PRELIMINARY SITE INVESTIGATION
PALMERSTON NORTH REGIONAL FREIGHT HUB
NOTICE OF REQUIREMENT

PREPARED FOR **KIWIRAIL**

October 2020

Stantec

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REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
D1	2020-08-31	Draft Report	Scott Fellers	Ilze Rautenbach	Paul Heveldt	
D2	2020-09-17	Draft Report	Scott Fellers	Ilze Rautenbach	Karen Bell & Kylie O'Dwyer	
D3	2020-10-08	Draft Report	Scott Fellers	Ilze Rautenbach	Paul Heveldt	
F1	2020-10-19	Final Report	Scott Fellers	Ilze Rautenbach	Ilze Rautenbach	Jon England

Executive Summary

A Preliminary Site Investigation (PSI) also known as a Contaminated Land Assessment has been carried out for the KiwiRail Palmerston North Regional Freight Hub development (Freight Hub). This PSI has assessed the potential for contamination within the area of land that KiwiRail is seeking to designate through the Notice of Requirement (Designation Extent).

The PSI has identified two common rural HAIL activities, sheep dips/spray races (HAIL A8) and burn pads (HAIL G5), that are likely to have taken place on the Site and have the potential to have led to contamination within the Designation Extent. Any areas with such activities are likely to be disturbed by earthworks associated with the Freight Hub development activities.

No other potentially contaminating activities within the Designation Extent have been identified by this desktop investigation.

The two HAIL activities have likely led to soil contamination in limited areas surrounding these activities. Impacts to the project can be managed by well-established further investigation practices and ongoing management plan provisions.

Further investigations will likely include a detailed site investigation (DSI) with soil sampling prior to the project works commencing. The need for this will be assessed once the project design details have been confirmed and the volumes of soil disturbance likely to be required have been clarified. The DSI will inform whether a Contaminated Site Management Plan (CSMP) will be required.

A consent under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) will most likely be required due to the large volumes of earthworks and potential off-site disposal of surplus soil expected across the Site.

During the earthworks and construction phases, there is a minor chance of ground contamination occurring from diesel and/or oil leaks and spills from the equipment that will be used on the Site, although these would generally be expected to be limited in extent.

There are several HAIL activities associated with a railway hub that will be ongoing once the project moves into the operational phase. Effects of these HAIL activities can be largely mitigated through appropriate project Site design. This can be addressed in more detail at a later stage once more is known about these Freight Hub design aspects.

Abbreviations

CEnvP	Certified Environmental Practitioner
CLMG	Contaminated Land Management Guidelines
CSMP	Contaminated Site Management Plan
EDOD	Engineering Degree of Difficulty
DSI	Detailed Site Investigation
HAIL	Hazardous Activities and Industries List
HRC	Horizons Regional Council
MCA	Multi Criteria Analyses
MDC	Manawatu District Council
MfE	Ministry for the Environment
NESCS	National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
NIMT	North Island Main Trunk
PAHs	Polycyclic aromatic hydrocarbons
PNCC	Palmerston North City Council
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance and Quality Control
SQEP	Suitably Qualified and Experienced Practitioner

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1. Introduction

1.1 Scope of Preliminary Site Investigation

Stantec New Zealand (Stantec) has been commissioned by KiwiRail to undertake a Preliminary Site Investigation (PSI) also known as a Contaminated Land Assessment for the KiwiRail Palmerston North Regional Freight Hub. Approximately 177.7ha of land is proposed to be developed into a new inland railway hub and associated roads, landscape, and stormwater management areas. Further details regarding the proposed works are provided in Section 1.2.2.

1.1.1 PSI Methodology

This desktop PSI fulfils the reporting requirements for assessment of contaminated land effects against the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations 2011 (NESCS).

This PSI has been prepared in general accordance with the Ministry for the Environment's *Contaminated Land Management Guidelines No 1: Reporting on Contaminated Sites in New Zealand* and has been prepared and reviewed by persons considered to be suitably qualified and experienced practitioners (SQEP), in accordance with the NESCS.

In order to identify the likelihood of encountering contaminated soil within the proposed project area, a systematic desktop assessment of historical and current land uses has been carried out to narrow down the type, location and possible pathways of potential contaminant exposure with respect to the project.

This assessment has relied on:

- Palmerston North City Council (PNCC) online GIS maps, HAIL listings and related documents;
- Manawatu District Council (MDC) online GIS maps, HAIL listings and related documents. The Site falls outside of the MDC boundary, but MDC records were checked for neighbouring land use records;
- Horizons Regional Council (HRC) online GIS viewer and communication with HRC for HAIL files;
- Certificates of Title information available through Land Information New Zealand (LINZ) and EMap for land ownership;
- Aerial photography review including historic images (Retrolens) indicating land uses at properties on the Site; and
- Relevant technical reports as part of this Notice of Requirement, namely the Geotechnical and Stormwater Assessments.

1.2 Outline of Project

1.2.1 Project Location

The proposed works will be undertaken on land north of the Palmerston North Airport, south of the township of Bunnythorpe and immediately west of Railway Road. Figure 1-1 shows the Site location and the Designation Extent.

