may not be used in other contexts or for any other purpose without our prior review and written agreement. Any reliance will be a such parties' sole risk.
- e. No responsibility is assumed for inaccuracies in reporting by the information providers. In no event, regardless of whether GWE 's consent has been provided, does GWE accept any liability, whether directly or indirectly, for any liability or loss suffered or incurred by any third party to whom this report is disclosed placing any reliance on this report, in part or in full.
- f. GWE has relied on information provided by the Client and by third parties to produce this document and arrive at its conclusions. GWE has not verified information provided (unless specifically noted otherwise) and we assume no responsibility and make no representations with respect to the adequacy, accuracy or completeness of such information. No responsibility is assumed for inaccuracies in reporting by the information providers.
- g. Only a finite amount of information has been collected to meet the specific financial and technical requirements of the Client's brief and this report does not purport to completely describe all the site characteristics and properties.
- h. From a technical perspective, the subsurface environment at any site may present substantial uncertainty. It is a heterogeneous, complex environment, in which small subsurface features or changes in geologic conditions can have substantial impacts on water, vapour and chemical movement.
- i. Due to the inherent variability in natural soils and subsurface conditions, it is unlikely that the results, assumptions, and conclusions set out in this report represent the extremes of conditions at any location removed in time and/or place from the specific points of sampling. Uncertainties may also affect source characterisation, assessment of chemical fate and transport in the environment, assessment of exposure risks and health effects, and remedial action performance.

**APPENDIX A
DEVELOPMENT PLANS**



Saint Marys Church, Gordonton

Gordonton Retirement Village

Concept Development Plan
57 Piako Road, Gordonton

B&A
Urban & Environmental



Prepared for:

Wayne Bishop & Cameron Smith

Prepared by:

Meyer Neeson - Barker and Associates, Auckland

Reviewed by:

Frank Pierard - Barker and Associates, Auckland

Document date:

February 2023 - Rev A

Contents

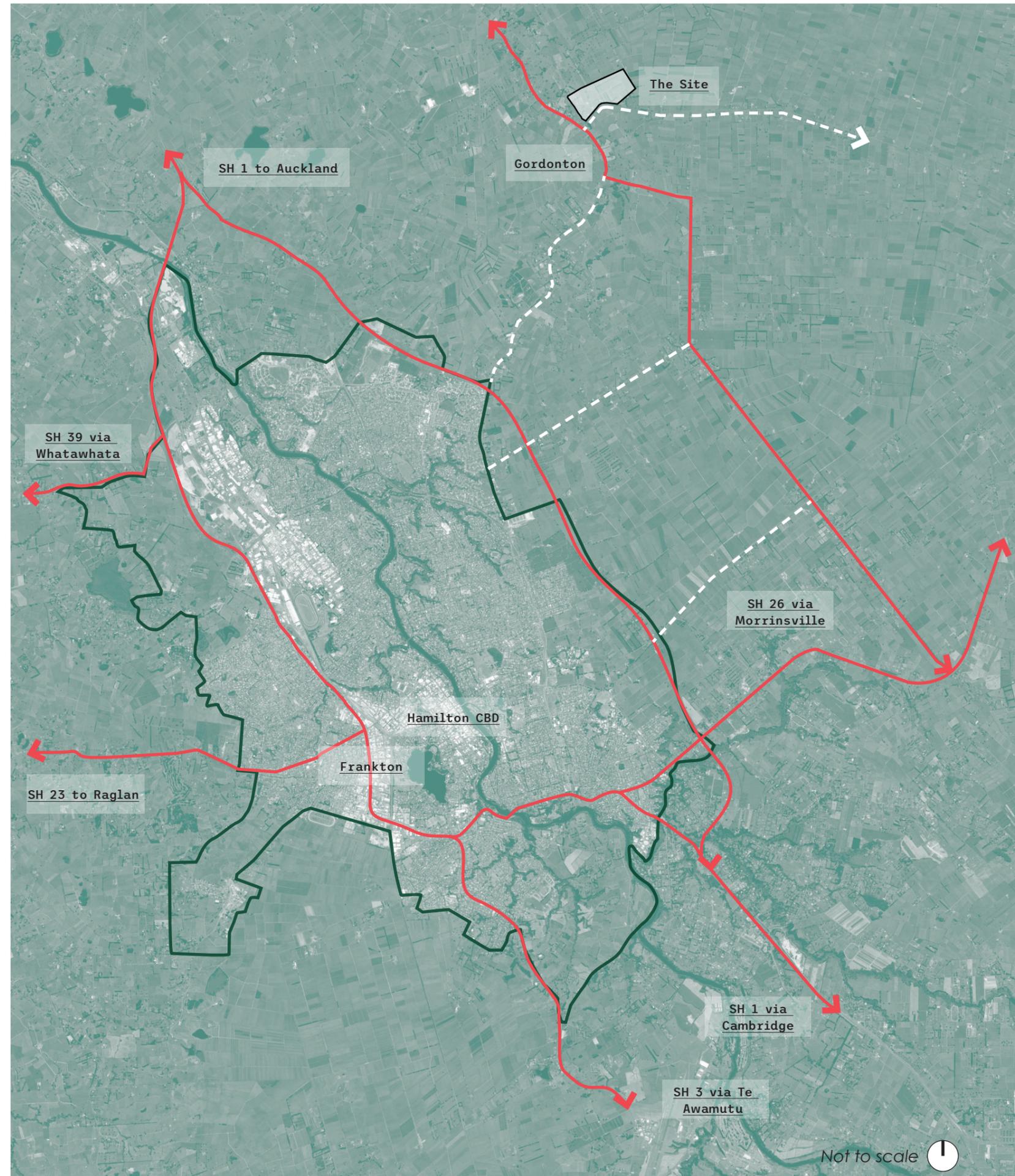
- 3 Regional context
- 4 Site context
- 5 Existing site conditions
- 6 Accessibility analysis diagram
- 7 Accessibility analysis table
- 8 Development opportunities
- 9 Key moves
- 10 Precedent imagery
- 11 Initial concept sketch
- 12 Concept development plan

Regional Context

The subject site is located approximately 17.5km / 20 minutes north of the Hamilton CBD by way of private motor vehicle. The site is also located approximately 10km / 8 minutes north of State Highway 1 providing access north to Auckland (approximately 113km / 1 hour 20 minutes from the site) and south to Cambridge (approximately 36km / 25 minutes from the site).