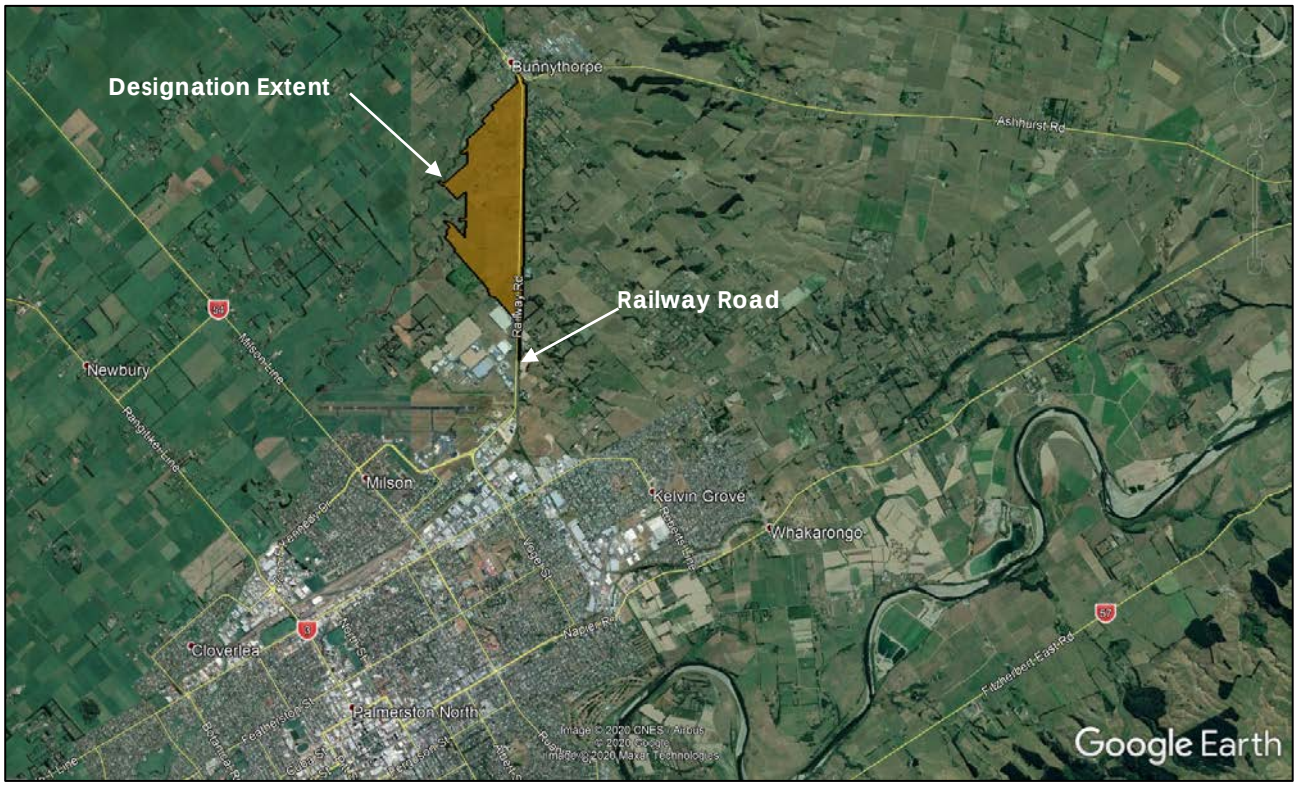


Figure 1-1: Site Location and Designation Extent (identified in orange) Source: Google Earth

1.2.2 Project Description

The project involves the development of approximately 177.7 ha of land to enable the construction and operation of KiwiRail's Regional Freight Hub). The Freight Hub is an intermodal freight facility that connects the rail network with the road transport system.

KiwiRail's objectives in developing a rail Freight Hub in or near Palmerston North on the North Island Main Trunk line are to:

- increase its operational capacity to efficiently accommodate projected regional and national freight growth and support wider regional development;
- enable rail to be integrated with, and connected to, other transport modes and networks; and
- improve the resilience of the regional and national freight transport system over time.

1.3 Assumptions and Exclusions

The following assumptions and exclusions have been made while compiling this report:

- A site visit was not undertaken in preparing this report due to various constraints, including time delays from the Covid-19 pandemic, and the report was therefore undertaken on a desktop basis. It should be noted we do not consider that this has had a major influence on our confidence in this assessment.
- We are reliant on the most recent HAIL site data from Horizons Regional Council, Manawatu District Council and Palmerston North City Council and we assume this information is up to date and accurate.
- Exact locations of small-scale HAIL activities such as sheep dip/spray races and burn pads were not identified in this report due to reporting constraints.

1.4 Project Shaping

Contamination was considered as part of the engineering degree of difficulty (EDOD) criterion during all stages of the Multi Criteria Analysis (MCA) used by KiwiRail to identify the preferred site location (from nine sites) now proposed for the Hub, as summarised in the MCA report[1]. For contamination, consideration was made under three key subcategories namely:

- The presence of known contaminated land
- The expected difficulty of remediation
- The risk of contamination / discharges to the environment

The selected Site (Site 3) was identified in the MCA as having low impacts in terms of contamination and under the EDOD criterion had a reasonable level of complexity.

[1] Multi Criteria Analysis and Decision Conferencing Process Summary Report. Stantec. 2020. Reference number 310003007

2. Land Uses

2.1 Current and Surrounding Land Uses

A review of aerial imagery shows that the Site is predominantly comprised of rural land which appears to be used for cropping and/or grazing, of which some is consistent with 'hobby-type' farming activities. Various dwellings and farm buildings are found interspersed around the Site, with a grouping of lifestyle blocks along Clevely Line in the northern part of the Site.

The northern part of the Site is zoned in the PNCC District Plan as Rural with the southern part of the Site zoned North East Industrial. Various unformed roads cross the northern part of the Site. The PNCC lists both zones as 'last reviewed' on September 2016. Figure 2-1 shows the proposed site area on the relevant PNCC District Plan map.

Figure 2-1: Approximate Location (black) of the Site Shown on the PNCC District Plan Map

The land use surrounding the project area is also predominantly rural, interspersed with areas of rural residential land. The project is bounded by land zoned by the PNCC as *Rural* with the south part of the site bounded *North East Industrial* zoned land, though it was not fully developed as industrial at the time of writing this report. Bunnythorpe Village is located just north of the site and includes general community establishments such as a tavern, dairy, rugby club, school and residential areas. The Bunnythorpe Cemetery is also a designated site located immediately to the north of the project Site as is the designated wastewater treatment pond to the northwest (accessed from Te Ngaio Road).

Bunnythorpe has had a history of industrial activity and it was the birthplace of the Glaxo company. The land occupied by Glaxo's factory for drying and processing cows' milk is located between Campbell Road, Dutton Street and Ashurst Road and was subsequently used by Pantha BMX as a manufacturing plant for its BMX bikes through 2006. The Site is currently used as a contractor's yard. Transpower's main switching point for the lower-central North Island is located on the north-eastern side of Bunnythorpe on a designated 16 ha block of land zoned rural.

2.2 Proposed Land Use

The Freight Hub will include key operational features such as:

- marshalling yards including arrivals and departure tracks to accommodate trains up to 1,500m in length, signals, overhead line equipment and other associated track assets including safety lighting (low level, street and tower)
- container terminal
- wagon storage
- maintenance and network services facilities
- freight forwarding facilities
- log handling
- bulk liquid storage
- stormwater management areas, with associated planting
- noise management areas, with associated planting
- access roads
- buildings and other activities ancillary to the Freight Hub.

The Freight Hub is expected to operate 24 hours a day and seven days a week, with lighting installed within the rail operational areas. These Freight Hub activities on the whole constitute industrial land use and therefore the NESCS classification for *commercial/industrial* land use is appropriate for the future assessments.

3. Existing Environment

3.1 Geology

The geology for the Site in the context of the regional geology is presented on the GNS Geology of the Wairarapa area QMAP. An extract of the geological map for the study area is presented in Figure 3-1 below.

The land at the location is predominately mapped as Q3 alluvium (river deposits) consisting of poorly to moderately sorted gravel with loess, sand and silt. There is a topographically low area that crosses east to west through the middle of the Site. This area, along with the north-west part of the Site, is mapped as younger Q1 river deposits consisting of alluvial gravel, sand, silt, mud and clay with local peat; includes modern riverbeds. This unit is likely to have comparatively poor engineering properties as well as higher groundwater levels.

Please refer to Stantec's Geotechnical Report[2] for further details.