State Highway 23 provides access further west toward Raglan while State Highway 3 provides access further south toward Ohaupo and Te Awamutu, smaller settlements within the Waikato District. Piako Road also provides access to Morrinsville which is located approximately a 20km / 17 minute drive from the site.

-  The Site (57 Piako Road)
-  State Highways
-  Hamilton City Boundary



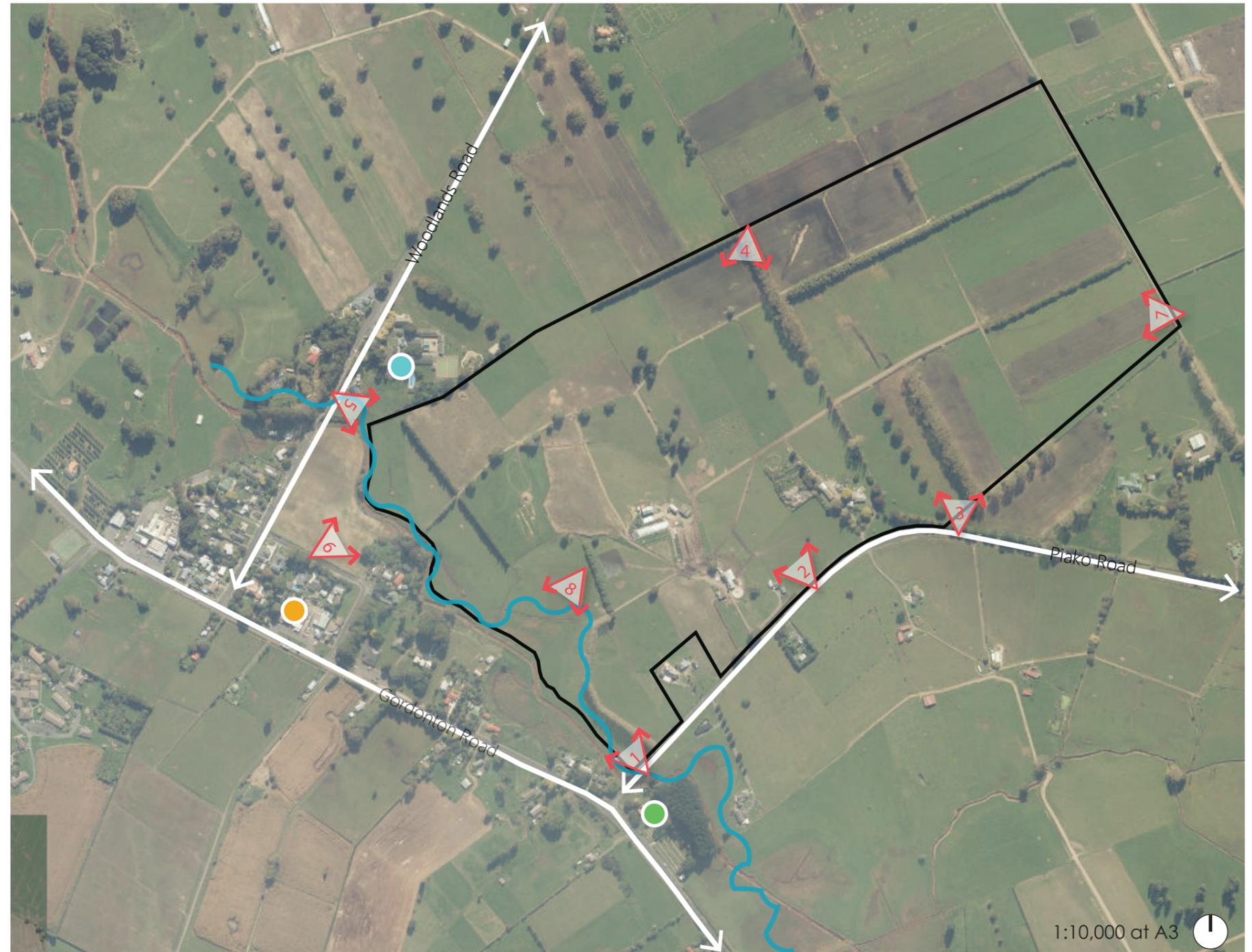
Site Context

The subject site is located at 57 Piako Road, Gordonton. The Komakorau Stream forms the south eastern boundary while Piako Road forms a large portion of the south eastern boundary. Gordonton (Primary) School is located directly north of the site.

The site currently comprises large open paddocks / pasture land, two residential dwellings and several ancillary farm buildings. A number of shelter belts and mature stand alone specimen trees are also located on site in varying conditions.

The Gordonton local shops are located directly south of the site and are currently accessed via Piako Road to Gordonton Road. These shops include a tyre shop, cafe, bakery, hair dressers, farming supply store and other niche stores. St Mary's Church is also located on the corner of Gordonton Road and Piako Road within walking distance from the subject site.

-  The Site (57 Piako Road)
-  Komakorau Stream
-  Gordonton School
-  Gordonton Local Shops
-  Saint Mary's Church
-  Viewpoints - refer to page XX for site photographs



Existing Site Conditions



Viewpoint 1:
Looking north west toward Komakorau Stream.



Viewpoint 2:
Looking north from Piako Road into the site.



Viewpoint 3:
Looking north east from Piako Road.



Viewpoint 4:
Looking south from the northern most boundary.



Viewpoint 5:
Looking south east along Komakorau Stream.



Viewpoint 6:
Looking north from Garfield Street.



Viewpoint 7:
Looking west from the eastern most boundary.



Viewpoint 8:
Looking south west toward Komakorau Stream.

Accessibility Analysis



- Legend**
- Site Location
 - X Existing Destinations
 - Pedestrian Connections
 - 400m & 800m distances (5 min & 10 min walk)
 - New Residential Zone
 - Living Zone
 - Light Industrial Zone
 - Village Business Zone
 - Reserve

Notes:

- This map was prepared using Google Maps
- 400m distance relates to a typical 5 minute walk.
- 800m distance relates to a typical 10 minute walk.
- This page should be read in conjunction with the following (page 7).

Scale 1 : 20,000 at A3

Accessibility Analysis

The National Policy Statement for Urban Development (NPS-UD) aims to ensure towns and cities are developing in a way that responds to changing needs and diverse communities. In small towns, the NPS-UD focuses on development which is well connected to existing services and infrastructure rather than the purpose of intensification.

As a small rural town, Gordonton’s existing services include local shops such as superettes, a hairdresser, a mechanic, and a number of cafes and shops. There are also a number of community facilities including a school/early childhood centre, Church and tennis club. Gordonton does not have any public transport connection within or to / from Hamilton City.

The site is located to the North West of the main shops on Gordonton Road. There is opportunity within the site for a connection to Gordonton’s centre via Garfield Street to increase the accessibility of the site and promote safe walking and cycling for future residents.

Destination		Starting point 1 within the site			Starting point 2 within the site			Starting point 3 within the site		
		Distance (m)			Distance (m)			Distance (m)		
1	Local Shops & Superette	870m	10 minutes	2 minutes	220m	2 minutes	1 minute	1500m	17 minutes	4 minutes
2	Cafe Shops & Mechanic	1100m	13 minutes	3 minutes	700m	8 minutes	2 minutes	1800m	21 minutes	5 minutes
3	Community Hall	830m	9 minutes	2 minutes	290m	3 minutes	1 minutes	1400m	16 minutes	4 minutes
4	Saint Marys Church & Cemetery	890m	10 minutes	2 minute	770m	9 minutes	2 minute	1500m	17 minutes	4 minutes
5	Willow Glen Cafe	1300m	15 minutes	4 minutes	1100m	13 minutes	3 minutes	1600m	19 minutes	4 minutes
6	Woodlands Garden Grove Cafe & Bar	4000m	47 minutes	12 minutes	3300m	39 minutes	9 minutes	4600m	54 minutes	13 minutes
7	Gordonton Vet	1800m	21 minutes	5 minutes	1300m	15 minutes	4 minutes	2400m	28 minutes	7 minutes
8	WEC International (mission organisation)	1600m	19 minutes	19 minutes	1100m	13 minutes	3 minutes	2200m	26 minutes	6 minutes
9	Gordonton School	1500m	17 minutes	4 minutes	1000m	11 minutes	3 minutes	2100m	25 minutes	6 minutes
10	Gordonton Early Learning Centre	1600m	19 minutes	4 minutes	1000m	11 minutes	3 minutes	2200m	26 minutes	6 minutes
11	Gordonton Tennis Club	1300m	15 minutes	4 minutes	800m	9 minutes	2 minutes	1800m	21 minutes	5 minutes



Pedestrian speed = 84 metres per minute

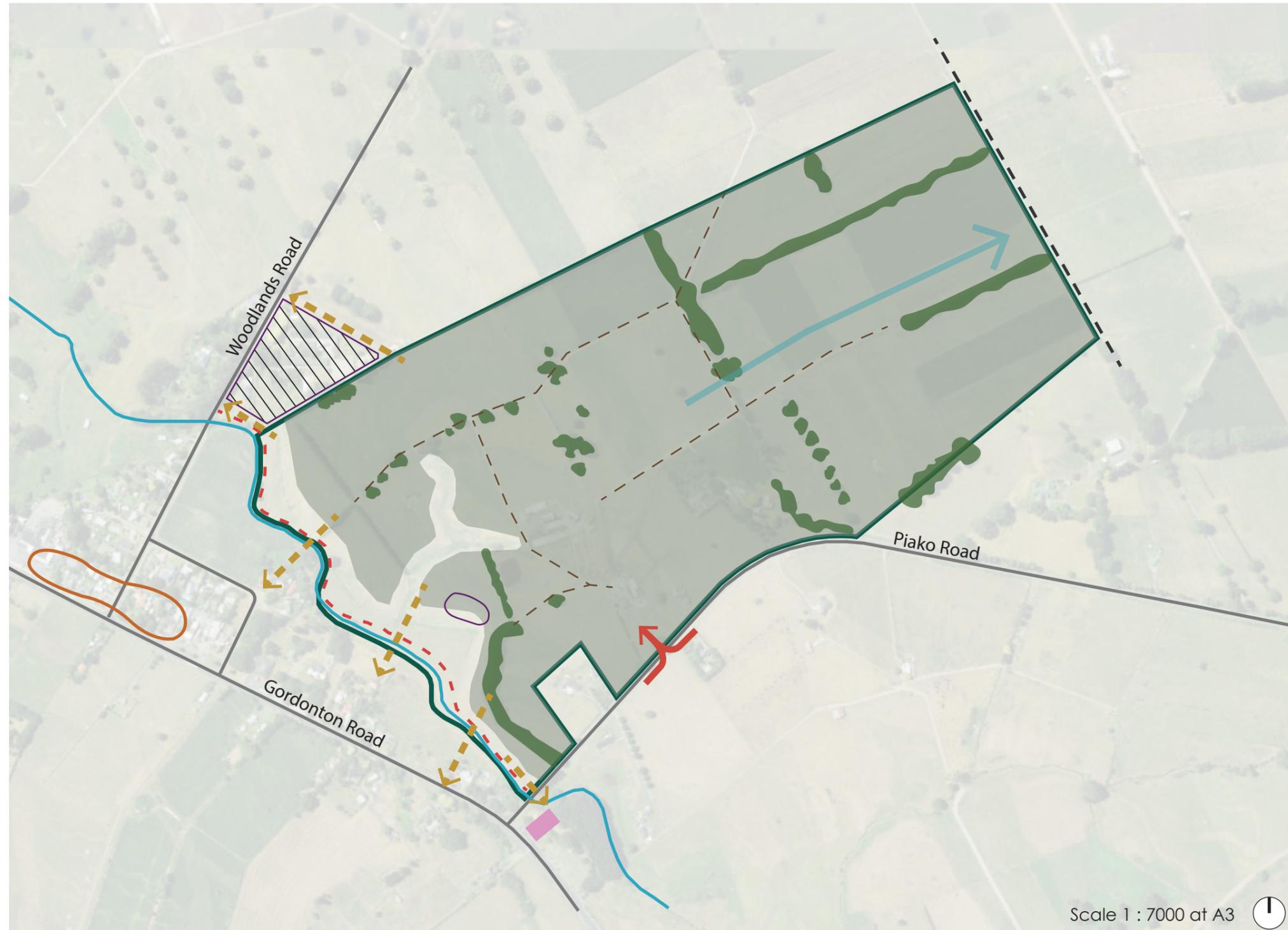


Cyclist speed = 333 metres per minute

Notes:

- All distances and travel times for both pedestrians and cyclists have been taken from Google Maps
- This page should be read in conjunction with the previous (page 6).