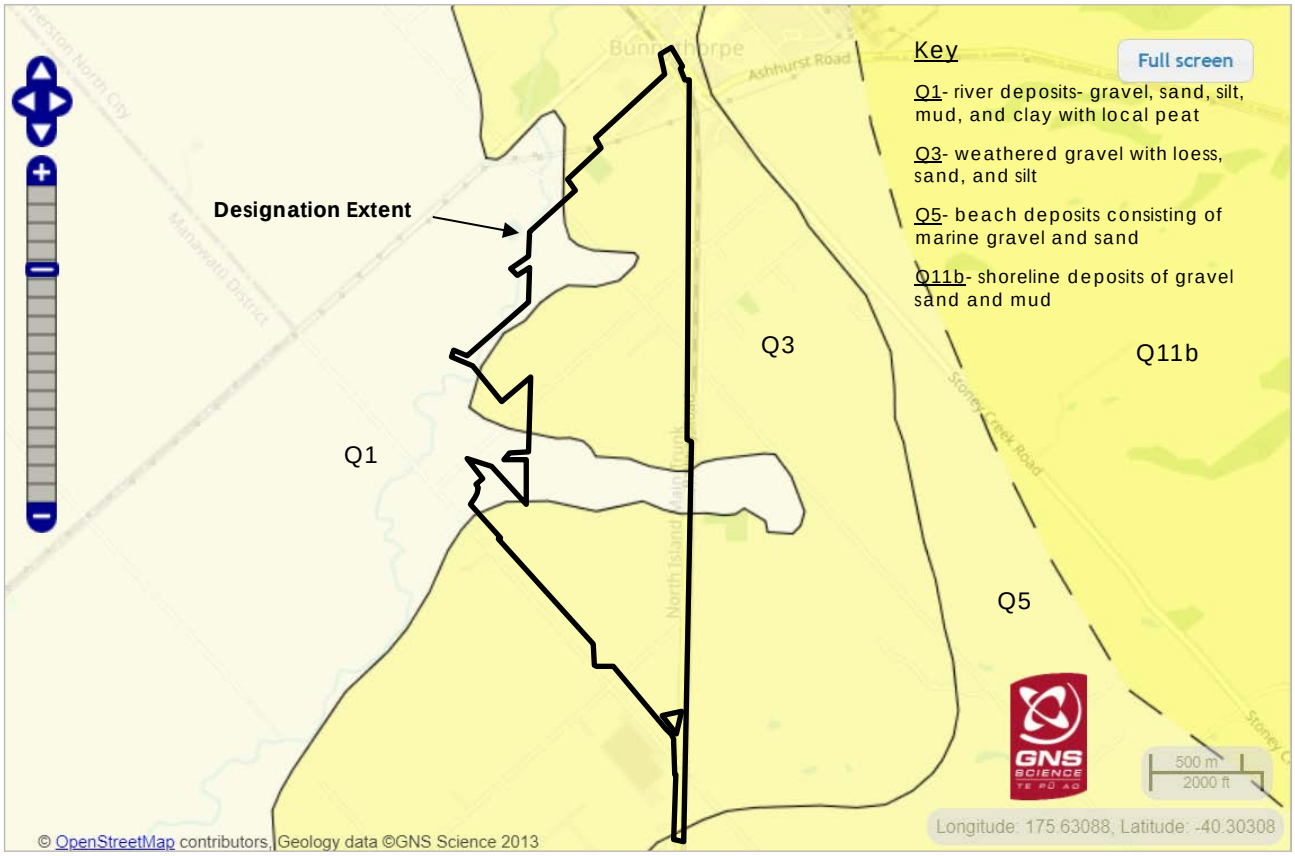


Figure 3-1: GNS Geology of the Manawatu Area

3.2 Hydrology

From a stormwater perspective, the existing environment of the Site can be described as flat to rolling countryside with predominantly rural pastoral existing land uses.

The Site is a part of the wider Mangaone Stream catchment. Catchments in the order of 1,200Ha in total drain through the Site from east of Railway Road and the NIMT, draining to the Mangaone Stream to the west of the Site. The predominant land use of this contributing catchment is rural pastoral.

[2] Preliminary Geotechnical Appraisal Report Palmerston North KiwiRail Hub. Stantec. 2020. Reference number 310003007

Flood levels and extents on the Site are influenced by the flows through the Site but also by the flood levels and flooding from the Mangaone Stream. The Mangaone Stream starts well north of the Freight Hub and drains to the west of the Site. The total catchment area to the downstream connection point from the hub Site is around 15,000Ha. It is the existing receiving system for stormwater flows from, through and adjacent to the Freight Hub. Please see Figure 3-2 below for an indication of the steams traversing the Site.

Please refer to Stantec's Stormwater Assessment[3] for further details.

3.2.1 Existing Bores

Sixteen existing boreholes are located on and near the Freight Hub. Groundwater monitoring will be required during the development of the Site and these bores would be available for groundwater monitoring as needed. If an existing bore is within an area of proposed earthworks, then those bores will need to be appropriately capped prior to the start of the earthworks program to ensure they do not become conduits for contamination to reach groundwater. Please refer to Figure 3-2 for bore locations and Table 3-1 below for a summary or each bore.

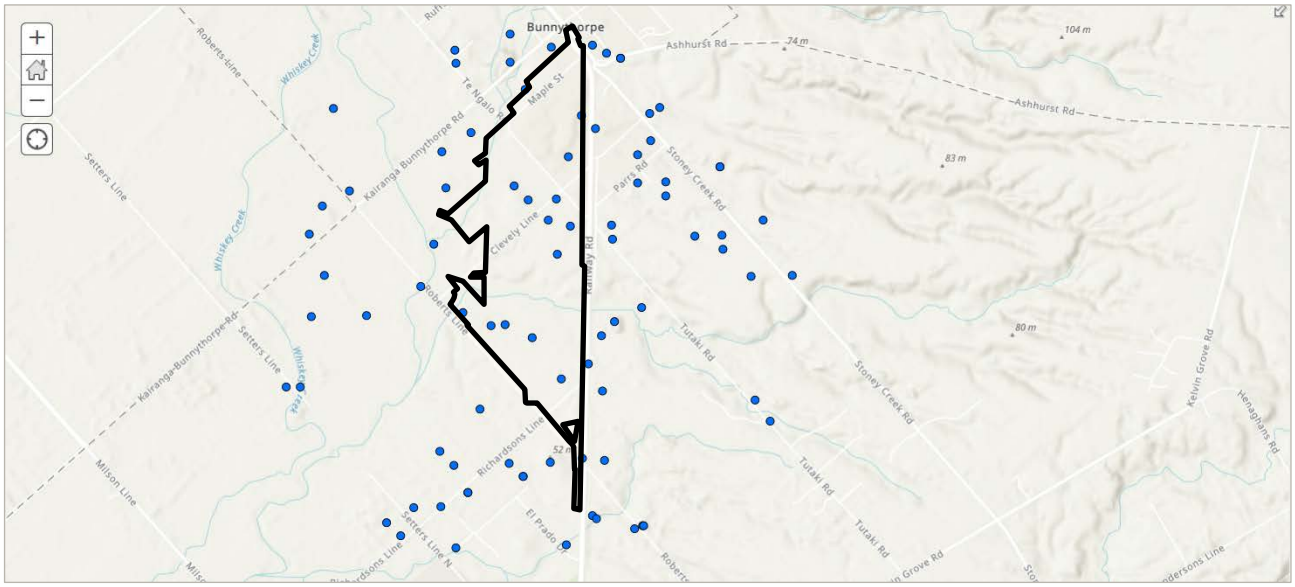


Figure 3-2: Location of Known Bores (© HDC) in and around the Designation Extent

Table 3-1: Details for Existing Bores

Map Reference	Depth (m)	Depth to GW (m)	Owner	Purpose
T24:336-962	254	17.3	PNCC	Public supply
T24:335-968	N/A	N/A	A Rowlands No2	N/A
T24:337-969	N/A	N/A	J De Boer	N/A
T24:333-971	18	N/A	H Gray No3	N/A
T245:331-972	N/A	N/A	H Gray No2	N/A
T24:330-972	38	N/A	H Gray No1	N/A
T24:335-977	45	N/A	Rangitoto Develts	N/A
T24:336-979	45	N/A	R Clevely No2	N/A
T24:334-979	50	2.0	RC Isles	N/A
T24: 335-981	20	N/A	R Clevely No1	N/A
T24:333-981	N/A	N/A	H Gray No4	N/A
T24:332-982	31	N/A	E Gore No4	N/A

[3] Preliminary Stormwater Assessment Palmerston North KiwiRail Hub. Stantec. 2020. Reference number 310003007

Map Reference	Depth (m)	Depth to GW (m)	Owner	Purpose
T24:336-984	N/A	N/A	Stanford	N/A
T24:337-987	31	N/A	E Gore No5	N/A
T24:328-973	48	0.3	HP Grey Estates	N/A
T24:338-986	21	N/A	Grant	N/A

Note: Bore T24:336-962 is excluded from the Designation Extent.

4. Summary of Current or Historic Potentially Contaminating Activities

4.1 Hazardous Activities and Industries List (HAIL) Sites

HAIL was developed by the Ministry for the Environment (MfE) as a compilation of activities and industries that are considered likely to cause land contamination resulting from current or historic hazardous substance use, storage or disposal. The list is intended to assist with the identification of locations where hazardous substances may have caused land contamination.

A review of available information from the local councils; HRC, MDC and PNCC on their respective GIS websites, did not show any HAIL sites recorded within the Designation Extent.

Two HAIL sites were identified by the PNCC as being within 200m of the Designation Extent. These are:

- The Bunnythorpe cemetery (HAIL G1), which is located immediately adjacent to the Freight Hub to the north. Contaminants of concern associated with cemeteries are lead, mercury, and nitrates. It would be unlikely for any of these contaminants to migrate into the project area at concentrations that would cause significant contamination within Designation Extent.
- The Bunnythorpe Wastewater Treatment Plant (HAIL G6), has been decommissioned since 2014 and the wastewater flows now go directly to the Palmerston North WWTP at Totara Road. It is possible, although very unlikely, that trade waste flows having chemical wastes within them have contaminated the soil at the WWTP. The residual risk from the decommissioned plant with respect to soil contamination is extremely low. The ponds were backfilled in 2020.

Figure 4-1 shows the location of the identified HAIL sites along with the Designation Extent.

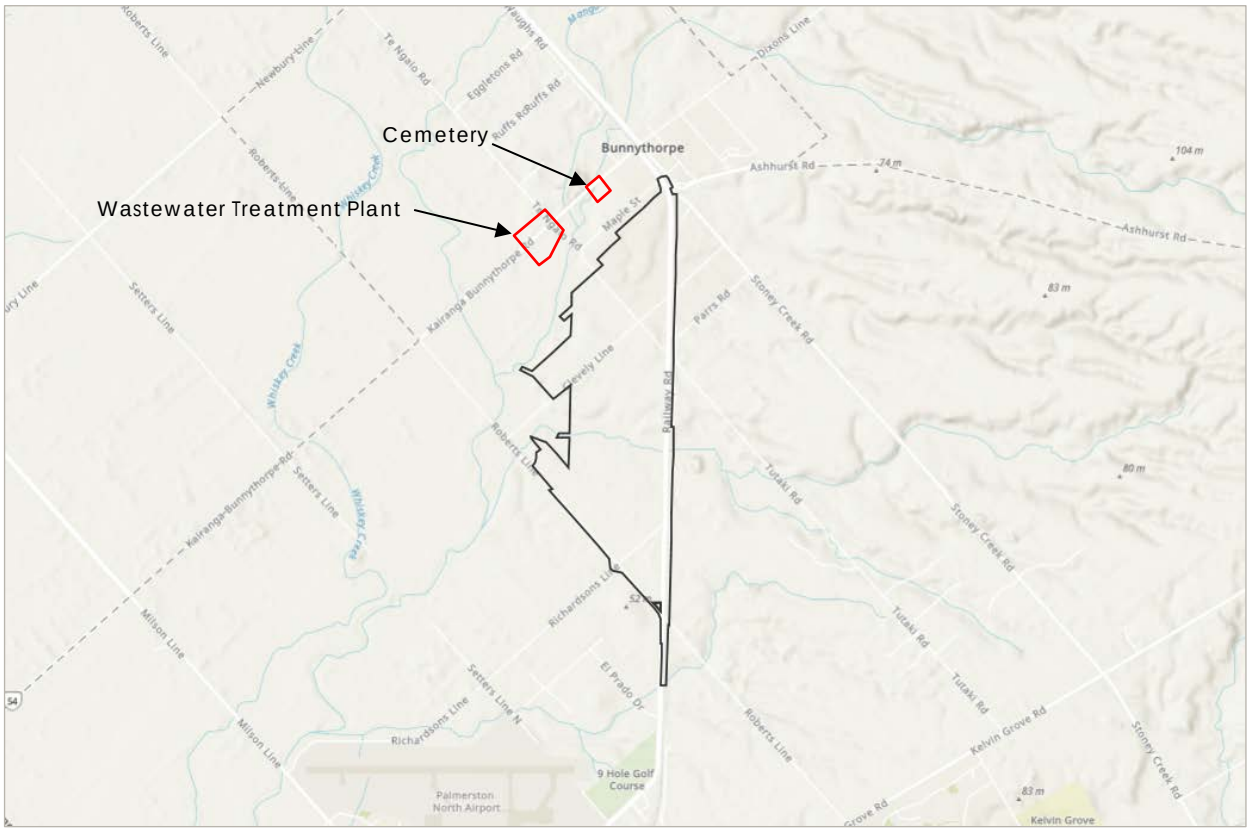


Figure 4-1: Location of HAIL Activities Identified (outlined in red) from PNCC GIS Data

4.2 Information from Resource Consents

A review of relevant resource consents from Horizons District Council was completed for this assessment. One resource consent has been issued within the project boundary. This is for an activity which is located within the southern part of the Site. Details of the consent are listed below:

- Consent ATH-2018202441.00 permits the construction of a new truck washing facility. The consent expired in August 2020 and based on the most recent aerial imagery on Google Earth (February 2020), the truck wash facility has not been constructed.