Development Opportunities

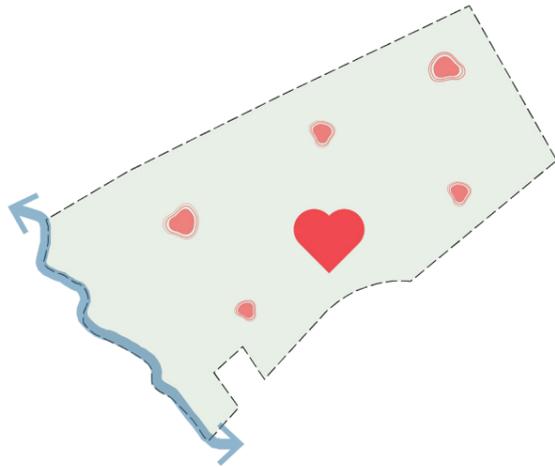


Legend

- Site Boundary
- Existing Roads
- Komakorau Stream
- Existing Vegetation
- Possible future connection
- Potential vehicular access points
- Drainage direction
- Council Managed Stormwater Drain
- Potential pedestrian walkway
- Farm Tracks
- Flat land
- Church
- Existing School (Gordonton School)
- Maori Site of Significance (s14/211)
- Gordonton Centre

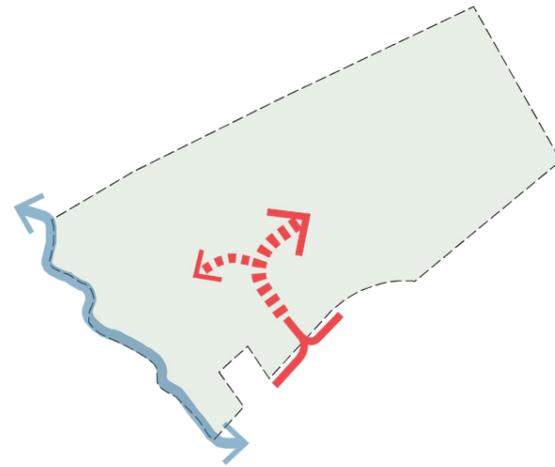
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Key Moves



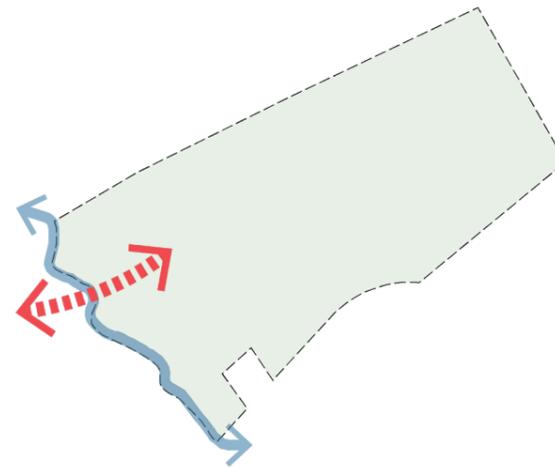
Community heart

Provide a series of communal facilities within the heart of the development to create a walkable development and foster a strong sense of community



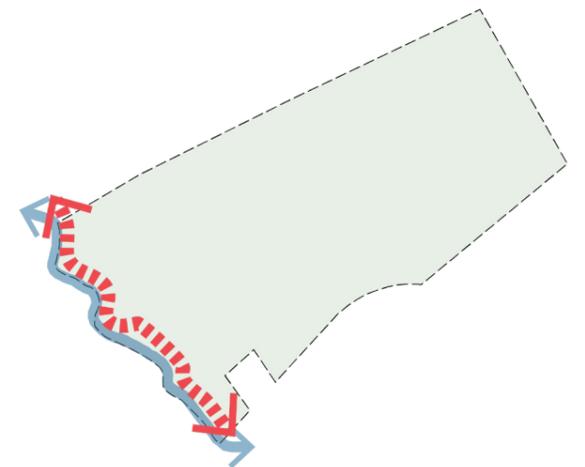
Access

Provide the primary vehicle access off Piako Road. Ensure the access point is positioned in the most logical and efficient location.



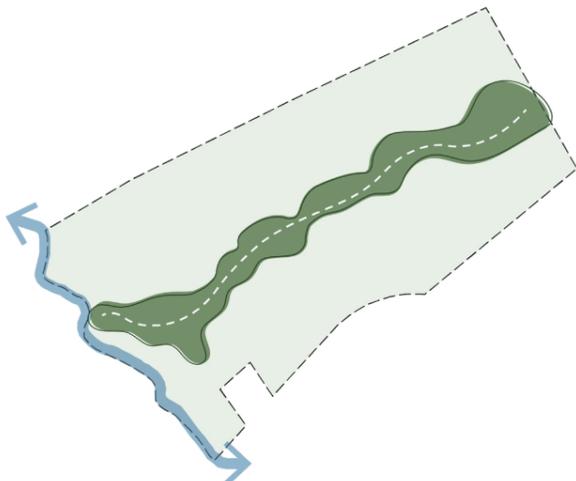
Creating connections

Provide an opportunity to connect into the heart of Gordonton across Komakorau Stream.