Within 100m of the Designation Extent (but outside it) there are four resource consents held for various activities. Consent ATH-1992004997.00 permits the discharge of treated effluent from a septic tank located to the north of the Site. Three additional consents are related to the PNCC water bore, which is adjacent to the Site to the south. The three consents relate to the taking and use of groundwater for various purposes. In our opinion, based on experience it is unlikely that any of these activities have led to ground contamination within the Designation Extent.

4.3 Findings from Aerial Photographs

Historic aerial photographs were accessed from Retrolens[4] and Google Earth[5]. A selection of historic aerial photographs reviewed is attached in Appendix A, with the Designation Extent marked. Note that the aerial photographs were reviewed electronically and therefore the imagery was clearer than in the PDFs attached in Appendix A. Table 4-1 below summarises the observations made for each historic aerial photograph.

Table 4-1: Historic Aerial Photographs Summary

Year	Comment
1952	Land uses are predominantly rural in nature with most of the site cropped and/or grazed. Scattered rural residential dwellings and farm buildings are present across the site. Imagery from this date only covers the southern portion of the site.
1968	Land uses are generally unchanged from previous imagery. The site is predominantly rural with most of the site cropped and/or grazed, with scattered rural residential dwellings and farm buildings.
1982	Land uses are generally unchanged from previous imagery. Imagery from this date only covers the northern portion of the site.
2001	Additional residential properties are now visible in the north part of the site.
2011	Land uses are generally unchanged from previous imagery.
2015	Additional development of residential properties is visible along Clevely Line in the northern part of the site.
2020	Land uses are generally unchanged from previous imagery.

4.4 Commonplace Rural HAIL Activities

Certain HAIL activities have historically been commonplace in rural environments across New Zealand and these would be expected within the Designation Extent. Sheep dips and/or spray races (HAIL A8) were commonly used in rural New Zealand to treat sheep with chemical insecticides for economic and animal welfare reasons. These dips/spray races and the surrounding land areas may typically be impacted by contaminants such as arsenic, DDT and dieldrin. Parts of the Site have also been used for dairy farming though no specific HAIL activities directly relate to dairy farming.

[4] http://retrolens.nz/. Retrieved August 2020
[5] https://www.google.com/earth/. Retrieved August 2020

It has also been common practice in rural environments for general rubbish and treated timber to be disposed of by burning, along with other organic matter, as a means of disposal. These burn areas are generally called burn pads (HAIL G5) and typically result in the soil immediately below and surrounding the burn pads being impacted by arsenic, lead, and other contaminants. Due to the discrete nature of burn pads, impacted areas are usually restricted to well defined visually blackened areas of soil.

It would be expected that both of these types of HAIL activities have taken place on a 177.7 ha rural project Site such as this. Exact locations of these small-scale activities were not however specifically identified in this report as this was a desktop study.

5. Assessment of Contamination Risk

Table 5-1 below summarises the activities identified as potentially occurring within the Designation Extent, as determined by this desktop investigation. The table lists the HAIL activities and provides comments as to whether it is considered likely that any contaminants, if present, could potentially pose a risk to human health or the environment.

Table 5-1: Summary of Contamination Risks

Identified HAIL Activity	HAIL Description	Receptor(s)
A8: Livestock dip or spray race operations	Historical sheep dip/spray race sites are typically contaminated due to the persistent and toxic chemicals used. The main contaminants of concern are arsenic, dieldrin and DDT. Arsenic, DDT and dieldrin might all possibly be found due to their environmental persistence, and concentrations can often exceed the recommended human health or environmental criteria. Contaminants are likely to be found in and around sheep dip locations and within soils immediately surrounding pens as treated animals drip surplus solution onto the ground. Once the chemical solution has dried on the sheep the pathway for contaminants to enter the soil is broken. Therefore, it is unlikely that this activity will have led to wide-spread contamination across the Designation Extent.	Site workers during the construction phase of any future earthworks. Dust may land on roofing of neighbouring properties where roof water may be collected for use as drinking water. The receiving environment of any removed soil.
G5: Waste disposal to land (burn pads)	In rural New Zealand, the burning of rubbish on burn pads has historically been commonplace. If recently used, these burn pads can often be identified by the blackened soil present. Burning of various materials may leave residues that contain contaminants in significant concentrations, including possibly lead and arsenic. These burn residues are generally limited to shallow depths at discrete locations. It is highly unlikely however that this activity will have led to widespread contamination across the Designation Extent.	Site workers during the construction phase of any future earthworks. Dust may land on roofing of neighbouring properties where roof water may be collected for use as drinking water. The receiving environment of any removed soil.

6. Assessment of Effects of Railway Hub Development

The potential effects of developing the Freight Hub have been evaluated based on the findings of this report. The section below describes positive and adverse effects related to contaminated land.

6.1 Positive Effects

The removal of contaminated material as part of this development will have a general positive effect on the Site, as the possibility of any contaminants impacting human or sensitive environmental receptors such as groundwater and / or surface water will be eliminated or mitigated through these site development works.

6.2 Adverse Effects During Earthworks and Construction

To prepare the land for the construction of the Freight Hub, a large volume of earthworks will be required. These earthworks will require significant amounts of machinery to be brought in. Each piece of machinery has the possibility to have diesel and/or oil spills through operation or refuelling activities. Given that the machinery would be assumed to be modern and appropriately maintained, soil contamination caused by the operation of earthworks machinery would generally be expected to be limited in extent.

Additionally, dust created during the earthworks and construction phase has the potential to cause adverse effects on the surrounding environment and on neighbouring properties that rely on roof collection of rainwater for water supply.

In relation to the HAIL activities identified across the Designation Extent, adverse effects may occur due to the development of the Freight Hub by creating a previously unconnected pathway between the source and receptor during the construction phase when soil disturbance is likely to take place. Please refer to Section 7.4 for more details.

6.3 Adverse Effects During Operation

Once the Freight Hub is operational, there are several HAIL activities that will be taking place on the Site; these have the potential to give rise to adverse effects during the operation of the Freight Hub. A railway yard is in itself a HAIL activity (HAIL F6) and includes activities such as goods-handling yards, workshops, refuelling facilities and maintenance areas. Contaminants such as diesel and oil will potentially be released from the locomotives along the railway tracks and in the fuel storage areas, In addition, cleaning chemicals, fuel and lubricants from the rolling stock maintenance yard could potentially enter surface water through wash bays and drainage channels that in turn could result in soil contamination.

Dust and exhaust emissions may also be created through the movement of heavy machinery around the Site.

It is assumed that there will be a commercial refuelling facility associated with the railway yard and this is also a HAIL activity (HAIL F7). The land used for refuelling of machinery and locomotives and underground or above ground storage tanks could be susceptible to fuel spills or leakages. The design of these facilities must follow established best practice and compliance with all relevant regulatory requirements.