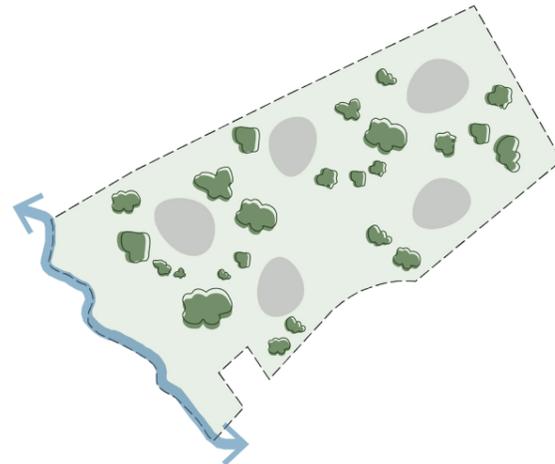
Activate and enhance Komakorau Stream

Activate the streams edge with pedestrian & cycling connections.



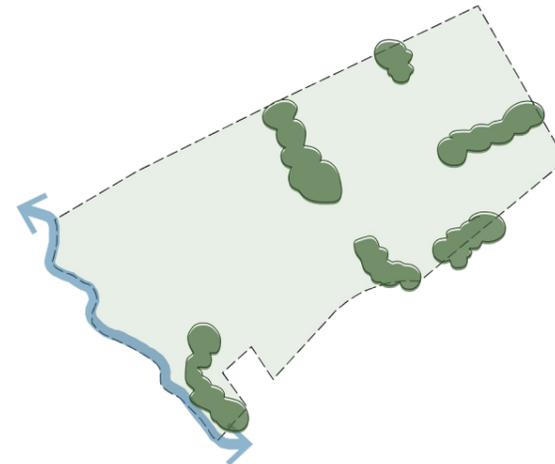
Central east west green spine

Vegetated and landscaped spine with shared pedestrian and cycle facilities.



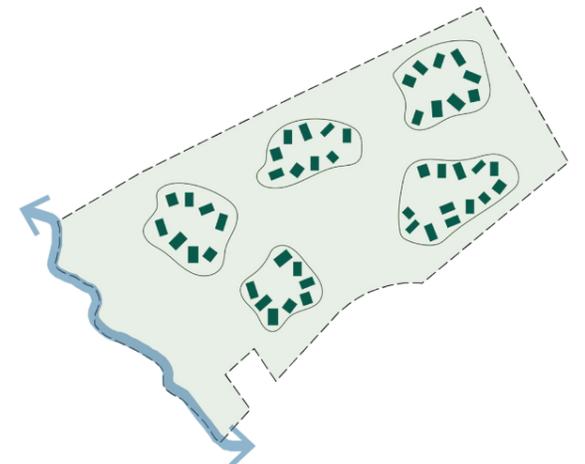
Create a strong sense of spaciousness

Creating a strong sense of spaciousness between dwelling clusters. Utilising strategic planting and significant setbacks



Retain the rural character

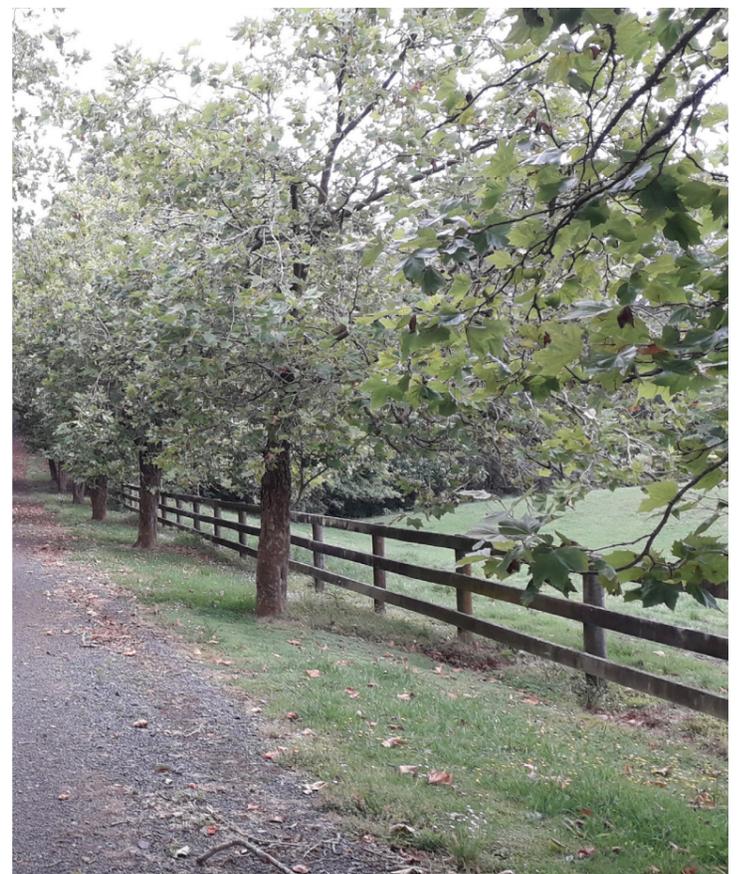
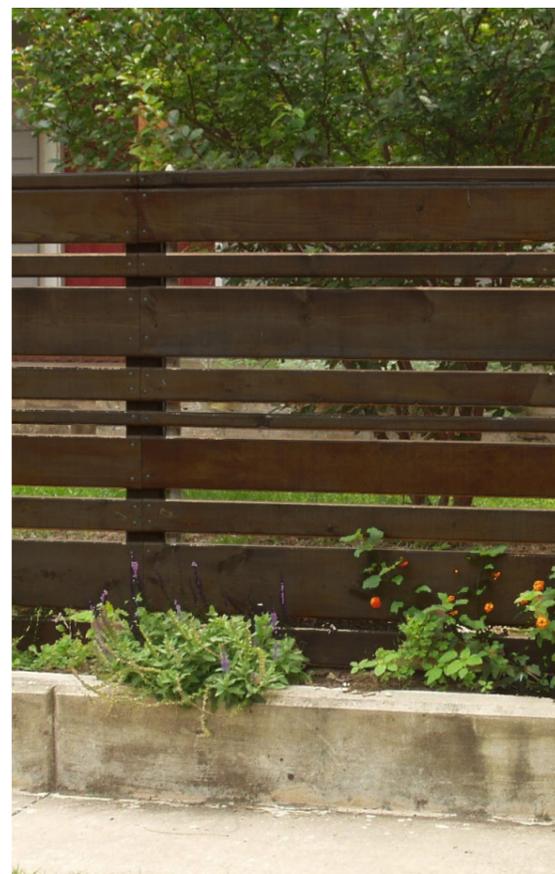
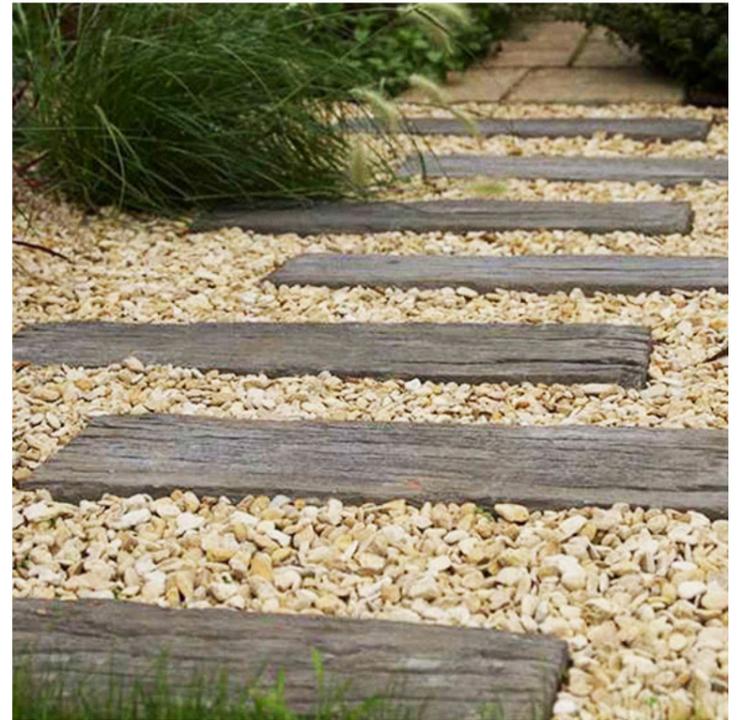
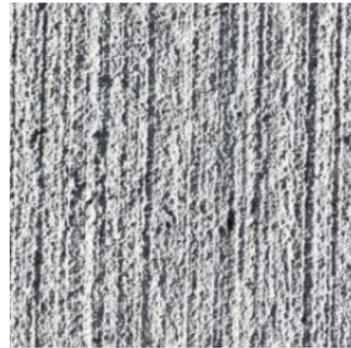
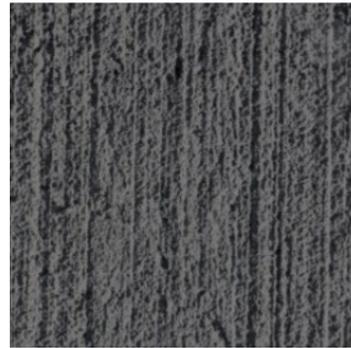
Retain existing mature vegetation, shelter belts, and rural character where possible



Clustered nodes

Cluster dwellings and future dwellings into smaller nodes, interspersed with large open space areas / paddocks for grazing to retain a strong sense of spaciousness and the rural character

Precedent Imagery



Initial Concept Sketch



Concept Development Plan



Legend

- ① Komakorau Stream
- ② Proposed communal facilities
- ③ Proposed primary loop road
- ④ Proposed secondary roads
- ⑤ Proposed laneways / mews
- ⑥ Proposed grazing / farming areas
- ⑦ Proposed communal buildings
- ⑧ Proposed farm sheds
- ⑨ Proposed stormwater facilities
- ⑩ Proposed pedestrian and cycle connections
- ⑪ Possible future bridge connection
- ⑫ Maori site of significance (s14/211)
- ⑬ Amenity / open space areas

Total site area: 67.8ha approx.

Total grazing / pasture area: 14ha approx.

Total open space / amenity area: 18ha approx.

Total urbanised area (excluding roads / lanes):
16ha approx.

Scale 1 : 5000 at A3



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APPENDIX B
WAIKATO REGIONAL COUNCIL MAPS



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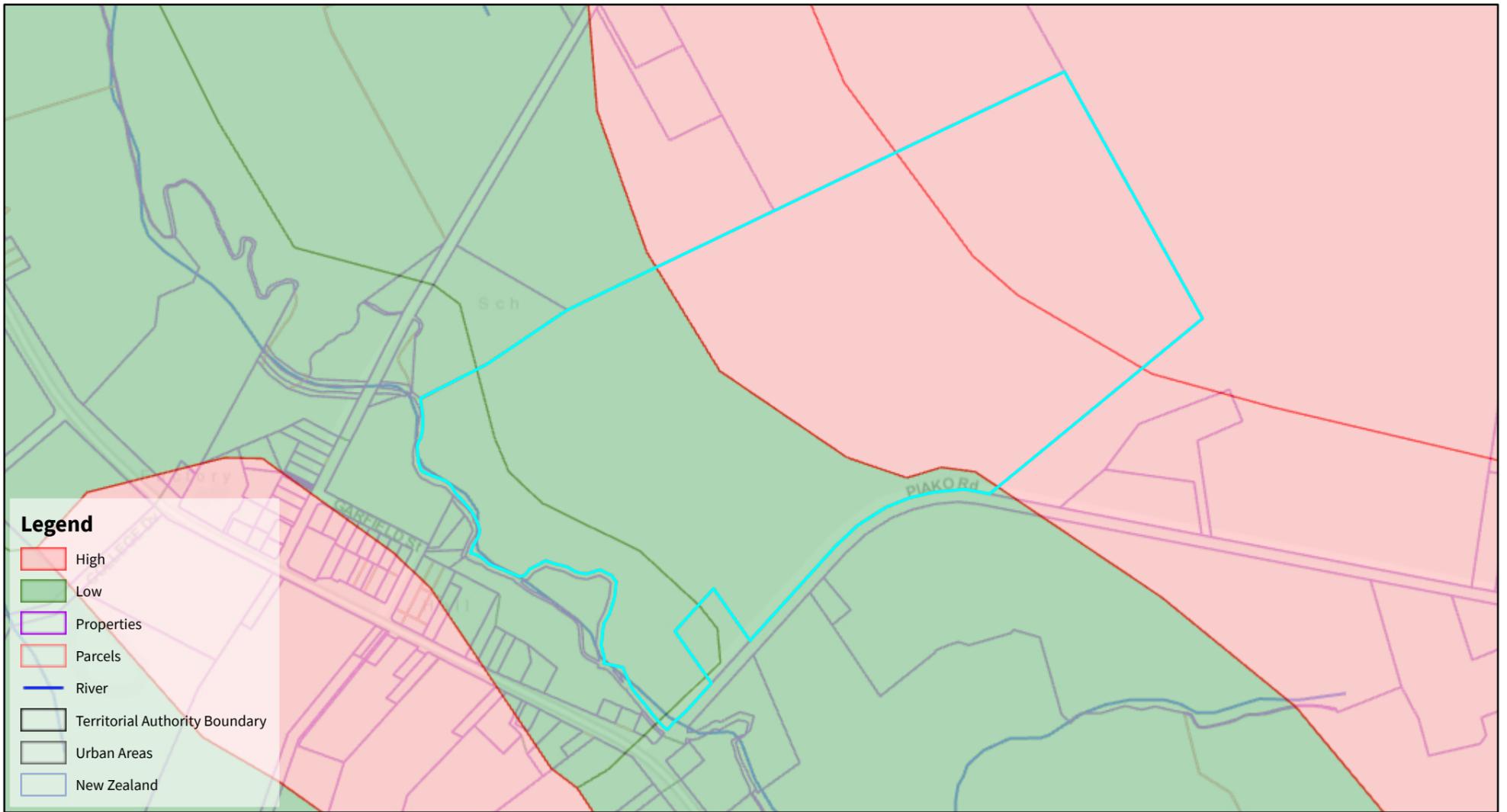
River Classification Plan