It is further assumed that the railway yard will also double as a transport depot which is another HAIL activity (HAIL F8). Any storage areas for potentially hazardous goods stored temporarily or permanently at the transport depot could potentially result in ground contamination. Please refer to Section 6.4 below for more details.

6.4 Assessment of Adverse Effects

Please refer to Table 6-1 below for a summary of potential effects of existing HAIL activities and Table 6-2 for a summary of potential effects of future HAIL activities.

Table 6-1: Assessment of Adverse Effects During Construction

HAIL Activity	Contaminants of Concern	Contaminant location	Potential Adverse Effects	Options for Avoiding or Mitigating Effects
HAIL A8: Sheep dip/spray race sites	Arsenic, dieldrin, DDT	Contaminants are likely to be found in and around the sheep dip/spray race but also within the surrounding pens as animals drip surplus solution onto the ground. Contamination is likely limited to shallow soils. Specific sheep dips/spray races within the Designation Extent have not been identified in this report. This should be done at a later stage in development.	Dermal contact, ingestion and inhalation exposure to workers and members of the public Improper soil management Sediment run-off	Further investigation to identify any sheep dips/spray races through a DSI to assess actual contamination levels through laboratory analysis of samples. This will guide any future controls needed, such as a CSMP, for soil disturbance within these areas during site works. Dust control measures Erosion and Sediment Control Plan Further investigations regarding appropriate soil disposal options
HAIL G5: Burn pads	Trace elements, PAH, asbestos	The burning of material leaves contaminated residues within shallow soils. These burn residues are often visible due to their dark colour. Contamination associated with them is generally limited to the area of the burn pad. Specific burn pads within the Designation Extent have not been identified in this report. This should be done at a later stage in development.	Dermal contact, ingestion and inhalation exposure to workers and members of the public Improper soil management Sediment run-off	Further investigation to identify any sheep dips/spray races through a DSI to assess actual contamination levels through laboratory analysis of soil samples. This will guide any future controls needed, such as a CSMP for soil disturbance within these areas during site works. Dust control measures Erosion and Sediment Control Plan Further investigations regarding appropriate soil disposal options
Onsite Machinery (Not HAIL)	Hydrocarbons	Diesel and/or oil leaks are possible from any of the machinery brought in for earthworks or construction phases of the project.	Dermal contact, ingestion and inhalation exposure to workers Hydrocarbons may enter surface or ground water	Use of modern appropriately maintained machinery. Refuel in designated purpose-built refuelling stations constructed to modern standards. Any refuelling areas will need to be paved and bunded where appropriate to reduce the risk of any spilled fuel entering ground or surface water.

Table 6-2: Assessment of Adverse Effects During Operation

HAIL Activity	Contaminants of Concern	Contaminant location	Potential Adverse Effects	Options for Avoiding or Mitigating Effects
HAIL F6: Railway Yards, including goods-handling yards, workshops, refuelling facilities or maintenance areas	Hydrocarbons, Fossil fuel combustion products (PAHs), solvents, metals	Diesel and oil spills are possible from the locomotives along the railway tracks and within fuel storage areas. Cleaning chemicals, fuel and lubricants from the rolling stock maintenance yard. Contaminants could enter surface water through wash bays and drainage channels could lead to ground contamination. More will be known once more detailed design information is available. Dust may be created through the movement of heavy machinery around the site.	Dermal contact, ingestion, and inhalation exposure to workers Contaminants of concern could enter soils and/or surface or ground water Dust may land on roofing of neighbouring properties where roof water may be collected for use as drinking water.	Effects can be largely mitigated through appropriate project design, specifically any areas of the railway yard that may have the potential to lead to site contamination. Areas where high vehicle traffic may occur should be paved to avoid the creation of excess dust.
HAIL F7: Commercial Refuelling Facilities	Hydrocarbons, BTEX, PAHs, lead	Land used for refuelling of machinery and locomotives and underground or above ground storage tanks could be susceptible to fuel spills or leakage. More will be known once more detailed design information is available.	Dermal contact, ingestion, and inhalation exposure to workers Contaminants of concern may enter surface or ground water	Effects can be largely mitigated through appropriate project design, specifically any areas of the refuelling facilities that may have the potential to lead to site contamination.
HAIL F8: Transport depots	Wide variety of chemicals, depending on what is being transported	Any storage areas for potentially hazardous goods stored temporarily or permanently at the transport depot could potentially cause ground contamination from leakages. More will be known once more detailed design information is available.	Dermal contact, ingestion, and inhalation exposure to workers Contaminants of concern may enter surface or ground water	Effects can be largely mitigated through appropriate project design, specifically any areas of the transport depot that may have the potential to lead to site contamination.

7. Conclusions and Recommendations

The Site comprises of a large block of predominantly rural land with scattered areas of residential land use. Associated with the historical rural land use, two HAIL activities have been identified as likely having occurred within the Designation Extent. These two activities are sheep dips/spray races (HAIL A8) and burn pads (HAIL G5). Both activities have the potential to have led to discrete areas of soil contamination.

Potential receptors for these contaminants would be the site workers during any future site development due to ingestion or possibly inhalation of small particles of dust or soil from contaminated areas. If soil is to be removed from the Site, any soil from an identified HAIL location may not meet the requirements for disposal or reuse at another site. Additional receptors could be workers or the environment if contaminated soil is not appropriately assessed and managed before it is moved off site. Further investigations into sheep dips/spray races and burn pads are recommended to confirm whether or not these activities have taken place and to identify specific HAIL locations within the Site.

No additional HAIL activities were discovered within the Designation Extent during this desktop investigation.

Further investigations will likely include a detailed site investigation (DSI) with soil sampling prior to the project works commencing. This parameters of this will be assessed once the project design details have been confirmed and the volumes of soil disturbance likely to be required have been clarified. The DSI will inform whether a Contaminated Site Management Plan (CSMP) will be required.

A consent under the NESCS will most likely be required due to the large volume of earthworks and potential off-site disposal of surplus soil expected across the Site.

Various activities have been identified in the earthworks and construction phases of development that have the possibility of resulting in minor ground contamination occurring at the Site. With the use of modern and well-maintained machinery and best practices around the operation of this machinery, it is likely that these effects will be no more than minor.

Once constructed, the Freight Hub will have several identified HAIL activities occurring on an ongoing basis. These activities will need to be considered in more depth once the detailed design parameters are known for the Site. It is expected that any negative impacts from these activities can be minimised in scale by appropriate design criteria and mitigation measures. It is recommended that the existing bores within the Designation Extent and surrounds should be utilised in order to monitor potential groundwater contamination.

Statement of Limitations

Stantec New Zealand (Stantec) has prepared this report for the use of the KiwiRail in accordance with the usual care and thoroughness of the consulting profession. It has been prepared in accordance with the scope of work and for the purpose outlined in this report. It is based on accepted practices and standards at the time it was prepared. No other warranty, express or implied, is made as to the professional advice included in this report. Stantec makes no determination or recommendation regarding a decision to provide or not to provide financing with respect to the site.

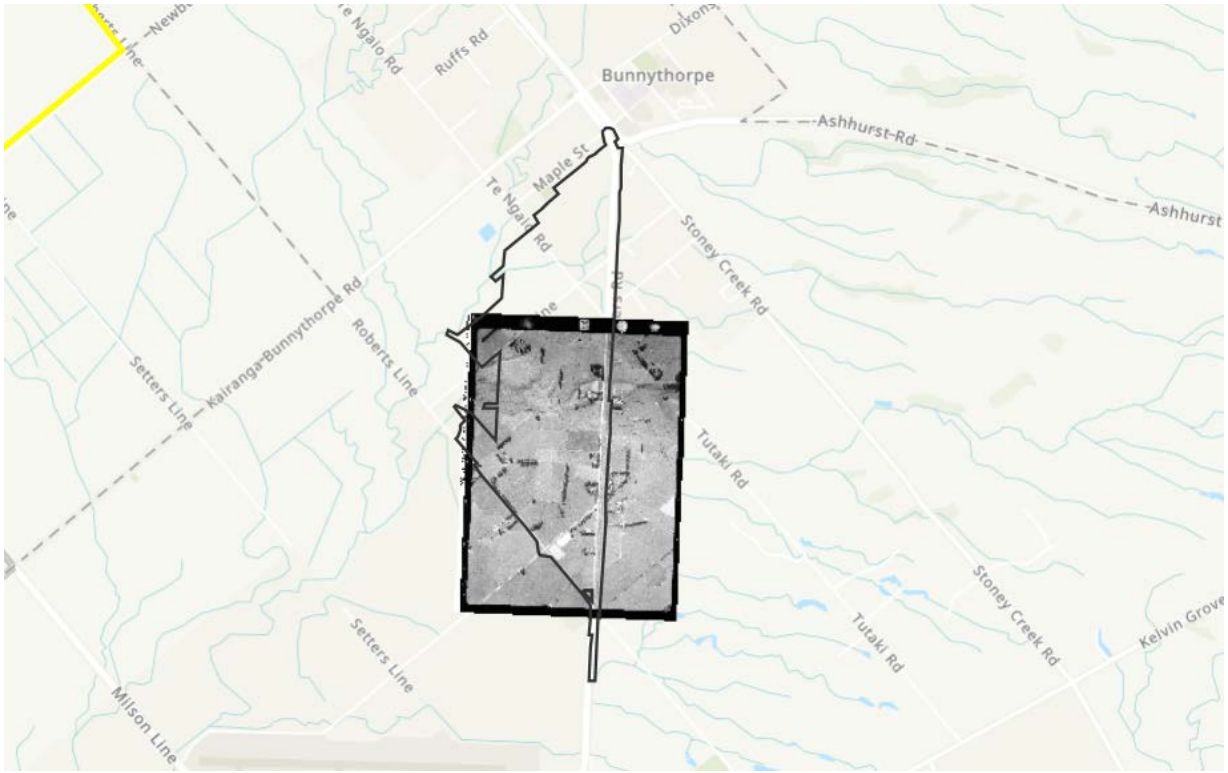
There is no investigation that is thorough enough to preclude the presence of materials at the site which presently, or in the future, may be considered hazardous. As regulatory evaluation criteria are subject to change, concentrations of contaminants present and considered acceptable may, in the future, become subject to different regulatory standards which cause them to become unacceptable and require remediation for the site to be suitable for the existing or proposed land use activities.

The methodology adopted, and sources of information used by Stantec are outlined in this report. Stantec has made no independent verification of the information beyond the agreed scope of works and Stantec assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to Stantec was false.

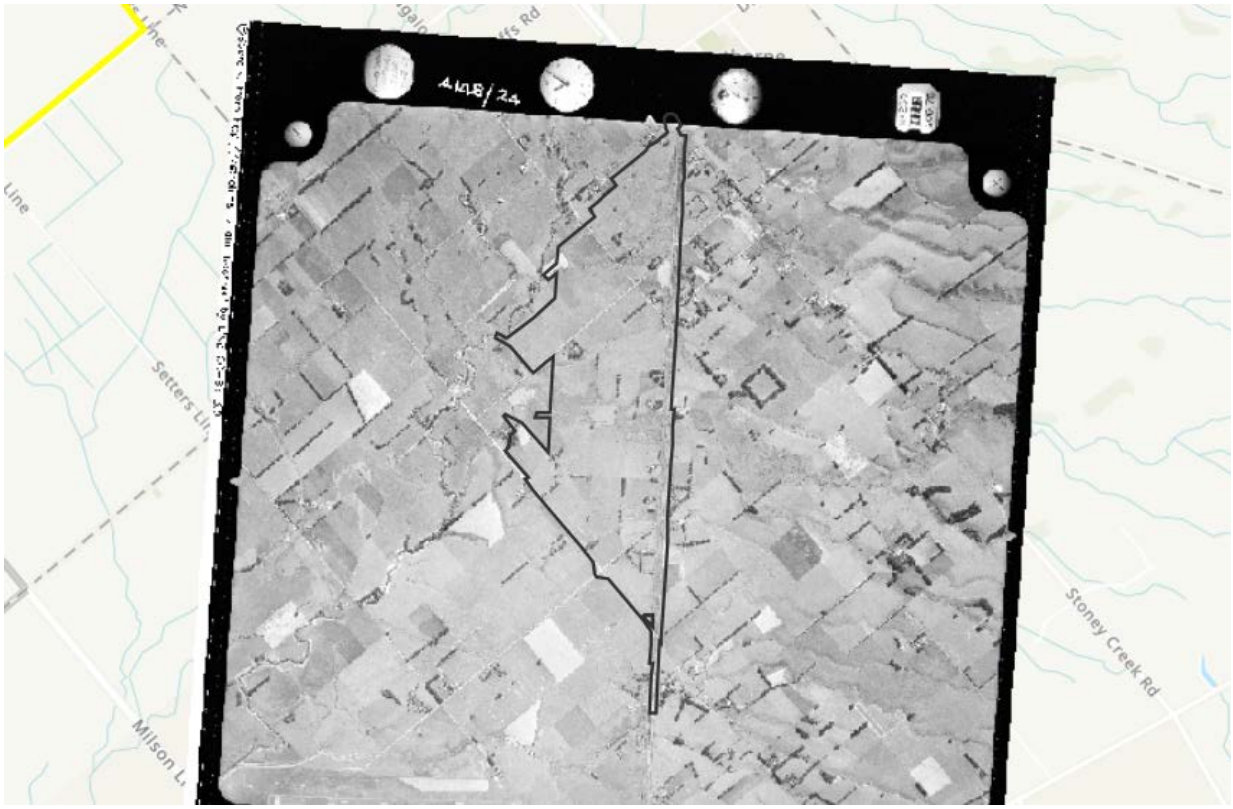
This report was prepared in September 2020 and is based on the information reviewed at the time of preparation. Stantec disclaims any responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