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 NZGD 2000 New Zealand Transverse Mercator

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 Layout: A2 Landscape


Waikato
 REGIONAL COUNCIL
 Te Kaunihera ā Iohē o Waikato



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Deprecated Basemap - Eagle Technology, Land Information New Zealand, See individual layers' metadata.

Soil Map



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 NZGD 2000 New Zealand Transverse Mercator

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Layout: A4 Landscape





Legend

- Properties
- Parcels
- Lake
- River
- Territorial Authority Boundary
- Urban Areas
- New Zealand

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Topography

0 0.1 0.2 0.4 0.6 0.8 1 1.2 1.4 km

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APPENDIX C
HISTROCIAL AERIAL PHOTOGRAPHY

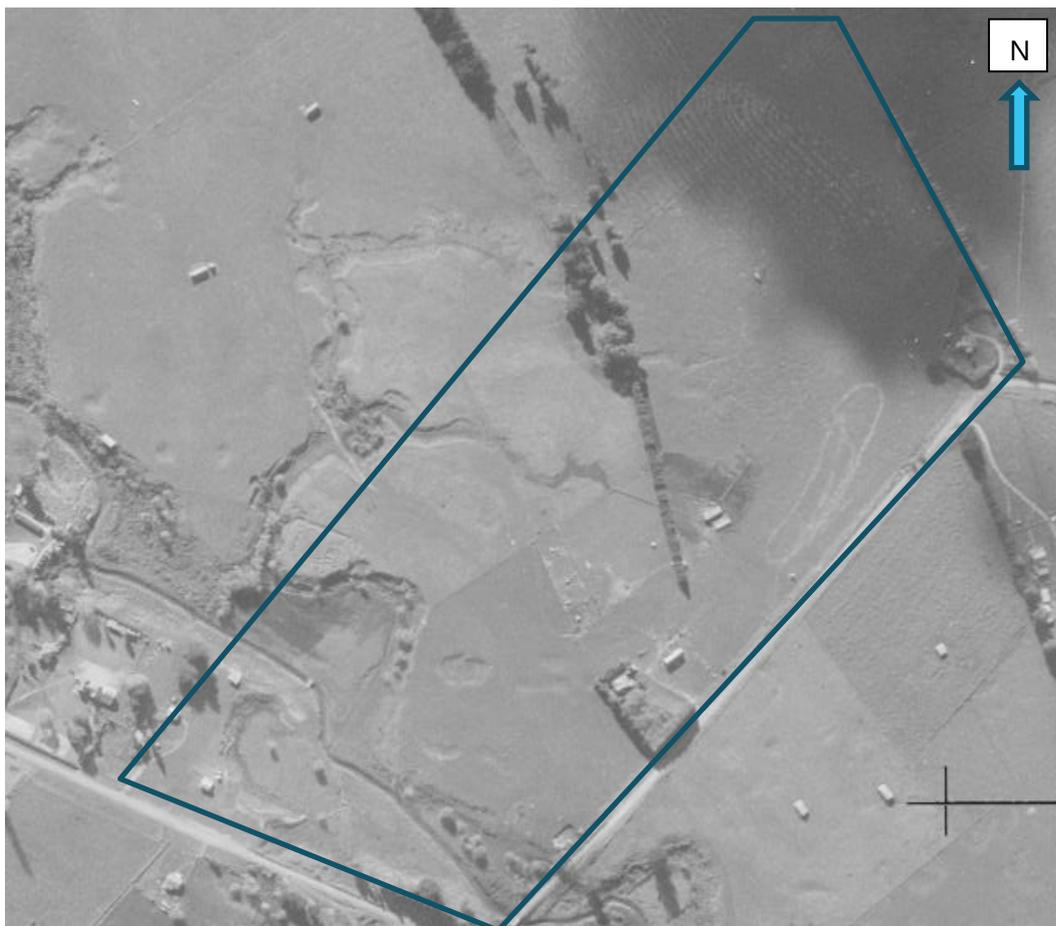


Image 1. 1948 Photograph (retrolens)