Appendix A Historical Aerial Photographs

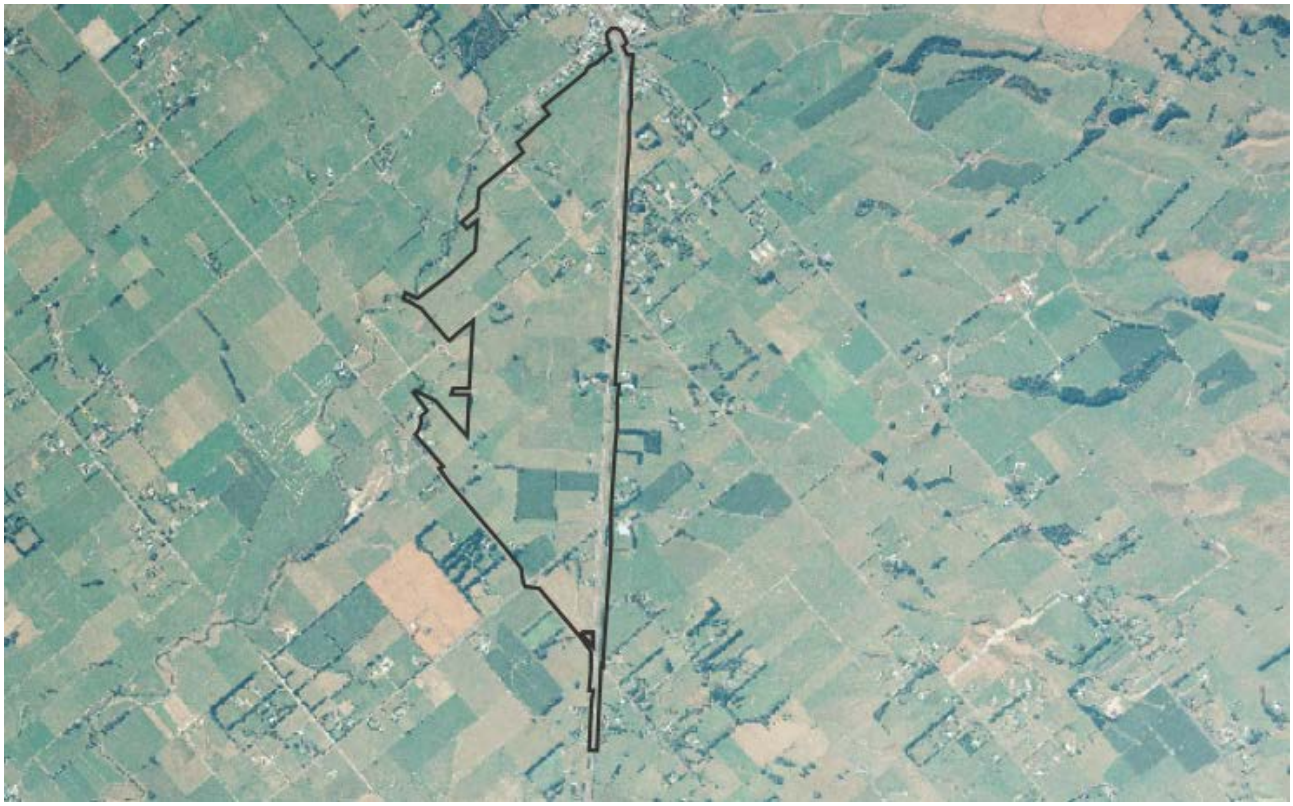


1952 Aerial Photograph

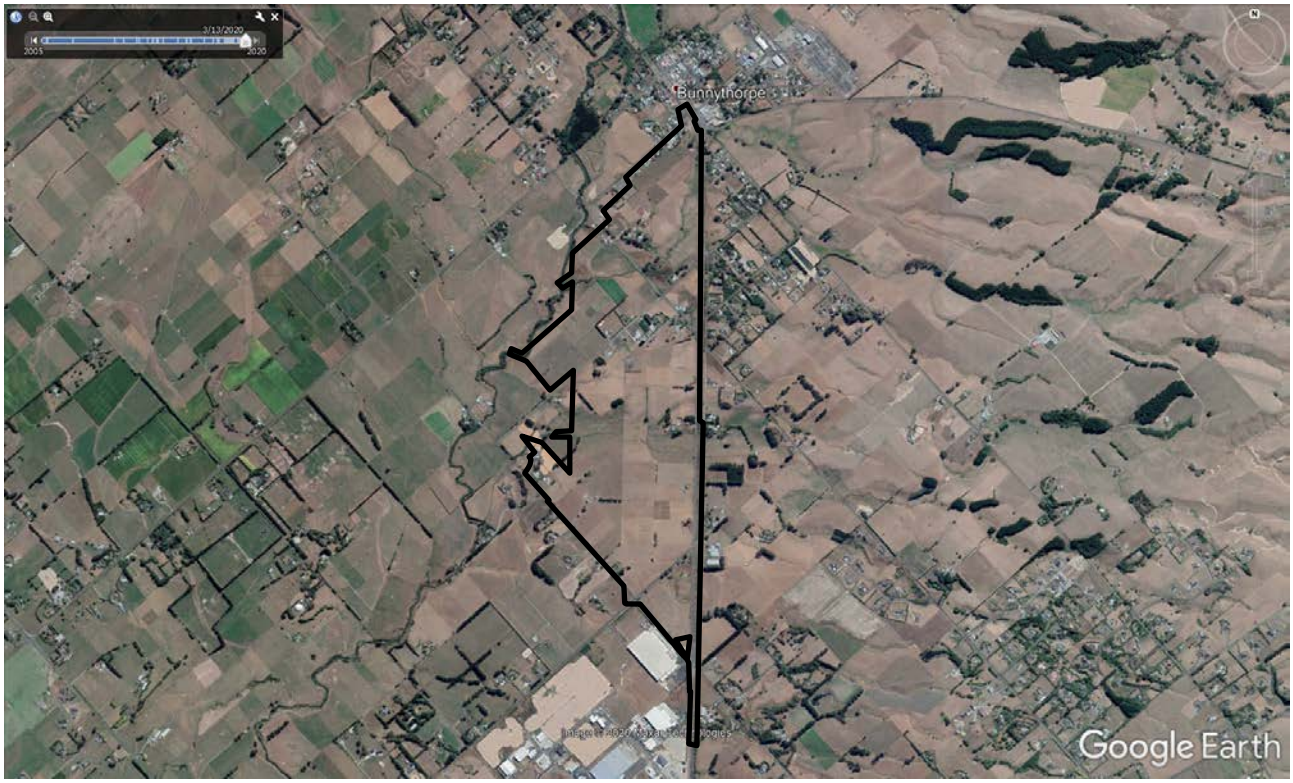


1968 Aerial Photograph

1982 Aerial Photograph



2001 Aerial Photograph



2020 Aerial Photograph