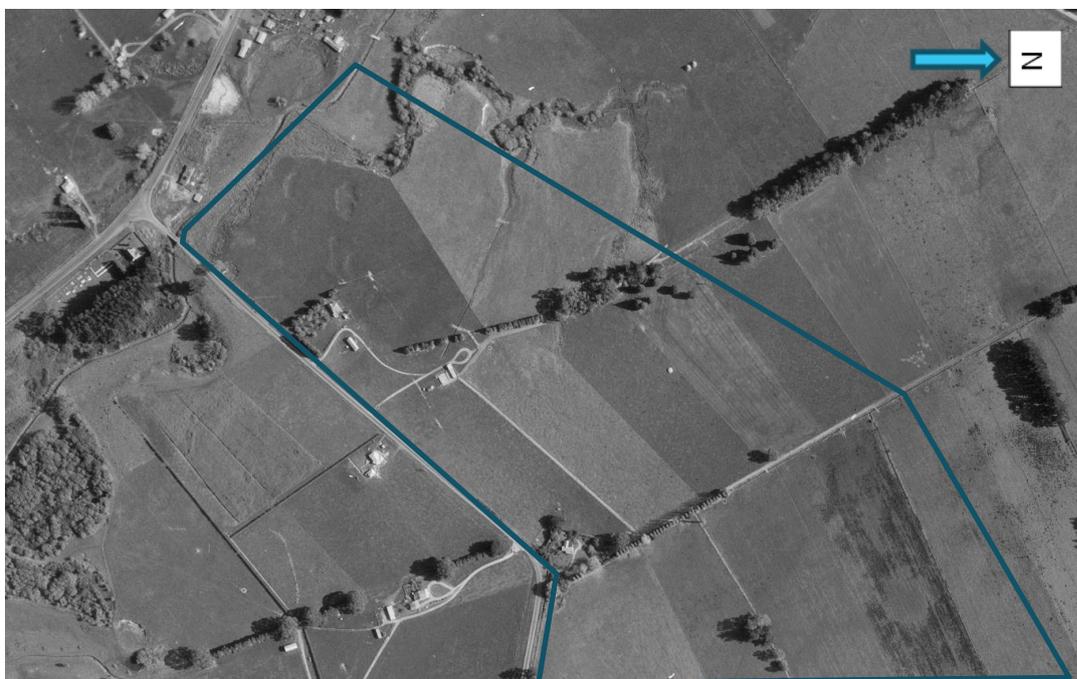


Image 2. 1963 Photograph (retrolens)



Image 3. 1974 Photograph (regtrolens)



Image 4. 1979 Photograph (retrolens)



Image 5. 1991 Photograph (retrolens)



Image 6. 1995 Photograph (retrolens)



Image 7. 2009 Photograph (sourced Google earth via images @224 Maxar Technologies)



Image 8. 2019 Photograph (sourced Google earth via images @224 Maxar Technologies)



Image 9. 2022 Photograph (sourced Google earth via Image @2024 airbus



Image 10. 2023 Photograph (Google earth via image@airbus)

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APPENDIX D
WAIKATO REGIONAL COUNCIL LUIR REPORT

SELECTED LAND USE SITE REPORT

Waikato Regional Council maintains a register of properties known to be contaminated based on chemical measurements, or potentially contaminated based on past land use. The Land Use Information Register is still under development and should not be regarded as comprehensive.

Report Created 21 May 2024 08:42:00PM

Report ID 5220

This report contains information held in the Waikato Regional Council Land Use Information Register for:

Valuation number (VRN) 04421/803/03

Address 57 PIAKO ROAD

Legal description LOT 2 DP 481700 LOT 3 DP 328606 LOT 4 DP 328606

Aerial view of property



SELECTED LAND USE SITE REPORT

This property appears on the Land Use Information Register.

Yes No

IMPORTANT THINGS TO NOTE

Information NOT recorded in the Land Use Information Register

- The use of lead-based paint
- The use of asbestos in building materials
- The broadacre use of superphosphate fertiliser
- Historic aerial photography. You can view historic aerial images free of charge at www.retrolens.co.nz - we recommend this resource is consulted for any HAL assessment

District council information

Our records are not integrated with those of territorial authorities (district councils). We recommend contacting the appropriate territorial authority to complete your audit of council records if you have not already done so. In general, information about known contaminated land will also be included on a property LIM report produced by the territorial authority.

Soils investigation information "Unverified HAL" and "Verified HAL-No Sampling" sites are included on the register for land use information only. If you require specific soil investigation or consent related information for sampled sites please submit a request using the online [Request for Service](#) form and include the site number and report ID as the reference details. Your request may take up to 20 days to process. If your enquiry is urgent, please note this foremost in your enquiry and we will do our best to assist.

General contaminated land information For more general guidance or information relating to contaminated land, please refer to our website www.waikatoregion.govt.nz

APPENDIX E
SITE PHOTOGRAPHS



Image 1. View of the milking shed



Image 2. View of the feedlot with stormwater/washdown collection pond in the left of image



Image 3. View of stormwater/washdown collection pond



Image 4. View of decommissioned dairy waste treatment pond.



Image 5. View of the three bay shed and domed shed with adjacent water tanks
Type description.



Image 6. View of former silage storage area.



Image 7. Chemical drum storage area



Image 8. Chemical drum storage area



Image 9. Chemical mixing area



Image 10. Fertiliser bunker



Image 11. Tyre storage adjacent to silage silo



Image 12. View of shed in maintenance area.



Image 13. Fertiliser bunker



Image 14. Above ground fuel storage tank



Image 15. Staining beneath fuel tank

**APPENDIX F
HAIL PLAN**



NOTES:
 01. Aerial imagery from [LINZ CC BY 4.0](#) © [Imagery Basemap contributors](#)

0	FIRST ISSUE	RMD	RMD	RMD	17/06/24
REV	AMENDMENT	GIS	ENG	APPD	DATE
ISSUE STATUS:		DRAFT			

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PROJECT TITLE:	PRELIMINARY SITE INVESTIGATION
PROJECT ADDRESS:	57 PIAKO ROAD, GORDONTON
CLIENT:	GORDONTON RETIREMENT VILLAGE
DRAWING TITLE:	HAIL LOCAITON PLAN

PROJECT No:	Jxxxx
DRAWING No:	G100
REV:	0
SCALE:	1:1,200